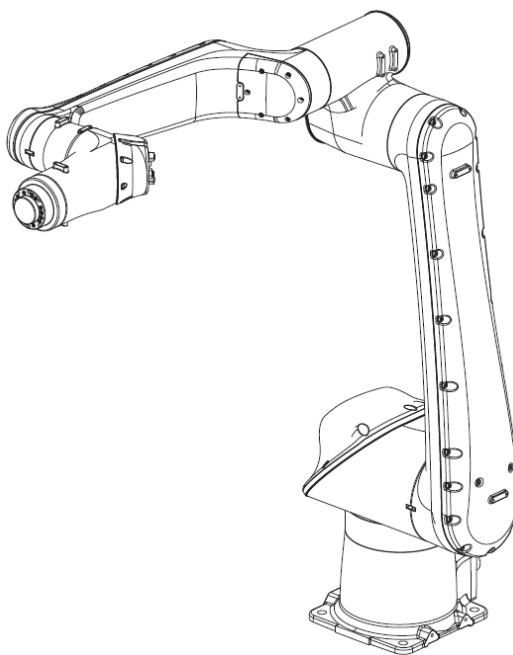


**NACHI**

Standard specifications

**CZ10-01 [CCZ]**

11th edition



**NACHI-FUJIKOSHI CORP.**

2112, SCZEN-113-011, 001

## Table of Contents

1. Outline.....	1
2. Basic specifications.....	4
3. Dimensions .....	5
4. Details of load mounting face.....	7
5. Installation procedure.....	8
6. Allowable wrist load.....	12
7. Options.....	15
8. Application wiring and piping diagram .....	16
9. Transport procedure.....	21
10. Delivery /Service (Specification including a robot) .....	22
11. Consuming power (Robot + Controller).....	22
12. Paint color .....	22
13. Warranty.....	22

## 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.

Features of the "CZ10-01".

(Safety functions)

- It can secure the minimum space of 25mm or more to prevent pinching as inherent safety.
- Detect the contact between the worker and robot by the torque sensing system that is equipped at each axis, and stops for safety.
- ISO10218-1 certified by third party.  
(One requirement for the collaborative work (\*) ; people and the robot work in the same space.)

(Operability)

- Teaching work can be performed easily by customers since it has the direct teaching function.
- Intuitive teaching is enabled since the inline wrist structure is adopted.
- Digital I/O connector for application and the built-in air piping are applied at the wrist part, so it can reduce the construction burden of the customers.

Also, this manual is for the robot's specification, so for please refer to the “Standard specification CCZ controller” (SCCZEN-016) of the separated manual regarding the controller.

(\*) Collaborative work

Robot is operated with sharing the same space with workers.

Nachi supplies the robot CZ10-01 to be used for collaborative work, but Nachi never guarantee the safety of system itself.

Risk assessment base on ISO10218-2 (Robots and robotic devices -- Safety requirements for industrial robots) is required for customer when collaborative robot is used.

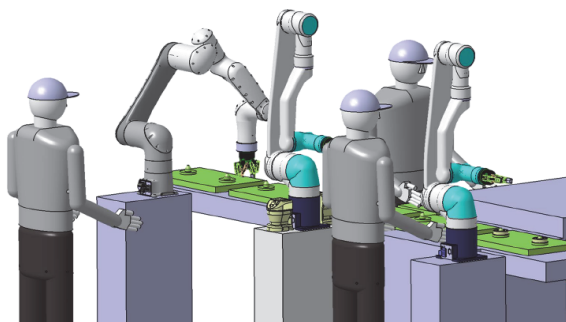


Image of collaborative work

Please confirm the followings.

- Workers are not pinched by the obstacles (work-piece tray, equipment and or so) in moving envelope, and the obstacles never occupy the evacuation way.
- Risk must be reduced, which exists in environment that end effector mounted on robot is sharp, is high temperature, is dangerous moving, and or so.
- Robot speed is considered to be slow down in order to avoid the injury of workers.
- In non-collaborative mode, do not forget that robot never stop automatically when contacting workers.

Also due to the limit of technological reason, remaining risks listed below exist in this robot. Before using this robot these remaining risks need to be reduced by risk assessment.

- Human body part thicker than 25mm may be pinched by robot.
- Human body which is highly possible to contact with robot, such as head, face, eyes and or so, need to be protected using protector.
- Robot joint will stop when detecting unexpected torque, however, closing position from joint may not stop because detecting sensitivity is low.

