Techman Plugin Quick Start Manual

Model Name: ARH305B Rev. 0.00



R Plexmotion

Shinano Kenshi Co., Ltd.

1. Installation



•If a plug-in from another company is installed, the robotic gripper may malfunction. Please uninstall unnecessary plugins first.

1.1. Installation Instructions

- 1. Connect the USB device with the downloaded component to the robot controller.
- 2. Click Import/Export from the system menu.



3. Select the Import button.



4. Select the robot and click the OK button.

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Ф ТСР		Robot List					
Command		TMComponents					
馅 Component							
Point Base							
Operation Space							
Var Global Variable							
🟹 Path							
% Motion Record	Ľ	ОК	Cancel				
(D) Modbus	Device 0 ¥USB¥TMROBOT	•	Free Space:	5727 MB			Import

5. Select a component from the import list.

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입 Component								
Point Base								
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🐺 Path								
% Motion Record								
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6. The component appears in the file list.

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₽⇔ Project	GRIPPER_ASPINA_ARH305COM_V100_CLOSE.z				
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Command					
价. Component					
Point Base					
Operation Space					
Var Global Variable					
🔀 Path					
% Motion Record					
😟 Modbus	Device 0 ¥USB¥TMROBOT	Free Space:	7320 MB		mport

7. Select all components in the file list, confirm that they have been moved to "Selected Files", and press the Import button.



8. Confirm that the process is successful and press the OK button.

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Import Export Select files TMComponents	Selected files
<u>₽</u> [*] Project	Component GRIPPER_ASPINA_ARH305COM_V100_CLOSE.zip
	Component GRIPPER_ASPINA_ARH305COM_V100_OPEN.zip
О ТСР	Component GRIPPER_ASPINA_ARH305COM_V100_SET.zip
	Component GRIPPER_ASPINA_ARH305IO_V100_MOVE.zip
Command	Component GRIPPER_ASPINA_ARH30SIO_V100_SELZIP
쓋) Component	OK .
Point Base	OK.
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🖓 Path	
Second Motion Record	
Device 0 YUSBYTMROBOT	Free Space: 7320 MB

9. Select Settings from the System menu and select a component.

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			Robot	Setting					
	∲ Wizard	Vision Setting	TCP Setting	10 I/O Setup	Safety	Controller			
	Speech	End Button	Component	Operation Space	Command				
	Posture Setting	TMmanager	Global Variable	Text File Manager	The setting	TM Al+			



10. Click the radio button for the imported component to enable it and select Save.

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Component List				
Enable GRIPPER, ASPINA, ARH305COM, V100, ELOSE Component GRIPPER, ASPINA, ARH305COM, V100, CLOSE Component GRIPPER, ASPINA, ARH305COM, V100, SET Component GRIPPER, ASPINA, ARH305O, V100, V100, SET Component GRIPPER, ASPINA, ARH305O, V100, SET Component				

11. Launch a new project and confilm that the component has been added to the node list.

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Force Control M-Decision												
Collision Check CVNewObj												
CVPoint CVCircle												
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ARH_COM_SE ARH_JO_MOVE												
ARH_IO_SE									_	Ð	100%	•

1.2. Uninstallation Instructions

1. Select Settings in the menu and select Components.

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		Robot	Setting					
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3		_ 0		\$	Z			
Speed	h End Button	Component	Operation Space	Command	Connection			
5		Var		-9	8			
Posture Se	tting TMmanager	Global Variable	Text File Manager	Motion Setting	TM AL+			



2. Select the x mark to the right of the component that the user wants to uninstall and select OK on the warning screen.



3. Confirm that the component is removed and select Save.

→			№ 0 mm/s	100 % 😌 3236		ì	11
Component List							
component List	Enable	Component Name GRIPPER, ASPINA, ARHBOSCOM, V100, CLOSE.Component GRIPPER, ASPINA, ARHBOSCOM, V100, OPPIN Component GRIPPER, ASPINA, ARHBOSCO, V100, MOVE.Component					
					S	ave	



4. Launch a new project and check the node list to see that the component has been removed.





2. How to install on the robot



 \cdot When installing with the robot, make sure that the power of the robot is off.

