



Standard specifications

ES06-01-CFD
ES12-01-CFD

1st edition

NACHI-FUJIKOSHI CORP.

1512, SESEN-087-001,001

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1. Outline

“NACHI ROBOT” has used mechatronic techniques, cultivated throughout the last few decades, to supply robots suited for industries utilizing welding and the material handling techniques.

“ES06/12 series” is a robot of high speed and simple highly rigid structure which is optimal for assembling and material handling application. Hollow wrist enables easier routing of wires from robot body to the tool. This can reduce customer’s work for connection greatly.

We provide full line-up of robot which has different forward/backward and up/down stroke.

Robot specification

Specification			Robot type
Payload	Reach	up/down stroke	
6kg	350mm	200mm	ES06-3520-01
		340mm	ES06-3534-01
	450mm	200mm	ES06-4520-01
		340mm	ES06-4534-01
	550mm	200mm	ES06-5520-01
		340mm	ES06-5534-01
12kg	550mm	350mm	ES12-5535-01
		450mm	ES12-5545-01
	700mm	350mm	ES12-7035-01
		450mm	ES12-7045-01
	850mm	350mm	ES12-8535-01
		450mm	ES12-8545-01

Controller specification

	Type	Specification	ES06	ES12
Body	CFD-0000	Refer to controller spec. sheet	○	○
Motor encoder harness	S101C-J1-02-A	2m	○	○
	S101C-J1-05-A	5m		
	S101C-J1-10-A	10m		
	S101C-J1-15-A	15m		
	S101C-J1-20-A	20m		
Application cable	IOCABLE-70-02M	2m	○	○
	IOCABLE-70-05M	5m		
	IOCABLE-70-10M	10m		
	IOCABLE-70-15M	15m		
	IOCABLE-70-20M	20m		

Please refer to Standard specification of CFD controller (SCFEN-010) for the detail of controller and electric options.

2. Basic specifications

2.1 ES06-01 basic specification

Item		Specifications					
Robot model		ES06 -3520-01	ES06 -3534-01	ES06 -4520-01	ES06 -4534-01	ES06 -5520-01	ES06 -5534-01
Construction		Horizontally Articulated					
Number of axis		4					
Drive system		AC servo motor					
Brake		Axis 1, 2 and 4 ; without brake Axis 3 ; with brake					
Max. working envelope	Axis 1	±2.97 rad (±170 °)					
	Axis 2	±2.53 rad (±145 °)					
	Axis 3	200 mm	340 mm	200 mm	340 mm	200 mm	340 mm
	Axis 4	±6.28 rad (±360 °)					
Max. speed *4	Axis 1	6.98 rad/s (400 °/s)					
	Axis 2	11.69 rad/s (670 °/s)					
	Axis 3	2400 mm/s					
	Axis 4	43.63 rad/s (2500 °/s)					
Rated pay load (maximum)		3 kg (6 kg)					
Maximum pushing down force of axis 3 *7		165 N					
Allowable moment of inertia *1		0.12 kg·m ² (rated 0.01 kg·m ²)					
Position repeatability	X-Y plane	±0.012 mm					
	J3 (Z)	±0.01 mm					
	J4 (θ)	±0.004 °					
Longest reach		350 mm		450 mm		550 mm	
Air tubes		Primary : ϕ6×2 Secondary : ϕ4×8 *5					
Application signals		Gripper 8 input / 8 output (20 core) Specified wires for multi purpose gripper (2core + power 2core) Ethernet cable ×1 <100BASE-TX> (8core) *6					
Installation		Floor mounting					
Ambient conditions		Temperature: 0 to 40 °C *2 Humidity: 45 to 85%RH (No dew condensation allowed) Vibration to the installation face: Not more than 0.5G (4.9 m/s ²)					
Environmental performance *3		IP20					
Robot mass		36 kg				37 kg	

1[rad] = 180/π[°], 1[N·m] = 1/9.8[kgf·m]

- On controller display, axis 1 to 4 is displayed as J1 to J4 for each.

- The specification and externals described in this specification might change without a previous notice for the improvement.

- The explosion proof specification is not available.

*1: The Allowable moment of inertia of a wrist changes with load conditions of a wrist. *2: Permitted height is not higher than 1,000m above sea level. If used in higher place, permitted temperature is affected by height. *3: Liquid such as organic compound, acidity, alkalinity, chlorine or gasoline cutting fluid which deteriorates the seal material are not available to use. *4: The "Max. speed" in this table is the available maximum value and will change depending on the work-program and the wrist load condition. *5: Secondary tube $\phi 4$ is a set of solenoid valve option. *6: LAN cable (8core) can be used for auxiliary wires. *7: This is a maximum pushing down force at tool top point when maximum payload is mounted and axis 1, 2 and 4 does not move. Please use robot under specified limit. In case that continuous pushing down force is applied, overload error may occur. Please use robot under the condition of which no overload error occurs.

2.2 ES12-01 basic specification

Item		Specifications					
Robot model		ES12 -5535-01	ES12 -5545-01	ES12 -7035-01	ES12 -7045-01	ES12 -8535-01	ES12 -8545-01
Construction		Horizontally Articulated					
Number of axis		4					
Drive system		AC servo motor					
Brake		Axis 1, 2 and 4 ; without brake Axis 3 ; with brake					
Max. working envelope	Axis 1	±2.97 rad (±170 °)					
	Axis 2	±2.53 rad (±145 °)				±2.67 rad (±153 °)	
	Axis 3	350 mm	450 mm	350 mm	450 mm	350 mm	450 mm
	Axis 4	±6.28 rad (±360 °)					
Max. speed *4	Axis 1	7.33 rad/s (420 °/s)				4.89 rad/s (280 °/s)	
	Axis 2	7.85 rad/s (450 °/s)					
	Axis 3	2800 mm/s					
	Axis 4	41.89 rad/s (2400 °/s)					
Rated pay load (maximum)		3 kg (12 kg)					
Maximum pushing down force of axis 3 *7		200 N					
Allowable moment of inertia *1		0.3 kg·m ² (rated 0.025 kg·m ²)					
Position repeatability	X-Y plane	±0.012 mm		±0.015 mm			
	J3 (Z)	±0.01 mm					
	J4 (θ)	±0.005 °					
Longest reach		550 mm		700 mm		850 mm	
Air tubes		Primary : ϕ 6×2 Secondary : ϕ 4×8 *5					
Application signals		Gripper 8 input / 8 output (20 core) Specified wires for multi purpose gripper (2core + power 2core) Ethernet cable ×1 <100BASE-TX> (8core) *6					
Installation		Floor mounting					
Ambient conditions		Temperature: 0 to 40 °C *2 Humidity: 45 to 85%RH (No dew condensation allowed) Vibration to the installation face: Not more than 0.5G (4.9 m/s ²)					
Environmental performance *3		IP20					
Robot mass		65 kg		67 kg		69 kg	

1[rad] = 180/π[°], 1[N·m] = 1/9.8[kgf·m]

- On controller display, axis 1 to 4 is displayed as J1 to J4 for each.
- The specification and externals described in this specification might change without a previous notice for the improvement.
- The explosion proof specification is not available.

*1: The Allowable moment of inertia of a wrist changes with load conditions of a wrist. *2: Permitted height is not higher than 1,000m above sea level. If used in higher place, permitted temperature is affected by height. *3: Liquid such as organic compound, acidity, alkalinity, chlorine or gasoline cutting fluid which deteriorates the seal material are not available to use. *4: The "Max. speed" in this table is the available maximum value and will change depending on the work-program and the wrist load condition. *5: Secondary tube $\phi 4$ is a set of solenoid valve option. *6: LAN cable (8core) can be used for auxiliary wires. *7: This is a maximum pushing down force at tool top point when maximum payload is mounted and axis 1, 2 and 4 does not move. Please use robot under specified limit. In case that continuous pushing down force is applied, overload error may occur. Please use robot under the condition of which no overload error occurs.