ZERTIFIKAT ◆ CERTIFICATE ◆ 認 証 證 書 ◆ CERTIFICADO ◆ CERTIFICAT




Product Service

## CERTIFICATE

No. Z1 063642 0017 Rev. 01

**Holder of Certificate:** **NACHI-FUJIKOSHI CORP.**  
 1-1-1 Fujikoshi-Honmachi  
 Toyama, Toyama  
 930-8511 JAPAN

**Certification Mark:**



**Product:** **Robot system**

**Model(s):** **CZ10-01-CCZ-0000**  
**(CZ10-01: Robot, CCZ-0000: Controller)**

**Parameters:**

Rated voltage:	AC 200 - 220 V (Single Phase)
Rated frequency:	50 / 60 Hz
Rated current:	15 A
Protection class:	I

**Tested according to:**

- EN ISO 10218-1:2011
- EN ISO 12100:2010
- EN 60204-1:2018
- EN ISO 13849-1:2015
- EN ISO 13850:2015
- ISO/TS 15066:2016

The product was tested on a voluntary basis and complies with the essential requirements. The certification mark shown above can be affixed on the product. It is not permitted to alter the certification mark in any way. In addition, the certification holder must not transfer the certificate to third parties. This certificate is valid until the listed date, unless it is cancelled earlier. All applicable requirements of the testing and certification regulations of TÜV SÜD Group have to be compiled. For details see: [www.tuvsud.com/ps-cert](http://www.tuvsud.com/ps-cert)

**Test report no.:** 73568054-01  
**Valid until:** 2026-09-28

**Date,** 2021-09-29

  
 ( Arnaud Viger )

Page 1 of 1  
 TÜV SÜD Product Service GmbH • Certification Body • Ridlerstraße 65 • 80339 Munich • Germany



Certification of TUV

UL/CSA is certified as standard.

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UCB\_F\_12.02 2012-02



# CERTIFICATE

No. U8 18 06 63642 018

**Holder of Certificate:** NACHI-FUJIKOSHI CORP.

1-1-1 Fujikoshi-Honmachi  
Toyama  
Toyama  
930-8511 JAPAN

**Production Facility(ies):** 63714

**Certification Mark:**



**Product:** Robot system  
Collaborative robot system

**Model(s):** CZ10-01-CCZ-0000

**Parameters:**

Rated Input Voltage:	200-200 V AC (1 phase)
Rated Frequency:	50/60 Hz
Rated Input Current:	1.0 kVA
Protection class:	I
Ambient Temperature:	45°C

**Tested according to:** CAN/CSA C22.2 Z434-03  
CAN/CSA C22.2 No. 73-83  
UL 1740:2015

The product was voluntarily tested according to the relevant safety requirements noted above. It can be marked with the certification mark above. The mark must not be altered in any way. This product certification system operated by TÜV SÜD America Inc. most closely resembles system 3 as defined in ISO/IEC 17067. Certification is based on the TÜV SÜD "Testing and Certification Regulations". TÜV SÜD America Inc. is an OSHA recognized NRTL and a Standards Council of Canada accredited certification body.

**Test report no.:** 73570856-000

**Date,** 2018-06-25

Page 1 of 1



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TUV®

UL/CSA Certification

## 2. Basic specifications

Item		Specifications
Robot type		CZ10-01
Structure		Articulated
Degree of Freedom		6
Drive system		AC servo motor
Maximum motion range <sup>*1</sup>	Axis 1	±2.96rad (±170 °)
	Axis 2	-1.30~+3.92rad (-75~+225 °)
	Axis 3	-1.34~3.96rad (-77~+227 °)
	Axis 4	±3.14rad (±180 °)
	Axis 5	±2.96rad (±170 °)
	Axis 6	±6.28rad (±360 °)
Maximum Velocity <sup>*2</sup>	Axis 1	2.09rad/s (120 ° /s)
	Axis 2	2.09rad/s (120 ° /s)
	Axis 3	3.14rad/s (180 ° /s)
	Axis 4	3.14rad/s (180 ° /s)
	Axis 5	3.14rad/s (180 ° /s)
	Axis 6	3.14rad/s (180 ° /s)
Maximum payload	Wrist	10kg
Maximum static load torque	Axis 4	25.9 N · m
	Axis 5	25.9 N · m
	Axis 6	5.9 N · m
Maximum moment of inertia <sup>*3</sup>	Axis 4	0.75 kg · m <sup>2</sup>
	Axis 5	0.75 kg · m <sup>2</sup>
	Axis 6	0.08 kg · m <sup>2</sup>
Position repeatability <sup>*4</sup>		±0.08mm
Maximum Reach		1300mm
Air piping		φ 4 × 1 <sup>*5</sup>
Application signal line		(Digital Input) × 4, (Digital Output) × 3
Mounting Condition		Floor / Inverted
Ambient conditions		Temperature: 0 to 45 °C <sup>*6</sup> Humidity: 20 to 85 %RH (No dew, nor frost allowed) Vibration to the installation face: Not more than 0.5G (4.9 m/s <sup>2</sup> ) <sup>*7</sup>
Protection class <sup>*8</sup>		IP65 equivalent (dust-proof and moisture-resistant)
Noise level <sup>*9</sup>		70 dB
Robot weight		61 kg