2.1. Installation of robotic gripper

1. Attach the dedicated attachment-A to the robotic gripper body.







Side view



2. Attach the dedicated Attachment-B to the robot.



3. Attach 1 and 2.



Front view



Side view



4. Installation is complete.



**By changing the position of the positioning pin and attachment-B direction in step 2, The robotic gripper can set the position of 4 patterns. (Every 90°)

Positioning pin position(red circle)	The position of 4 patterns	

2.2. Wiring method



 $\cdot \ensuremath{\mathsf{When}}$ wiring with the robot, keep the power of the robot turned off.

2.2.1. I/O control connection

- 1. Connect the robotic gripper body cable to the conversion cable.
- 2. Connect the round connector of the conversion cable to the digital I/O of the robot end module.
- 3. The connection is now complete. \times Please refer to chapter 4.1 for more information on the operation.

(If there is a surplus of cables, consider making the wiring run around the robotic gripper.)



2.2.2. Communication control connection

1. Connect the robotic gripper body cable to the standard cable.



- 2. Fix the standard cable to the robot.
- 3. Turn on all the switches on the back of the RS485 to RS232C converter. (Set 2-wired RS-485, Terminator Enable)





4. Connect the standard cable to the RS485 to RS232C converter. Use GND as the power supply for the robot controller. (Bypass by the robot controller or by the wire itself)



5. Connect the 24 V GND line to the robot controller.



6. Connect the RS 485 to RS 232 C converter and RS 232 C cable (0.5 m). Connect the other RS 232 C cable to any com port on the robot controller.



7. Insert the DC plug supplied with the RS485 to RS232C converter into the RS485 to RS232C converter and connect USB type A to the USB port of the robot controller.



8. The connection is complete. X Please refer to chapter 4.2 for more information on the operation.



If the the robotic gripper RS 485 +/- cable is inserted incorrectly, communication will fail.
Incorrect connection between 24 V and GND may cause fatal defects in the robotic gripper.

•The converter may not operate properly unless power is supplied through the DC plug.

3. Robot Initialization

3.1. TCP Settings

- 1. Select Settings from the menu, and then select TCP Settings.
- 2. Select manual parameter entry for TCP.
- 3. Set Z, Mass as follows:.
 - Z: 173.5 (mm)

Mass: 0.8 (kg)



3.2. Setting the Gripper Button

- Case of I/O control
- 1. Select Settings from the System menu, and then select the Gripper button.
- 2. Select "General Gripper Output" and set it as follows.

Grip: End Module out 0 = High

Release: End Module out 0 = Low

- 3. Start a new project and press the gripper button to see how it works.
- Case of communication control
- 1. Select Settings from the System menu, and then select the Gripper button.
- Select "Use Customized Components" and set it as follows.
 Grip: "GRIPPER_ASPINA_ARH305COM_VXXX_CLOSE"
 Release: "GRIPPER_ASPINA_ARH305COM_VXXX_OPEN"
- 3. Start a new project and press the gripper button to see how it works.



4. Robot program

4.1. I/O control

The operation pattern set on the robotic gripper is controlled by digital I/O to operate the robotic gripper.

4.1.1. IO SET Components

Component		Component Content	Node
	10 •	To set DI0 and DI1 of a robot when performing I/O control.	
A	RH_IO_SET		

The various parameters are as follows:

	GRIPPER_ASPINA_ ARH305IO_V100_SET	$@\times$
	Provider :ASPINA	
Node Name	ARH305IO_V100_SET	1
SetDiReady		>
SetDiAlarm		\rightarrow
SetDiGripErro	r)	>
Advanced		
ок	Delete thi	s node

The user should set the function (Ready / Alarm / GripError) to the end modules DI0 and DI1. Assign values (-1, 0, 1) to the parameters, respectively. Each value means the following contents.