3. Dimensions

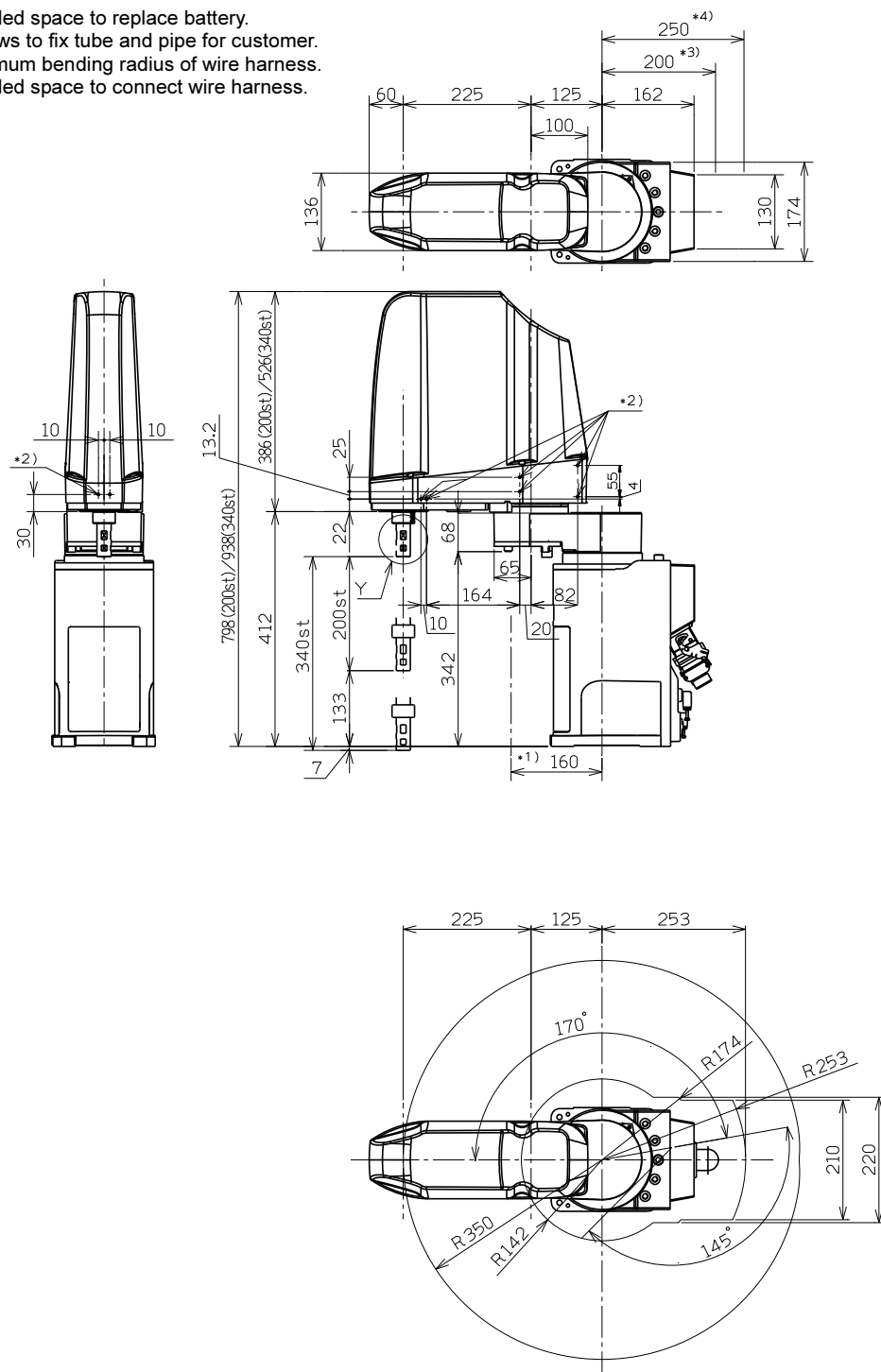
【ES06-3520-01】【ES06-3534-01】

*1) Needed space to replace battery.

*2) Screws to fix tube and pipe for customer.

*3) Minimum bending radius of wire harness.

*4) Needed space to connect wire harness.



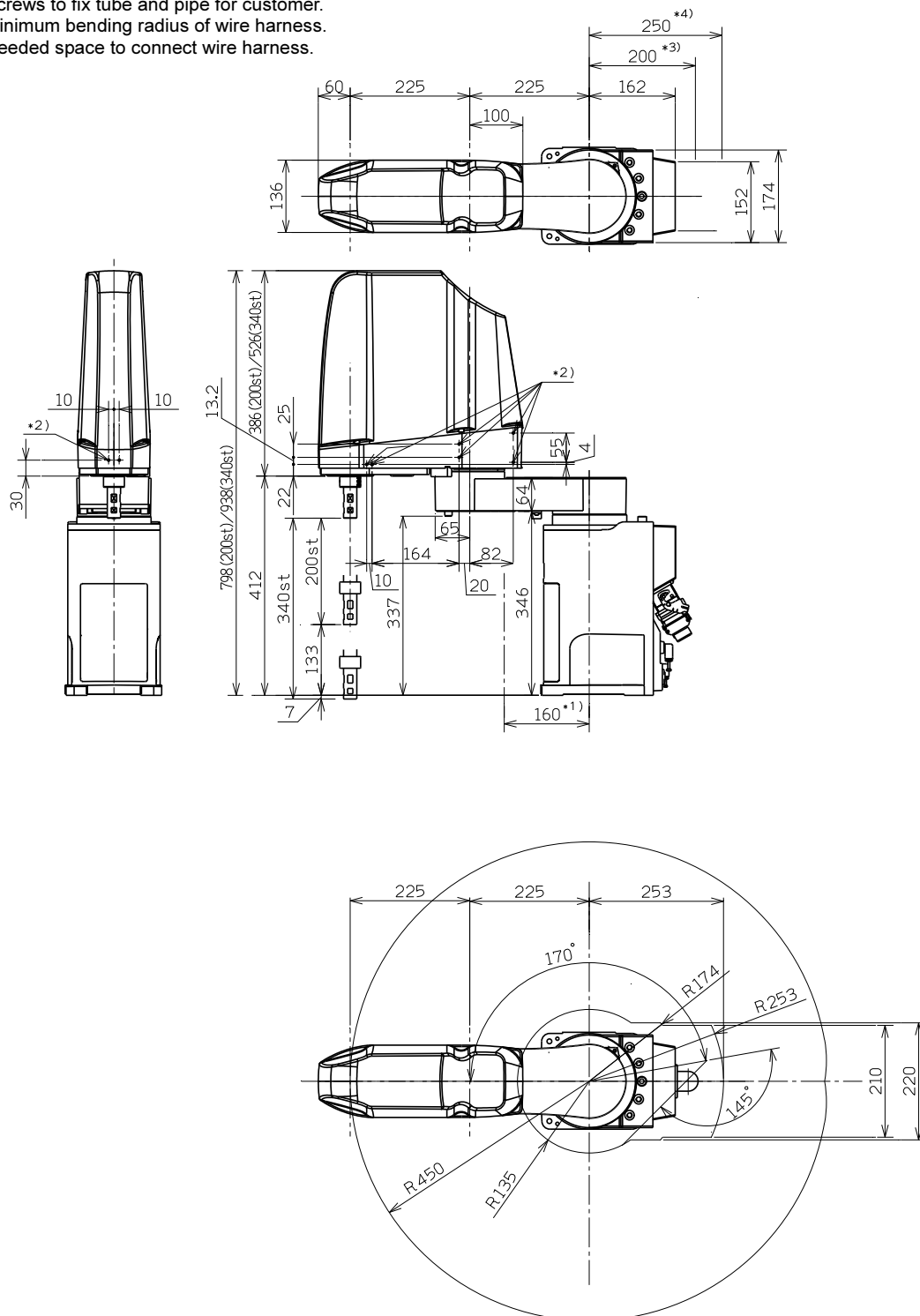
【ES06-4520-01】【ES06-4534-01】

*1) Needed space to replace battery.

*2) Screws to fix tube and pipe for customer.

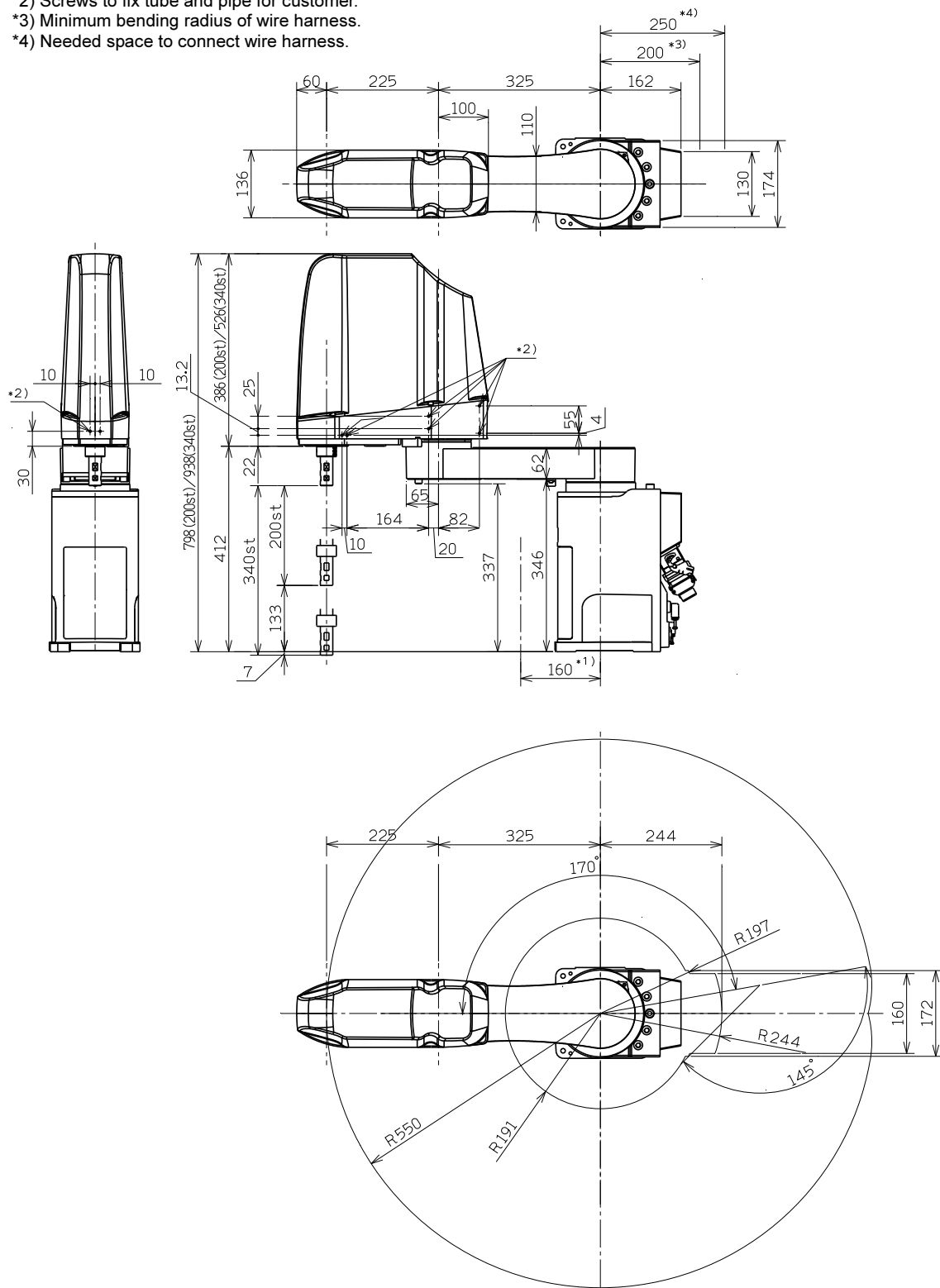
*3) Minimum bending radius of wire harness.

*4) Needed space to connect wire harness.



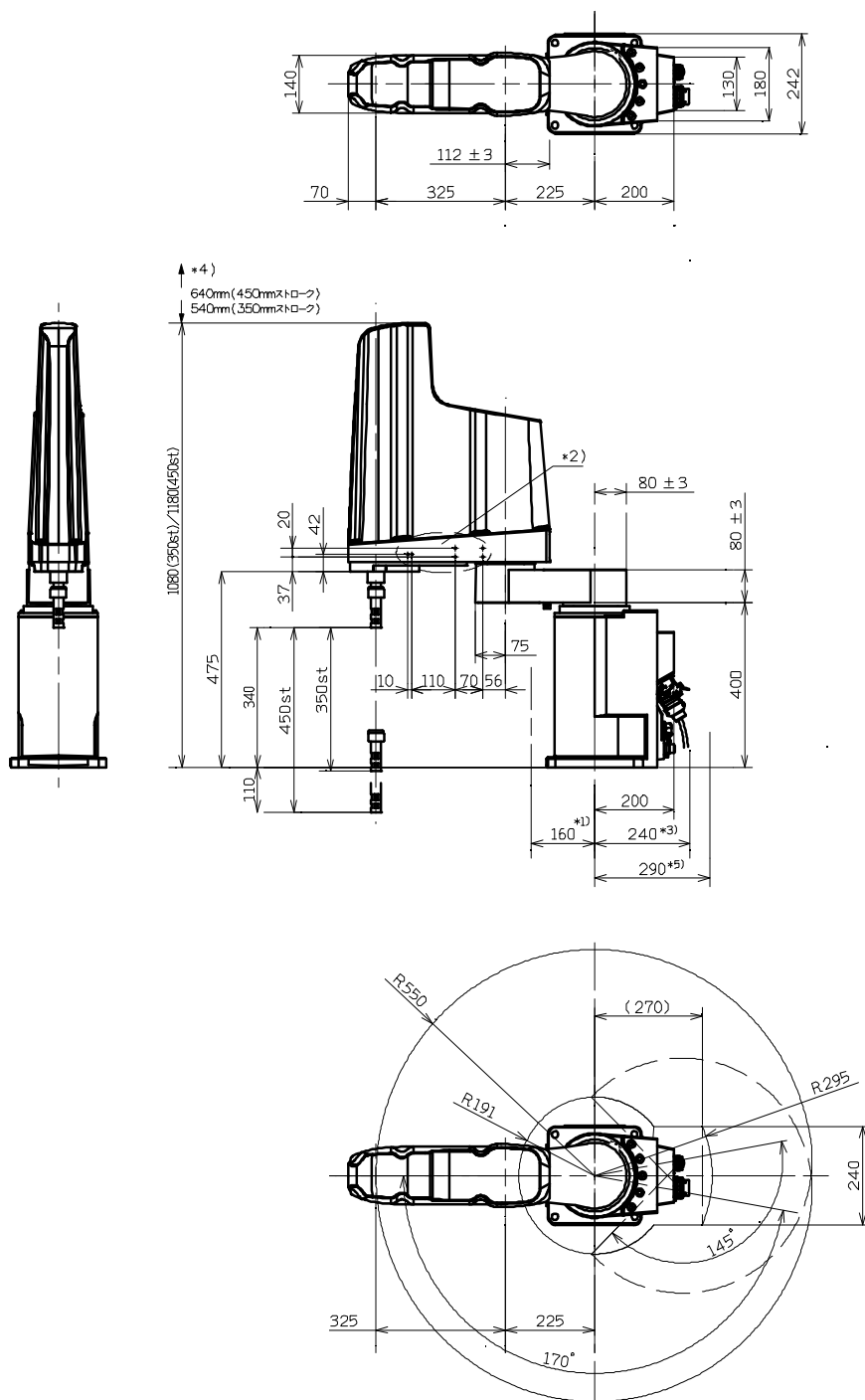
【ES06-5520-01】【ES06-5534-01】

- *1) Needed space to replace battery.
- *2) Screws to fix tube and pipe for customer.
- *3) Minimum bending radius of wire harness.
- *4) Needed space to connect wire harness.



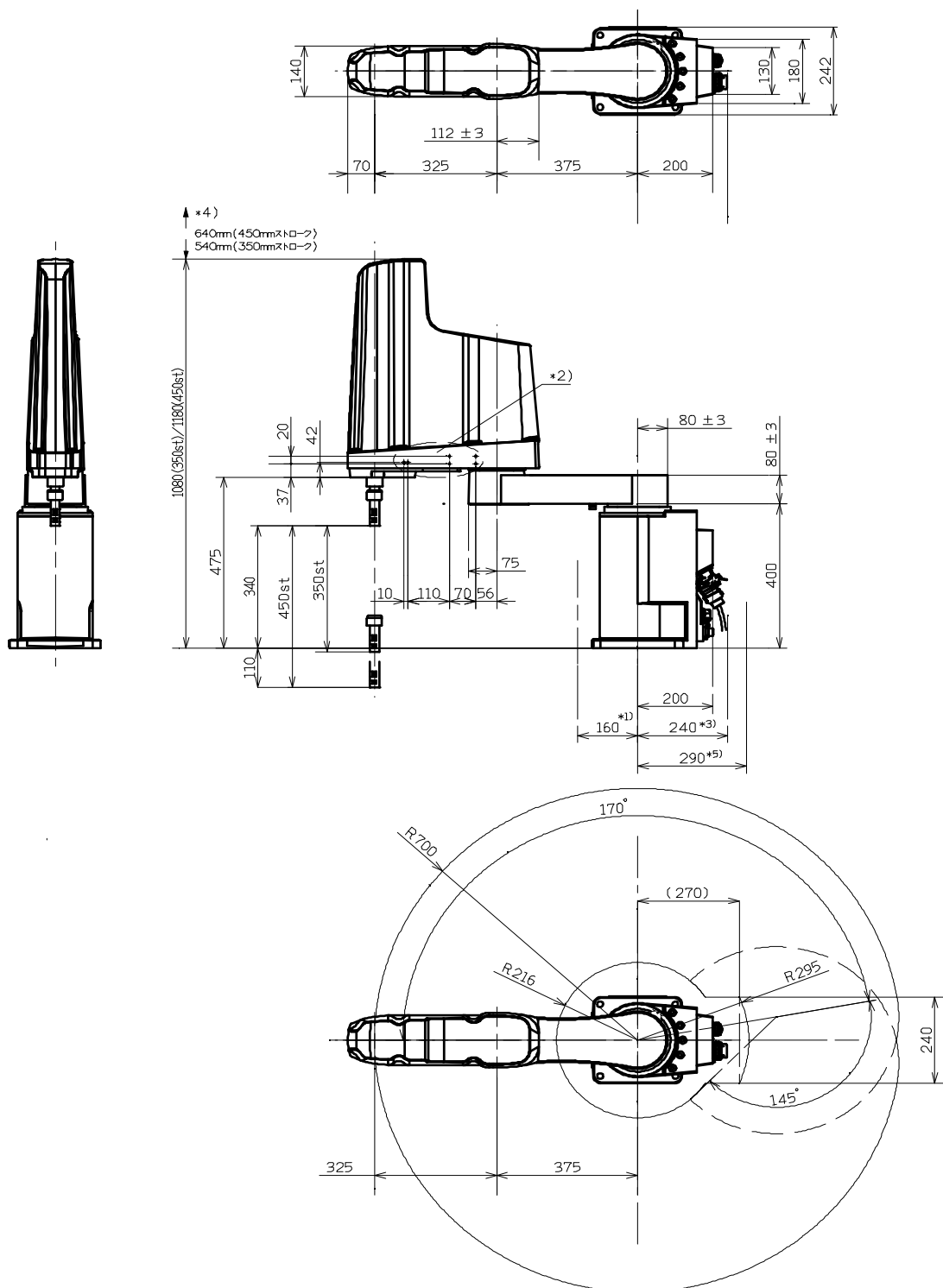
【ES12-5535-01】【ES12-5545-01】

- *1) Needed space to replace battery.
- *2) Screws to fix tube and pipe for customer.
- *3) Minimum bending radius of wire harness.
- *4) Needed space to mount/dismount cover.
- *5) Needed space to connect wire harness.