-1: Unassigned

- 0 : Assign function to the end module DI0
- 1 : Assign function to the end module DI1

Parameter	Variable	Parameter Name	Setting	Initial	Contents
			range	value	
Basic					
SetDiReady	numDiReady	Set Ready	-1 to 1	-1	Set Ready to the end module DI \ast
SetDiAlarm	numDiAlarm	Set Alarm	-1 to 1	-1	Set Alarm to the end module DI *
SetDiGripError	numDiGripError	Set GripError	-1 to 1	-1	Set GripError to the end module DI $\ensuremath{^*}$



 $\cdot \text{Check}$ that the setting of DIO 3 and 4 of the robotic gripper is the output. Do not assign inputs.

•The factory defaults for robotic grippers are DIO3 = GripError and DIO4 = Alarm. Therefore, DIO of the robot turns ON / OFF according to the range of GripError. The output of robot DI1 is fixed because it is not an alarm.

• If the DI setting of the robot is different from the output setting of the robotic gripper, unexpected behavior may occur.

4.1.2. IO MOVE Component

Component	Component Content	Node
	To set the robotic gripper operation parameters when performing I/O control.	
ARH_IO_MOVE		

The various parameters are as follows:



Parameter	Variable	Parameter Name	Setting range	Initial value	Contents
Basic					
SetWaitTime	msecWaitTime	waiting time	0 ~	1000	Sets the standby time for the
			10,000 msec		open/close operation.
SetMovePattern	numMovePattern	move pattern	1 ~ 4	1	Sets the move pattern of the robotic
					gripper. Setting $1 \sim 4$ is equal to $0 \sim 3$
					in the operation number.
SetGripErrorEnable	GripErrorEnable	Grip error	true/false	false	The user can enable or disable Grip
		permission			errors.
SetReadyEnable	ReadyEnable	Ready permission	true/false	false	The user can enable or disable the
					Ready. When Ready is disabled, the
					time set by SetWaitTime works.



Parameter	Variable	Parameter Name	Setting range	Initial value	Contents
Details					
SetGripErrorMode	GripErrorMode	Grip error mode	true/false	false	It can be set to Pause/Stop processing
		change			after a gripper error.
					Pause (true): The flow will pause after
					detecting a grip error.
					Stop (false) : The flow will stop after
					detecting a grip error.



 $\cdot \mbox{The ReadyEnable value is ignored if Ready is not assigned.}$

•The GripErrorEnable value is ignored if GripError is not assigned.

4.1.3. **IO Control Sample Program**

1. The initial settings of the robotic gripper are as follows. (factory default)

Terminal Name	I/O settings	Assignment		
DI1	Input (Fixed)	SEL [0]		
DI2	Input (Fixed)	Alarm Reset		
DIO 3	Outputs	GripError		
DIO 4	Outputs	Alarm		

For details, please refer to the "ARH305 series Operation manual Parameter settings".

The move pattern $1 \sim 4$ is equal to the operation number $0 \sim 3$ in the "ARH 305 series Operation Manual Individual operation". The default values are as follows.

Move pattern	Operation number	Target position [%]	Operation time [ms]	Torque [%]
1	0	0	1000	800
2	1	1000	1000	800
3	2	0	1000	800
4	3	1000	1000	800

Please use the dedicated app (RoboticGripperSetup) to change the parameters and pin functions of the robotic gripper. For details, please refer to the "RoboticGripperSetup_QuickStartManual".

2. Please create a new project. Click pencil mark on the Start node.

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ARH,COM,SET ARH,JO,MOVE									C	100%	
ARH_IO_SET	<										>

3. Disable [Reset AO DO while Project Initializing].

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ित्र Warp	Path	¢) 100%	•

4. Make sure it is unchecked and click OK.

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•If uncheck process is not done, there is a possibility that the robotic gripper will make unintended movements.

5. Drag and drop the into the flow.



6. The node is added to the program. Select the pencil mark for the added node. (If the IO SET node is placed at the beginning of the flow, so that all subsequent the IO MOVE node will reflect this setting).