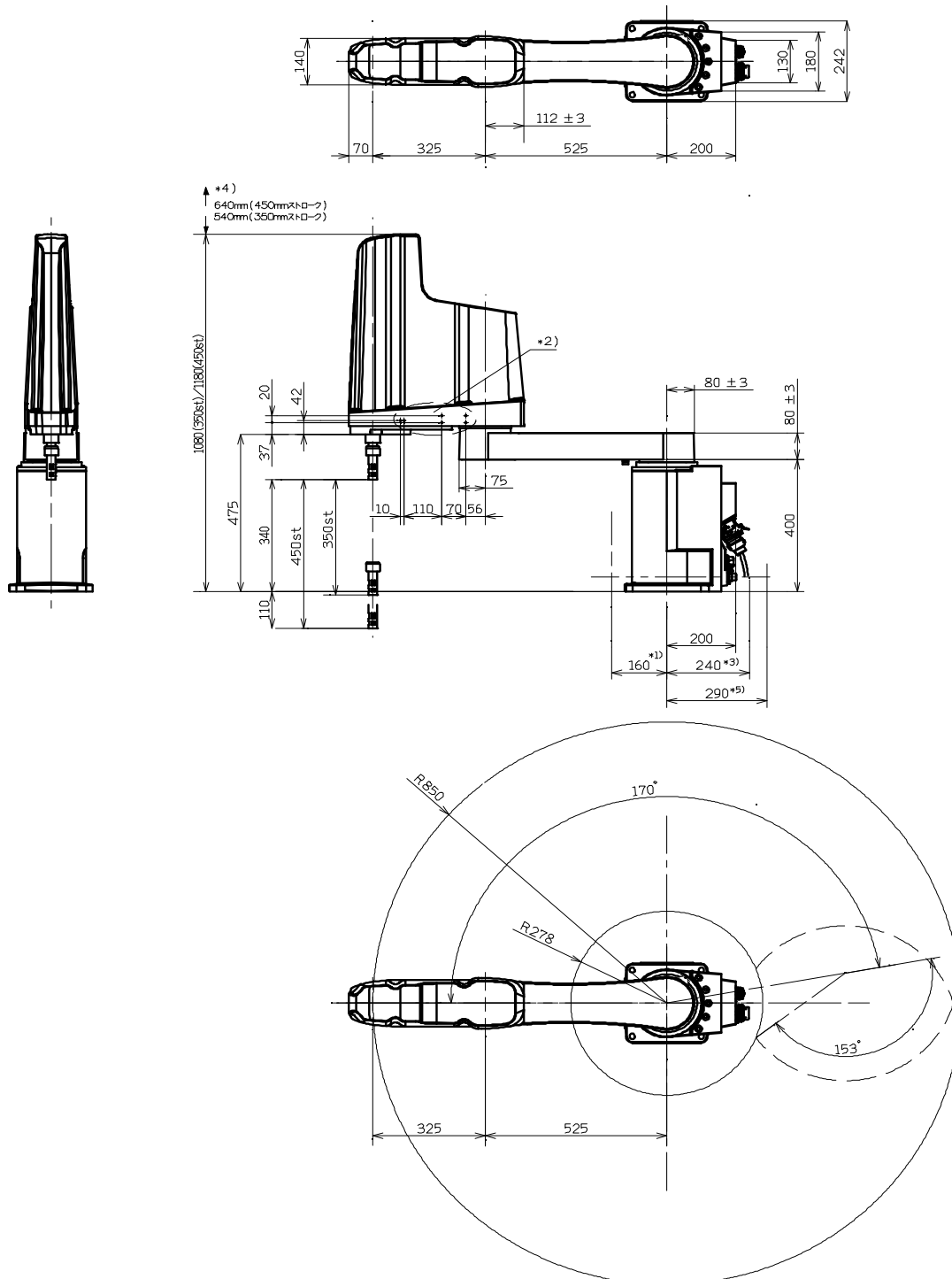
【ES12-7035-01】【ES12-7045-01】

- *1) Needed space to replace battery.
- *2) Screws to fix tube and pipe for customer.
- *3) Minimum bending radius of wire harness.
- *4) Needed space to mount/dismount cover.
- *5) Needed space to connect wire harness.



【ES12-8535-01】【ES12-8545-01】

- *1) Needed space to replace battery.
- *2) Screws to fix tube and pipe for customer.
- *3) Minimum bending radius of wire harness.
- *4) Needed space to mount/dismount cover.
- *5) Needed space to connect wire harness.



4. Detail of load mounting plate

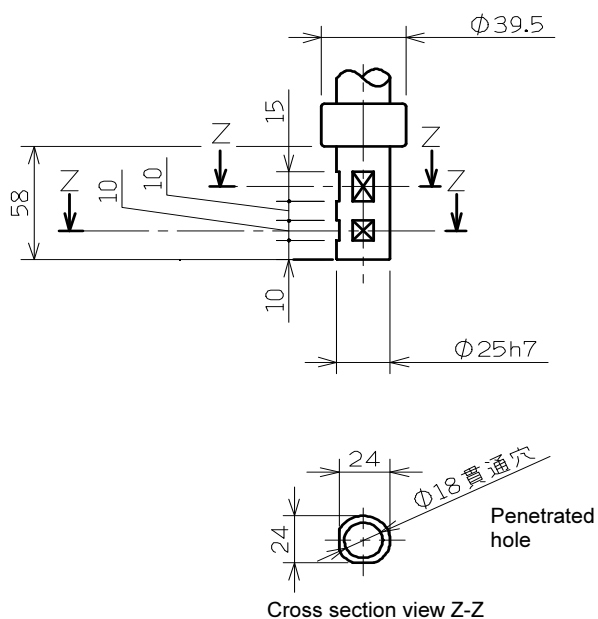
To mount end effector, please refer to drawing below.



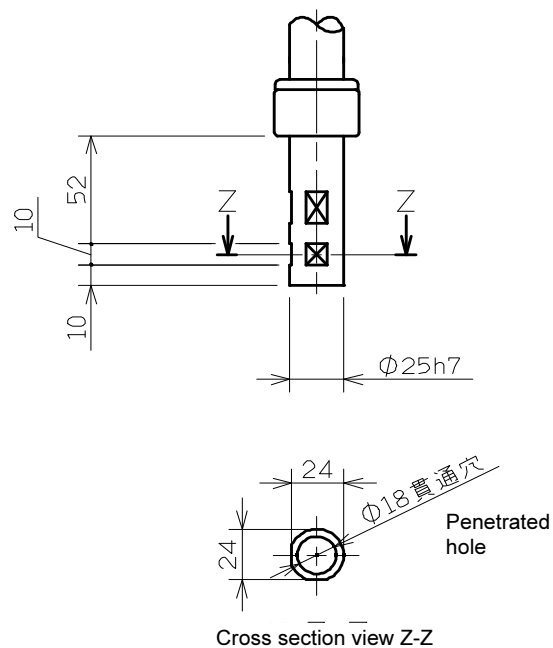
CAUTION

When mounting end effector, do not to apply excessive force to the shaft.
Especially never hit the shaft by hammer and or so. Ball screw shaft may be broken by excessive force.

【ES06-01】



【ES12-01】



5. Installation procedure

 DANGER	Axis 1, 2 and 4 do not have brake. So arms are free to move while carrying it. Never forget to fix arm properly when carrying robot in order not to be caught by moving arm.
 WARNING	To install the robot, it is important to position the robot so that no workers will get pinched by the robot inside or around a device to use the robot. The robot must not come into contact with any peripheral equipment when operating in the maximum operating range with a tool mounted on it.
 WARNING	Be sure to install the robot according to the specified procedure. Otherwise it will cause the robot to move or topple over while in operation, thus inducing an imminent hazardous situation.
 WARNING	To make wire connections between the robot and the controller or the peripheral equipment, fully understand the connection procedure for proper wire connections. Making wire connections according to improper procedure will cause the robot to malfunction.
 WARNING	Be sure to establish a proper ground for the robot. If equipment such as a welder that causes substantial noises is needed to use, establish the specified ground for the equipment.
 WARNING	During transport or installation of the robot, pay utmost care not to cause damage to wirings. Furthermore, after installing the robot, take protective measures such as using protective guards so that the wirings will not be damaged by workers or other persons, or forklift trucks or else.
 IMPORTANT	Robot is not dust-tight packaged. If robot is used in clean room, abrasive or fine particles shall be removed before carrying it in clean room. It is recommended that robot should be cleaned by swabbing with isopropyl alcohol (IPA). Use of other solvents or pure water could contribute rust or peel of coating materials.
 IMPORTANT	It is to be noted that cleanliness of robot is worse if it has operated in poor conditions for a long time or if it has been left as it was.

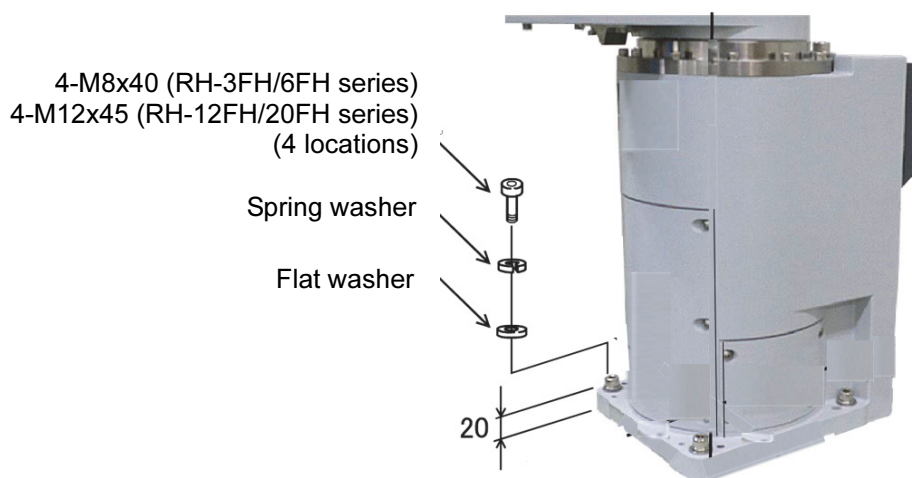
■ Installation location and ambient conditions

Conditions (temperature, humidity, height and vibration) are written in “2. Basic Specifications”. Further ambient conditions listed below must be observed.

- (1) Location with the drainage structure so that swivel base is not flooded, when the liquid such as water or cutting fluid is splashed on the robot body
- (2) Location with no flammable or corrosive fluid or gas.
- (3) Type D grounding (the grounding resistance is 100Ω or less) is necessary.

■ Installation procedure

- 1) Installation base is processed surface. Utilizing 4 installations holes on base (4- $\phi 9$ holes for ES06 series, 4- $\phi 16$ hole for ES12 series), fix robot properly by installation bolts (hex socket head bolts) which is accessory of robot.
- 2) We recommend to use the common basement in order that positioning error does not occur between robot and peripheral equipment.
- 3) Prepare sufficient high rigidity basement in order that no transformation and vibration occur on it by robot moving force and by static force from robot and peripheral equipment.
- 4) After installation finished, do not forget to dismount fixing plate, standing plate, hanging fixture and or so.

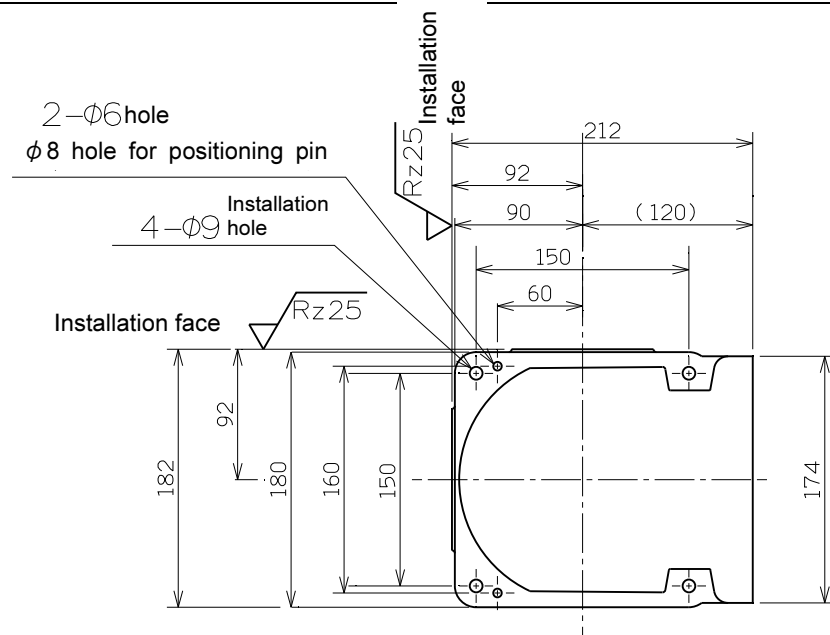


When installing robot, please do not forget to secure the enough space around the robot (cable accessing space behind robot, battery replacement space in front of robot). Do not install robot under direct sunshine or under direct lightening heat. Temperature inside robot body is raised and heat error may occur.

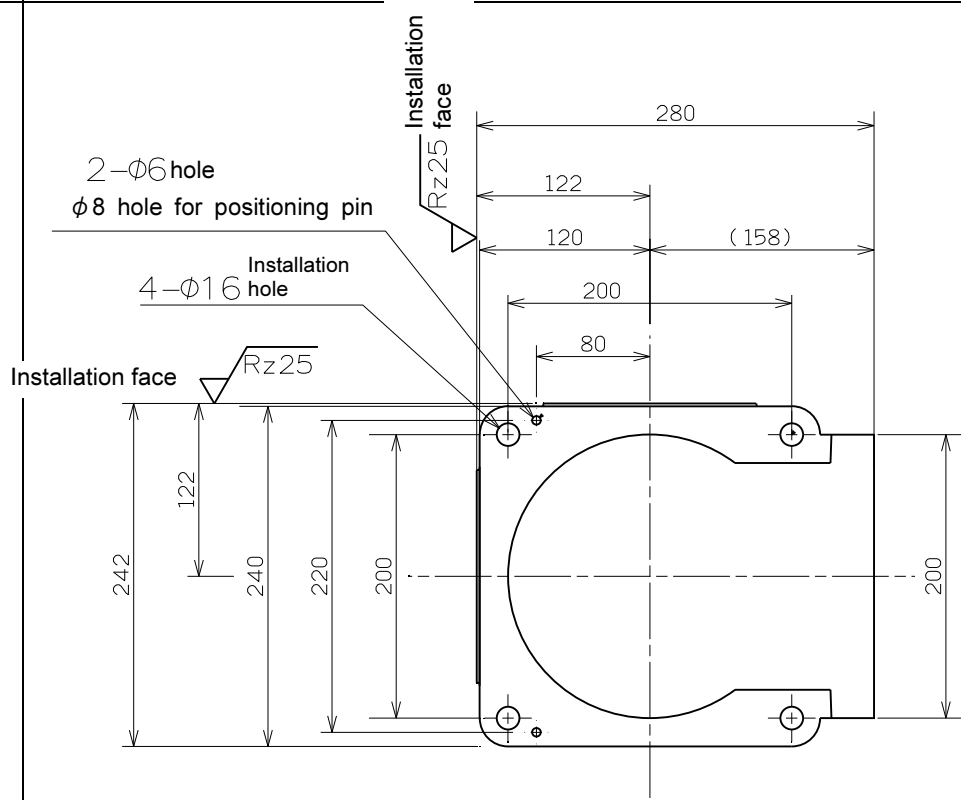
■ **Installation space**

To install the robot, lock the base of the robot.

【ES06-01】



【ES12-01】



■ Accuracy of installation surface

When installing robot, strictly observe precautions below to cause no deformation in the swivel base.

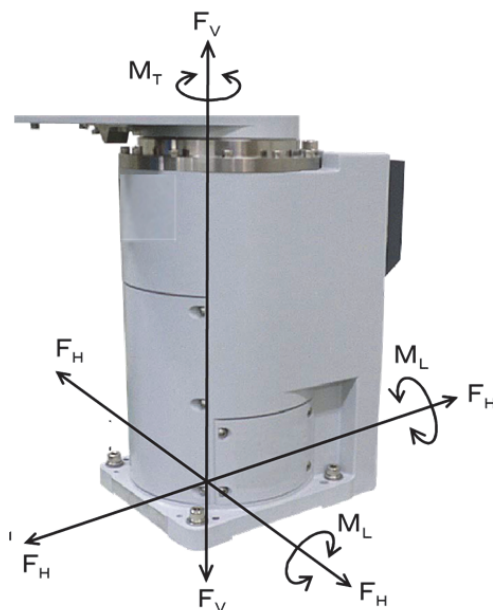
- (1) Install robot on horizontal and flat plane.
- (2) Deviation on the robot installation surface must fall within 0.1 mm.
- (3) The roughness of surface of the base plate is recommended less than Rz25. Rough surface may cause the position deviation trouble because robot can not contact base plate sufficiently.



■ Maximum robot generative force

While robot moves, large reaction force is applied to the installation base from all directions. Consequently, foundation must be considered sufficient stiffness and rigidity. Please refer to the following values to determine the foundation.

	Dimension	Value
ES06-01 series		
Tambling moment: M_L	N·m	1,640
Twisting moment: M_T	N·m	710
Horizontal generative force: F_H	N	1,653
Vertical generative force: F_V	N	2,318
ES12-01 series		
Tambling moment: M_L	N·m	3,190
Twisting moment: M_T	N·m	1,840
Horizontal generative force: F_H	N	2,240
Vertical generative force: F_V	N	2,500



6. Allowable wrist load



CAUTION

Load fixed on the tip of wrist is regulated by “allowable payload mass”, “allowable static load torque”, and “allowable moment of inertia”. Strictly keep the wrist load within each allowable value. If wrist load exceeds the allowable value, this robot is out of guarantee. Refer to the table of “2. Basic specifications” and following figures for the detail of each specification.

■ Torque map

Use the robot under condition that COG of wrist load falls on the range of following figure.

[Caution] Wrist load is greatly affected by robot speed and pose. If its weight is within the permitted limit, vibration on arm or overload / over current error may occur. In that case, slow down the robot speed or try to adjust acceleration (D1 to 3).

Also is tool constant was not set correctly, similar phenomenon may occur.

[Caution] Overhang amount such as moment and inertia written here is a dynamic limitation which is determined by motor and reduction gear specification. Guaranteed repeatability is at the center of mechanical interface surface. If long and low rigidity tool is mounted and working point is far from the center, positioning repeatability becomes worse or vibration on arm occur.

Allowable offset distance (Z direction) from bottom edge of shaft to tool COG is 100mm.