7. A separate window opens. Select SetDiGripError.



8. Select a variable. (This screen will be omitted in the following discussion.)



9. In the screen that opens, select the pencil mark for the variable.



10. Delete "-1" in the text box and enter 0. Then choose OK.

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		 0				×				tep L
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Smart Insert Listen		Variable	int/g_GRIPPER_	ASPINA_num 🔻	Insert					
Force Control M-Decision		Function	Byte_ToInt16()	•	Insert					
Collision Canda (CVNew/Obj)		Math	abs()		Insert					
CVPoint CVCircle		Boolean Value	true		Insert					
		Reserved	newline		Insert					
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11. The right side value changes from "-1" to "0". The GripperError assigns to DIO of the end module.



12. Repeat the previous step to numDiAlarm = 1, numDiReady = -1. The Alarm assigns to DI1 of the end module. The Ready is not assigned. 13. Drag the node and drop it into the flow.



14. The node is added to the program. Select the pencil mark for the added node.



15. The setting list appears.

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	Advanced OK Delete	this node		• 10	or: 😜 ,



16. Set SetMovePattern = 2, Other parameters with default values.



- 17. The setting of move pattern 2 is completed.
- 18. The move pattern = 1 is also added according to steps 11-16.



19. All settings are complete. Press the play button to run the program. Execute the operation of move pattern. The robotic gripper will close and open.



4.2. Communication control

A communication command is sent to the robotic gripper for each operation to operate the robotic gripper.

4.2.1. COM SET component



The various parameters are as follows:

	GRIPPER_ASPINA_ ARH305COM_V100_SET	? ×
	Provider :ASPINA	
Node Name	ARH305COM_V100_S	SET1
SetCommSla	velD	>
Advanced		
ок	Delete ti	nis node

Parameter	Variable	Parameter	Setting	Initial	Contents
		Name	range	value	
Basic					
SetCommSlaveID	numComport	Comport number	1 ~ 3	1	Sets the robot's com port.
	numSlaveID	Slave ID	1 ~ 31	1	Sets the slave ID of the robotic gripper.



•If the settings of the com port and slave ID are wrong, communication with the robotic gripper will fail.



4.2.2. COM OPEN/CLOSE component

Component	Component Content	Node
ARH_COM_CLOSE	To set parameters for closing motion or outer diameter gripping	
	To set parameters for opening motion or inner diameter gripping.	

The various parameters are as follows:.

 Details Basic GRIPPER_ASPINA_ ARH305COM_V100_CLOSE GRIPPER_ASPINA_ ARH305COM_V100_CLOSE $? \times$ $? \times$ Provider :ASPINA Provider :ASPINA ARH305COM_V100_CLOSE1 ARH305COM_V100_CLOSE1 Node Name Node Name SetPosition SetTorque SetSpeed SetSpeed SetPushParameter SetWaitEnable SetWaitEnable > etGripErrorEnabl SetGripErrorEnable > SetGripErrorRange SetGripErrorMode Advanced Advanced

Parameter	Variable	Parameter	Setting	initial value	Contents
		Name	range		
Basic					
SetPosition	mArhPosition	target position	0 ~ 100%	OPEN: 0	Target stop position of the robotic gripper
				CLOSE: 100	
SetTorque	mArhTorque	Torque	15 ~	80	Torque value during the robotic gripper
			100%		operation
SetSpeed	mAhSpeed	operating time	10 ~	100	Full-stroke operating speed
			400%		0.25 ~ 10 [sec]
SetWaitEnable	mIsWaitEnable	wait	true/false	true	Standby ON/OFF Operation
		permission			Enabled/Disabled
SetGripErrorEnable	mIsGripErrorEnable	grip error	true/false	false	Gripper Error Enabled/Disabled
		permission			