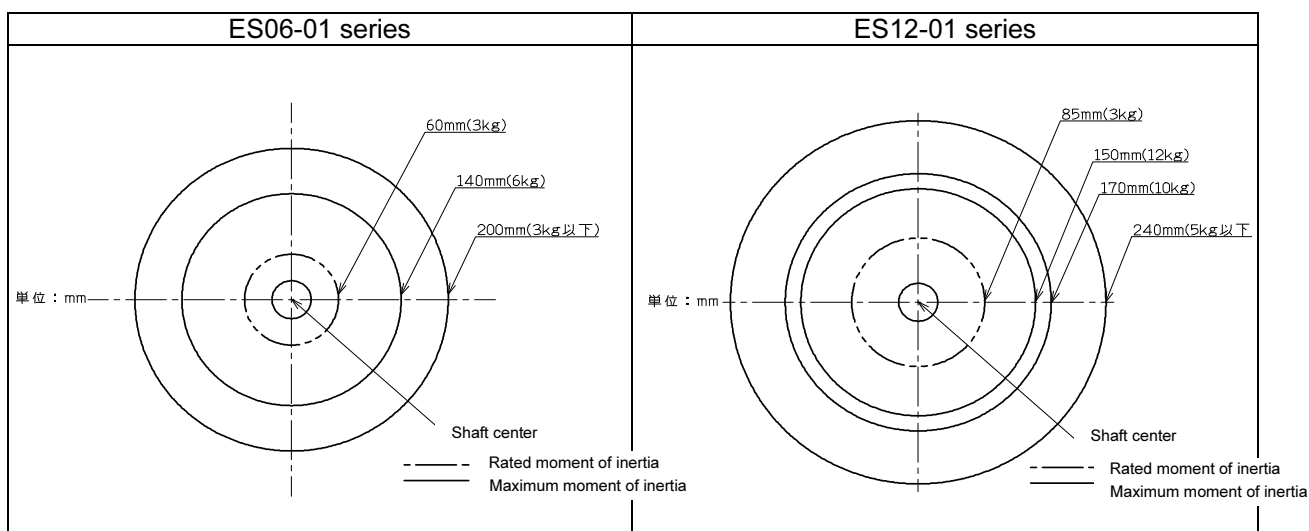
[Caution] Although tool is within the permitted limit, overload error may occur if robot continuously moves to upward in extremely slow speed. In such case, robot speed needs to be modified much faster.

[Caution] Acceleration is automatically limited if tool COG becomes further from shaft center.

Allowable offset distance from shaft center to tool COG is

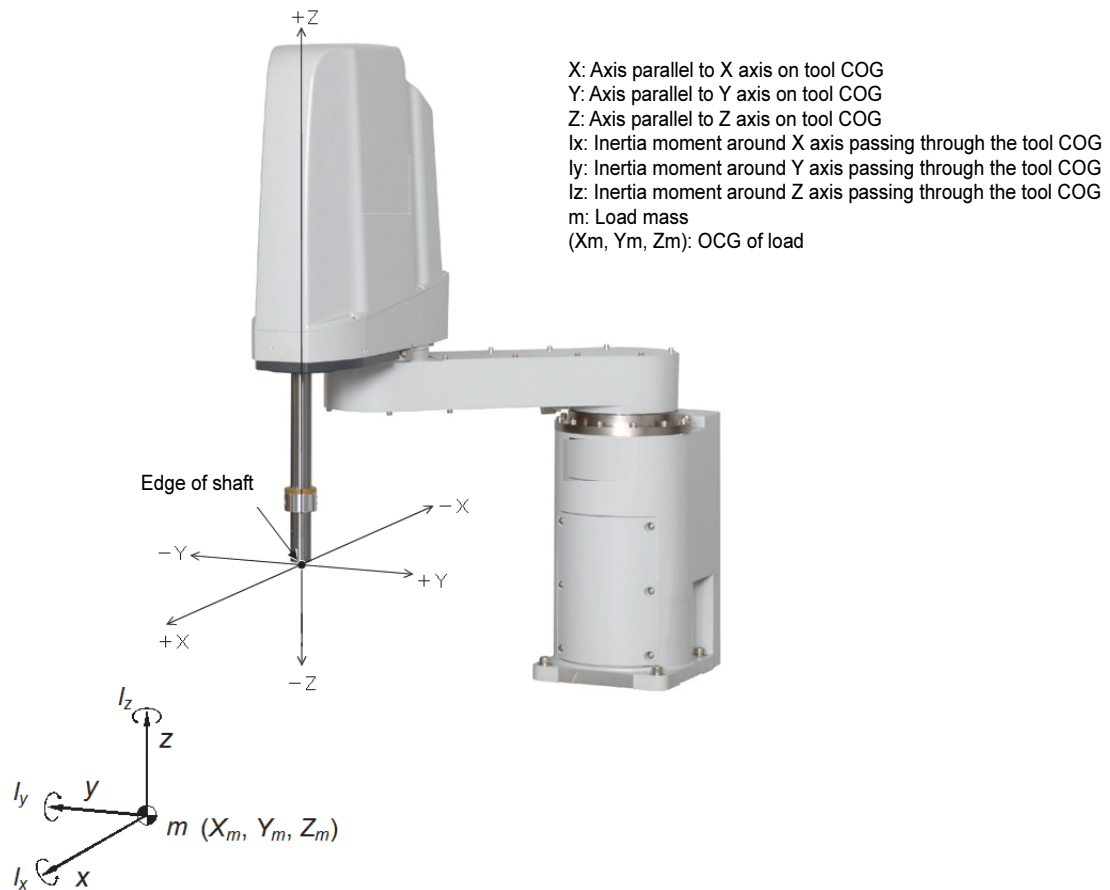
ES06 : 200mm or shorter

ES12 240mm or shorter.



■ How to find the inertia moment of each axis

The following section shows general methods of calculating the inertia moment around each axis.



Inertia moment around each axis

- $I_Z = m \cdot (X_m^2 + Y_m^2) + I_z$
- $I_X = m \cdot (Y_m^2 + Z_m^2) + I_x$
- $I_Y = m \cdot (X_m^2 + Z_m^2) + I_y$

7. Option specifications

№	Name	Parts No.	Specifications	Robot model	
				ES06-01	ES12-01
1	Axis1 changing operation range	OP-S5-029	Attachment work needs to be done by customer	☐	
		OP-S5-030	Attachment work needs to be done by customer		☐
2	Solenoid valve set	OP-H4-010	Sink type 1 valve	☐	
		OP-H4-011	Sink type 2 valves	☐	
		OP-H4-012	Sink type 3 valves	☐	
		OP-H4-013	Sink type 4 valves	☐	
		OP-H5-012	Source type 1 valve	☐	
		OP-H5-013	Source type 2 valves	☐	
		OP-H5-014	Source type 3 valves	☐	
		OP-H5-015	Source type 4 valves	☐	
		OP-H6-006	Sink type 1 valve		☐
		OP-H6-007	Sink type 2 valves		☐
		OP-H6-008	Sink type 3 valves		☐
		OP-H6-009	Sink type 4 valves		☐
		OP-H7-002	Source type 1 valve		☐
		OP-H7-003	Source type 2 valves		☐
		OP-H7-004	Source type 3 valves		☐
		OP-H7-005	Source type 4 valves		☐
3	Gripper output cable	OP-F10-015	With robot connector (other side is not manufactured)	☐	☐
4	Gripper input cable	OP-F10-013	With robot connector (other side is not manufactured)	☐	
		OP-F10-014	With robot connector (other side is not manufactured)		☐
5	Gripper curl tube	OP-H1-019	For 4 valves $\phi 4 \times 8$	☐	
		OP-H1-020	For 4 valves $\phi 6 \times 8$		☐
6	External wires and tubes box	OP-H2-003	For 4 valves $\phi 4 \times 8$	☐	
		OP-H2-004	For 4 valves $\phi 6 \times 8$		☐
7	Internal wires and tubes set For gripper	OP-H1-021	8 input / 2 power / $\phi 4-8$ / for 200mmSt.	☐	
		OP-H1-022	8 input / 2 power / $\phi 4-8$ / for 340mmSt.	☐	
		OP-H1-023	8 input / 2 power / $\phi 6-4$ / for 350mmSt.		☐
		OP-H1-024	8 input / 2 power / $\phi 6-4$ / for 450mmSt.		☐
8	Zeroing pin	OP-T2-095	To adjust zero position (reference position)	☐	☐

<ES06-01 option specification>

ES06 series



Refer to "2. Basic specifications" for detail.

Solenoid valve set

- OP-H4-0** (Sink type)
(**: 10~13=1~4 valves)
- OP-H5-0** (Source type)
(**: 12~15=1~4 valves)



With gripper output cables

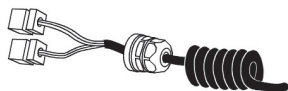
Gripper output cable

- OP-F10-015(4 valves)



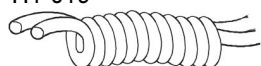
Gripper input cable

- OP-F10-013



Gripper curl tube

- OP-H1-019

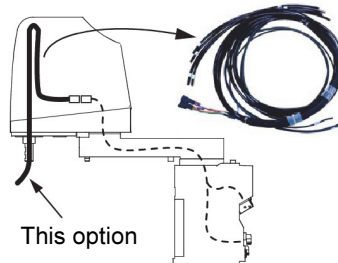


Axis1 changing operation range

- OP-S5-029

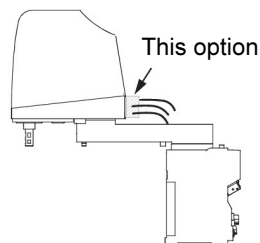
Internal wires and tubes set for gripper

- OP-H1-021(200mm stroke)
- OP-H1-022(340mm stroke)



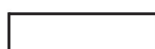
External wires and tubes box

- OP-H2-003

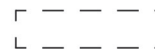


Gripper (prepared by customer)

[Notes]



Standard



Option



Prepared by customer

<ES12-01 option specification>

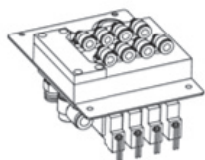
水平多関節形
(ES12 シリーズ)



Refer to "2.Basic specifications" for detail.