Parameter	Variable	Parameter	Setting	initial value	Contents
		Name	range		
Details					
SetPushParameter	mPushPosition	Push amount	0 ~ 100%	0	Pushing amount of the pushing operation
					(0 = Inactive Push)
	mPushTorque	push-in torque	0 ~ 100%	20	Torque value during pushing operation
					(0 = Inactive Push)
	mPushSpeed	pushing speed	0 ~ 100%	20	Operation speed during pushing
					operation
					(0 = Inactive Push)
SetGripperErrorRange	mArhGripErrorH	Grip error	0 ~ 100%	OPEN: 5	Maximum value of the GripError output
		output range		CLOSE: 100	range
		higher limit			
	mArhGripErrorL	Grip error	0 ~ 100%	OPEN: 0	minimum value of the GripError output
		output range		CLOSE: 95	range
		lower limit			
SetGripErrorMode	mIsGripErrorMode	Grip error	true/false	false	Pause/Stop Processing After a grip Error
		setting			Pause (true): The flow will pause after
					detecting a grip error.
					Stop (false) : The flow will stop after
					detecting a grip error.

4.2.2.1. Push-in operation

It allows two levels of operation within a single operation. For the push-in amount parameter, set the opening / closing width mPushPosition to set how far before the target position (mArhPosition) the push-in starts. In push operation, it is necessary to set one-step operation (mArhPosition, mArhTorque, mArhSpeed) and push operation (variable in SetPushParameter). Pushing operation can be disabled by setting mPushPosition = 0, mPushTorque = 0, and mPushSpeed = 0. The settings differ depending on the OPEN / CLOSE component.

OPEN Component

·Sample Configuration (The initial finger position is 100%.)

When mArhPosition = 0% and mPushPosition = 30%.



 CLOSE component

·Sample Configuration (The initial finger position is 0%.)





·In the OPEN component, set so that

"target position (mArhPosition) < push amount (mPushPosition)".

·In the CLOSE component, set so that

"target position (mArhPosition) > push amount (mPushPosition)".

4.2.2.2. Grip check

The success or failure of grasping can be determined by setting mAhGripErrorH and mAhGripErrorL. By setting mAhGripErrorH and mAhGripErrorL, the user can set the range to output grip errors.

OPEN/CLOSE Component

Configuration Example

OPEN:

mAhGripErrorH = 5%, mAhGripErrorL = 0%

CLOSE:

mAhGripErrorH = 100%, mAhGripErrorL = 95%





•Grip error output range higher limit (mArhGripErrorH) > Grip error output range lower limit (mArhGripErrorL).



4.2.3. Communication control sample program



•This program uses the com port 3. Switch according to the setting environment of the robot.

1. Please create a new project.



2. Drag the node and drop it into the flow.



3. The node is added to the program. Select the pencil mark for the added node. (The COM SET node is placed at the beginning of the flow, so that all subsequent COM OPEN/CLOSE node will reflect this setting)



4. A separate window opens. Select SetCommSlaveID.

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ARH_IO_SET		ок		Dele	te this node			Ð	80%	

5. Select a variable. (This screen will be omitted in the following discussion.)



6. In the screen that opens, select the pencil mark for the variable.

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APH.COM.SET APH.O. MOVE	OK			-	
ng ∳ro				66 80%	

7. Delete "1" and enter "3" in the text box. Then choose OK.

(Switch the setting according to the Comport used by the robot controller.)

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8. The right side changes from "1" to "3". This sets it to the robot com port 3.

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- 9. Repeat the previous step to set numSlaveID = 1.
- 10. Drag the node and drop it into the flow.



11. The node is added to the program. Select the pencil mark for the added node.



12. The setting list appears.

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📑 🖻 🗖 🦘 📂 Step Run Diagnosis	Point Manager Base Manager Controller Variables	EditBlock 🛛 0 RobotBa 🔻 🔳 0 NOTOO 🔻 Display 📄
Command I-VOID Start	GRIPPER ASPINA ARH305COM_VIO0_CLOSE ② X Provider JSPINA Node Name ARH305COM_VIO0_CLOSE1	
Smart Listen	SetPosition > SetTorque >	ca de la calencia de la c
rera Control M. Ducksion	SetSpeed > SetWaitEnable >	
CVPoint CVCircle	SetGripErrorEnable	
ANICONCEL ANICONOM	Advanced	
ARHJO, SET	OK Delete this node	• «» •



- 13. Set parameters with default values.
- 14. Place the node . Set parameters with default values.