Solenoid valve set

- OP-H6-0** (Sink type)
(**: 06~09=1~4 valves)
- OP-H7-0** (Source type)
(**: 02~05=1~4 valves)



With gripper output cables

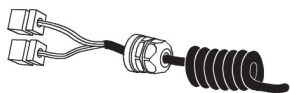
Gripper output cable

- OP-F10-015(4 valves)



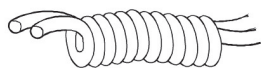
Gripper input cable

- OP-F10-014



Gripper curl tube

- OP-H1-020

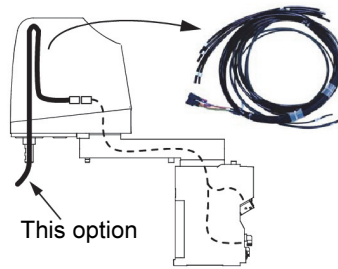


Axis1 changing operation range

- OP-S5-030

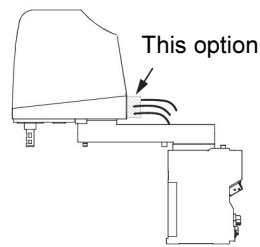
Internal wires and tubes set for

- OP-H1-023 (350mm stroke)
- OP-H1-024 (450mm stroke)



External wires and tubes box

- OP-H2-004



Gripper (prepared by customer)

[Notes]

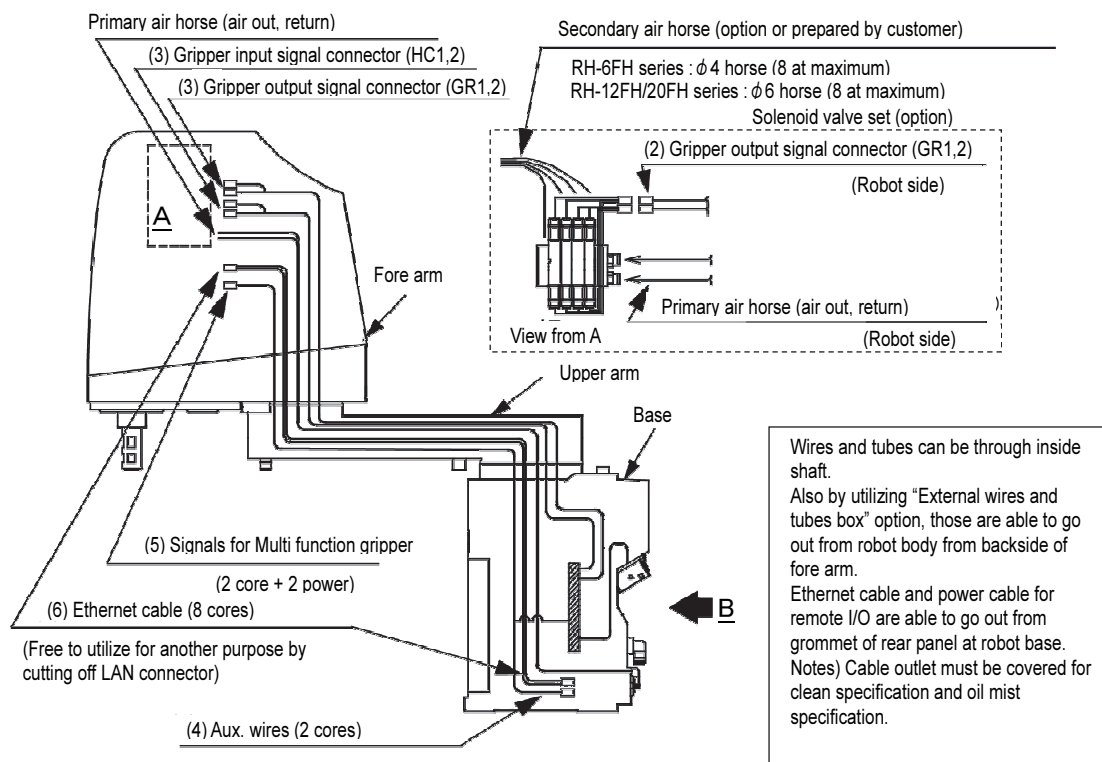
 Standard

 Option

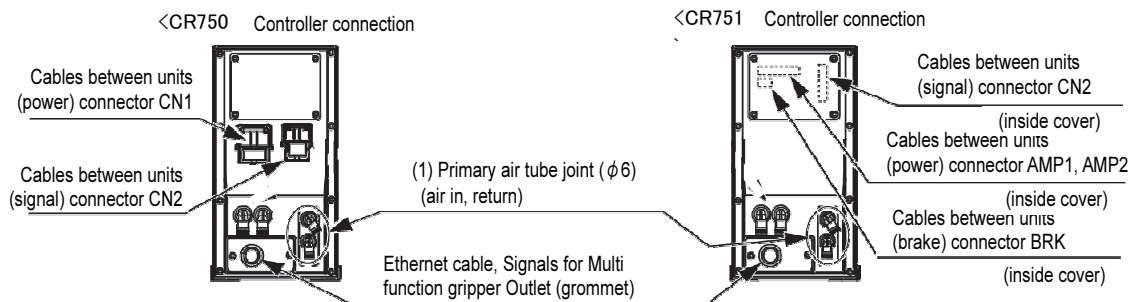
 Prepared by customer

8. Application wires and tubes diagram

■ Exterior of Gripper wires and tubes



Robot back side view; B

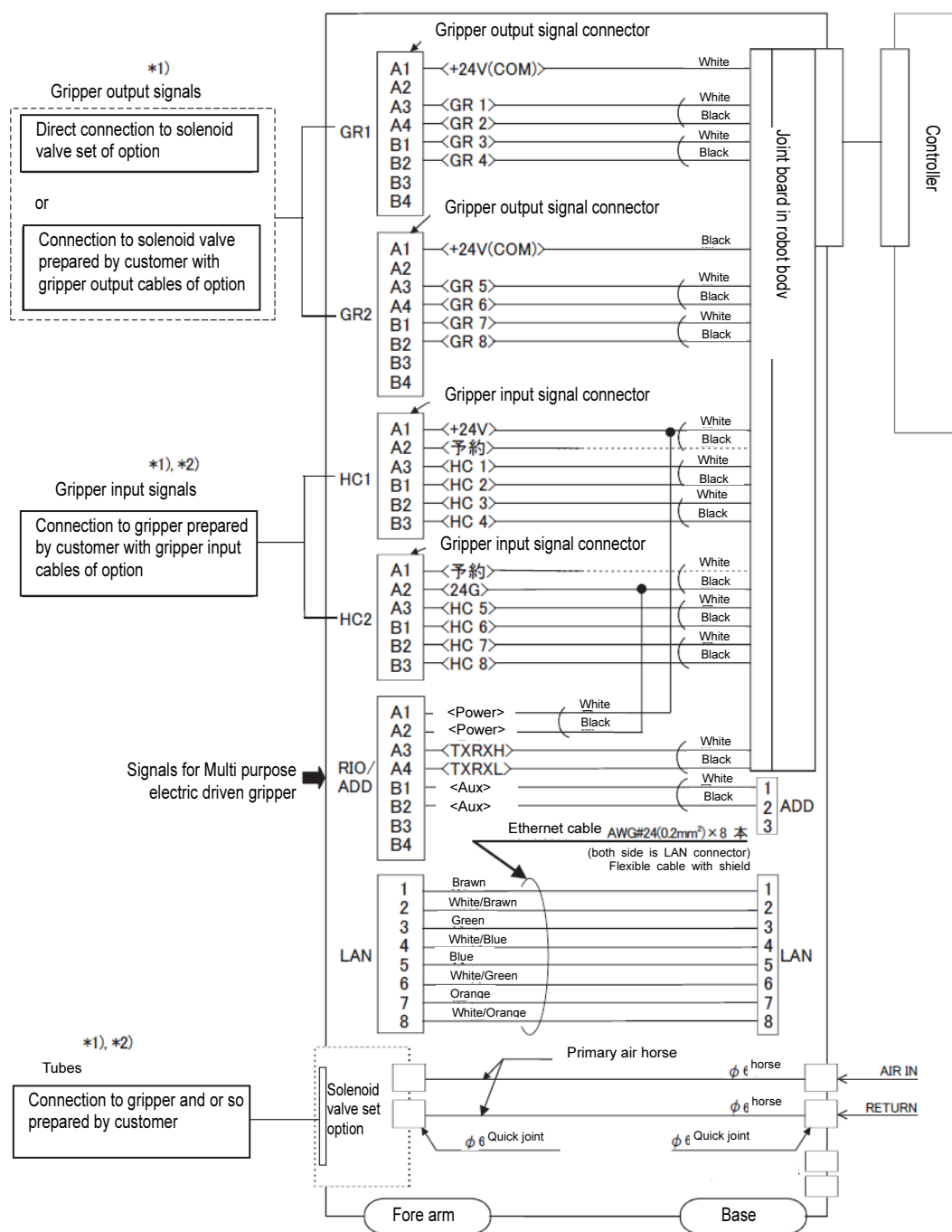


Connector and joint

Parts No.	Name	Q'ty	Robot side (accessory of robot)		Opposite (prepared by customer)		Manufacturer
			Connector, Joint	Connector pin	Connector	Connector pin	
(1)	Joint	2	UKBL6	-	-	-	KOGANEI
(2)	Connector	2	1-1717834-4	1318108-1	1-1318115-4	1318112-1	TE connectivity
(3)	Connector	2	1-1717834-3	1318108-1	1-1318115-3	1318112-1	TE connectivity
(4)	Connector	1	1-1318117-3	1318112-1	1-1318120-3	1318108-1	TE connectivity
(5)	Connector	1	2-1717834-4	1318108-1	2-1318115-4	1318112-1	TE connectivity
(6)	Connector	1	TM21P-88P	-	-	-	

Note1) 1 for ES06 series, 2 for ES12 series of Clean specification, 1 for all model of Oil mist specification, Nothing for standard specification.