20. All settings are complete. Press the play button to run the program. Performs fully closed and fully open operation.

5. Plug-in specification

5.1. Supported Products

Supported Products

- TM5 -700/TM5M -700
- TM5 -900/TM5M -900
- TM 12/TM 12 M
- TM 14/TM 14 M

Software Version Conditions

• Version TMflow SW 1.80 or later

6. troubleshooting

6.1. Error message list

6.1.1. ARH305IO Component Error

The errors in the IO component are:

error code	Contents	Countermeasures
E000	Alarm detected before operation.	Check the alarm.
E001	Alarm detected after operation.	Check the alarm.
E002	Alarm detected while waiting for Ready signal.	Check the alarm.
E003	Ready signal wait time has exceeded 12 seconds.	Check the fingers weight or alarm.
E004	GripError detected.	Check if there is a workpiece.
E005	Invalid numMovePattern setting.	Set numMovePattern within a range of $1 \sim 4$.
E006	Invalid msecWaitTime setting.	Set msecWaitTime within a the range of
		0 ~ 10000 msec.
E007	Invalid numValReady setting.	Set numValReady within a range of -1 \sim 1
E008	Invalid numValAlarm setting.	Set numValAlarm within a range of -1 \sim 1
E009	Invalid numValGripError setting.	Set numValGripError within a range of -1 \sim 1
E010	Ready, Alarm, GripError setting conflict.	Ready, Alarm, and GripError must be assigned -1, 0, 1
		respectively.

6.1.2. ARH305COM component error

The errors in the COM component are:

Error code	Contents	Countermeasures
E100	Communication failed.	Check the Comport, SlaveID, and wiring.
E101	Alarm detected before operation.	Check the alarm.
E102	Alarm detected while waiting for Ready signal.	Check the alarm.
E103	Alarm detected after operation	Check the alarm.
E104	Ready signal wait time has exceeded 12 seconds.	Check the fingers weight or alarm.
E105	Invalid mArhPosition setting.	Set the mArhPosition within a range of 0 \sim 100%.
E106	Invalid mArhTorque setting	The mArhTorque setting should be in the 15 \sim 100%
		range.
E107	Invalid mArhSpeed setting.	Set the mArhSpeed within a range of $10 \sim 400\%$.
E108	Invalid mPushPosition setting.	Set the mPushPosition within a range of 0 \sim 100%.
E109	mArhPosition must set higher than or equal to	The mArhPosition must set higher than or equal to the
	mPushPosition value.	mPushPosition value.
E110	Invalid mPushTorque setting.	Set mPushTorque within the 15 \sim 100% range.

E111	Invalid mPushSpeed setting.	Set the mPushSpeed within the 0 \sim 100% range.
E112	mArhGripErrorH must be set higher than the value of	Set mAhGripErrorH to higher than the value of
	mArhGripErrorL.	mAhGripErrorL.
E113	Invalid mArhGripErrorH setting.	Set mArhGripErrorH in the range of 0 \sim 100%.
E114	Invalid mArhGripErrorL setting.	Set mArhGripErrorL in the range of 0 \sim 100%.
E115	Invalid mArhPosition setting.	The mArhPosition is set within 0 \sim 100%.
E116	Invalid COM number.	COM must be set within the range of $1 \sim 3$.
E117	Invalid SlaveID number.	SlaveID must be between 1 ~ 31.
E118	Communication timed out and failed.Check the wiring	Check the Comport, SlaveID and wiring.
	and setting.	
E119	mPushPosition value must set higher than or equal to	The mPushPosition value must set higher than or equal
	mArhPosition value.	to the mArhPosition value.
E120	The value of mArhPosition + mPushPosition cannot	Set the value of mArhPosition + mPushPosition to within
	exceed 100%.	100%.

7. Release Notes

7.1. ASPINA_ARH305 version 01.00.00

• initial public version

8. revision history

edition	Contents
0.00	Initial Creation
	edition 0.00