■ Connection of Gripper wires and tubes



*1) By utilizing “External wires and tubes box” option, gripper I/O cables and horses are able to go out from robot body. This option contains following parts.

ES06-01 series : primary air tube φ6, 2 joints, secondary air tube φ4 and 8 joints

ES12-01 series : primary air tube φ6, 2 joints, secondary air tube φ6 and 8 joints

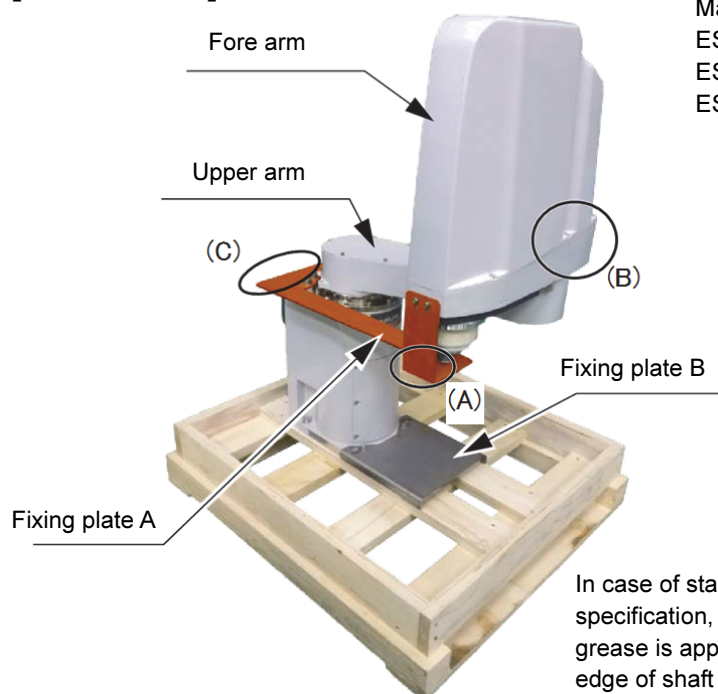
*2) By utilizing “Internal wires and tubes set for gripper” option, gripper I/O cables and air horses is able to get through inside shaft. This option contains following parts.

ES06-01 series : air horse φ4 x 8, gripper input cables (8 signals and 2 powers)

ES12-01 series : air horse φ6 x 4, gripper input cables (8 signals and 2 powers)

9. Transport procedure

【ES06-01 series】

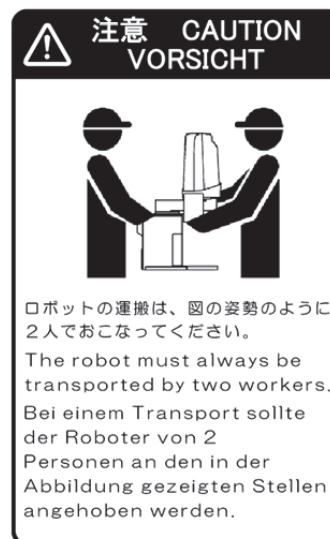


Mass

ES06-35**-01 series: Approx. 39kg

ES06-45**-01 series: Approx. 40kg

ES06-55**-01 series: Approx. 41kg



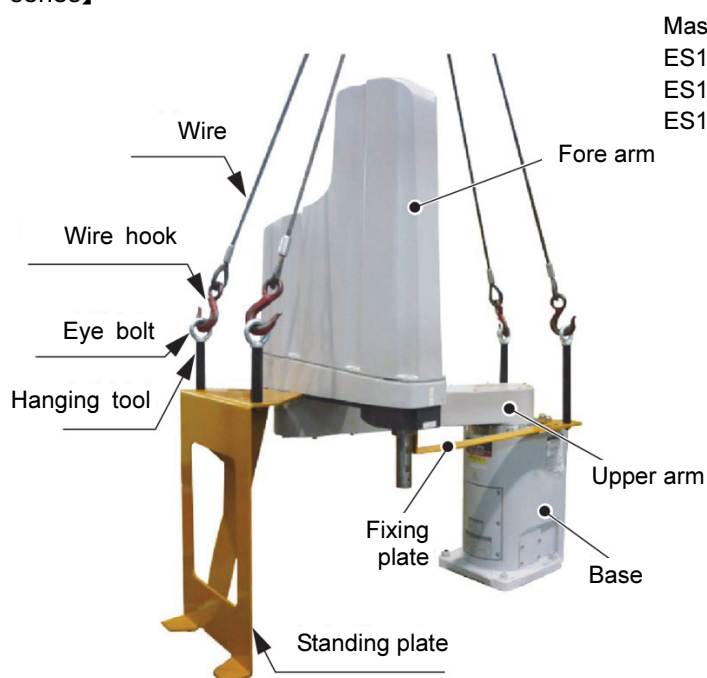
- 1) Do not dismantle fixing plate A and B before transporting. Transport the robot by 2 persons. Use a carrying table to the place near the installation position. When unloading robot from carrying table and determine the strict position of installation, please follow the procedure written below.
- 2) One person holds the fore arm (A) side and (B) side of fixing plate A, and another person holds the base side (C) of fixing plate A. Never hold robot cover directly. Robot cover may be broken or robot itself may fall down, resulting in serious injury. Pay utmost attention not to apply excessive force to robot over and robot body.
- 3) After installing robot, dismantle the fixing plate A and B.

 CAUTION	Never hold left/right side of robot arm and never hold robot cover.
 CAUTION	Do not apply excessive force to the shaft (axis 3). Shaft may be damaged and overload error may occur when operating robot.
 CAUTION	When mounting fixing plate again for transportation, make the robot pose written in table 9-1.
 CAUTION	Do not make robot side-way. Grease may ooze out, causing unexpected trouble.
 CAUTION	In case of clean specification, Ventilation duct is mounted at rear side of robot base. Pay attention to it when transporting and installing robot.

Table 9-1 Robot pose for transportation (ES06-01 series)

Axis	ES06-35**-01	ES06-45**-01	ES06-55**-01
J1	57.5°	28°	19°
J2	-147.5°	-118°	-109°
J3	-49.6mm		
J4	Not fixed		

【ES12-01 series】



Mass

ES12-55**-01 series: Approx. 65kg

ES12-70**-01 series: Approx. 67kg

ES12-85**-01 series: Approx. 69kg

In case of standard specification, anti-rust grease is applied at the edge of shaft (J3).

- 1) Hook the wires to 4 eye bolts. (Check all hooks certainly.)
 - 2) Hang up the robot by crane and move to desired place.
 - 3) Never make interference wires with robot arm and cover. Insert cushion in the contacting point.
 - 4) Do not apply excessive force to robot when transporting it.
 - 5) After locating robot to installation place (refer to installation procedure) remove wire hook. And remove standing plate, hanging tool and fixing plate.
 - 6) When robot needs to be transported again, follow the same procedure as above.
- If hanging robot arm with improper tool or hanging robot of improper pose, robot components may be broken or robot will fall down because its COG position is not in center.

 CAUTION	Use 4 wires without fail when transporting robot.
 CAUTION	When mounting fixing plate again for transportation, make the robot pose written in table 9-2.
 CAUTION	Do not make robot side-way. Grease may ooze out, causing unexpected trouble.
 CAUTION	In case of clean specification, Ventilation duct is mounted at rear side of robot base. Pay attention to it when transporting and installing robot.

Table 9-2 Robot pose for transportation (ES12-01 series)

Axis	ES12-55**-01	ES12-70**-01	ES12-85**-01
J1	-37.5°	-21.4°	-15.1°
J2	127.5°	111.4°	105.1°
J3 (*)	0mm		
J4	Not fixed		

(*) When J3 axis is operated to the end of stopper, its shaft will hit the floor.
So never forget to move robot arm to the above pose before transportation.

10. Delivery style (specification which contains a robot)

1. There are three styles as shown below.

	Style	Details
1	Delivery on the truck	Robot is delivered on the truck near the entrance of customer's plant. (Installation and test-run is not included)
2	Delivery after installation and test-run	Robot is installed and test-run is done. (Teaching with work piece is not included.)
3	Delivery after installation and teaching with work piece	After style 2, teaching with work piece is done.

Because the expense is different, which form to choose be sufficiently examined.

2. Operation and maintenance education

The special spot operation guide and the special spot preservation guide are the outside of the estimation. Consult with each NACHI-FUJIKOSHI office for the details as for the schooling system.

11. Consuming power (Robot + Controller)

0.4 kVA at maximum (may vary according to the application and motion pattern.)

12. Paint color (Robot + Controller)

Standard color	Controller cabinet	Munsell 0.6B7.6/0.2
	Robot body	Munsell N1.5

13. Warranty

Elapse of 1 year after delivery

The specification and externals described in this document might change without a previous notice for the improvement.

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