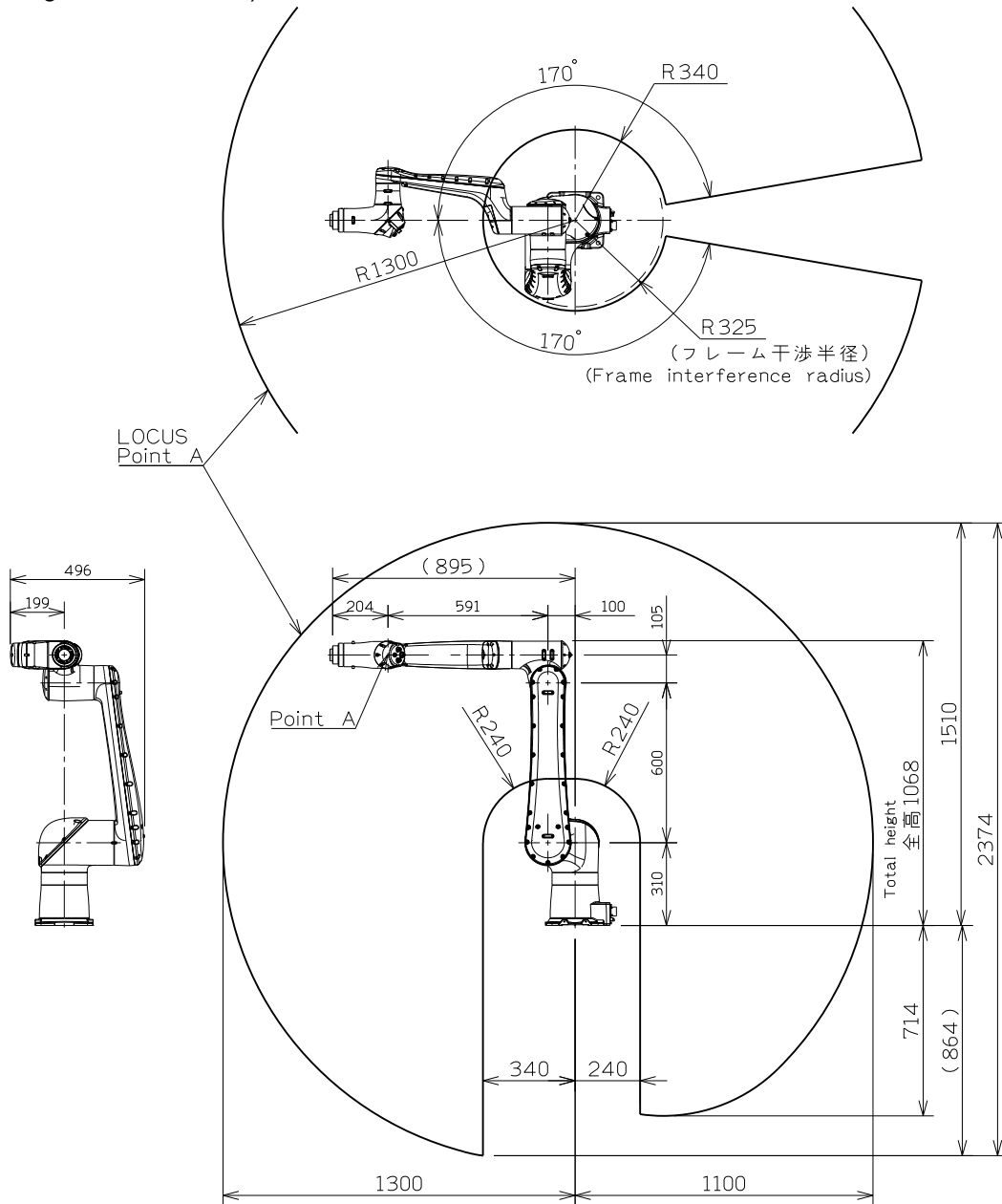
1[rad] = 180/π[°], 1[N·m] = 1/9.8[kgf·m]

- Axis 1 - Axis 6 are displayed as J1-J6 each on the controller screen.
- Specifications are subject to change without prior notice for technical changes.
- Explosion-proof version is not available.

\*1: Maximum operation angle of the each axis. \*2: Above specifications show maximum score of each item, and maximum 250mm/s when in the collaborative operation. \*3: Maximum moment of inertia of a wrist changes with load conditions of wrist. \*4: JIS B 8432 conformance. \*5: Air pressure must be lower than 0.5MPa. \*6: Using at 1000m or lower sea level. Ambient temperature has limitations when allowable altitude is exceeded. \*7: When using this robot in collaborative mode, robot may stop due to the vibration of floor or gripper. \*8: Liquid such as organic compound, acidity, alkalinity, chlorine or gasoline cutting fluid which deteriorates the seal material are not available to use. Wire harness part is equivalent of IP54, and the controller is equivalent of IP20. \*9: Robot noise is A-weighted equivalent sound level measured under "JIS Z 8737-1" (ISO 11201) with maximum payload and maximum velocity.

### 3. Dimensions

【CZ10-01】  
(Mounting condition: Floor)



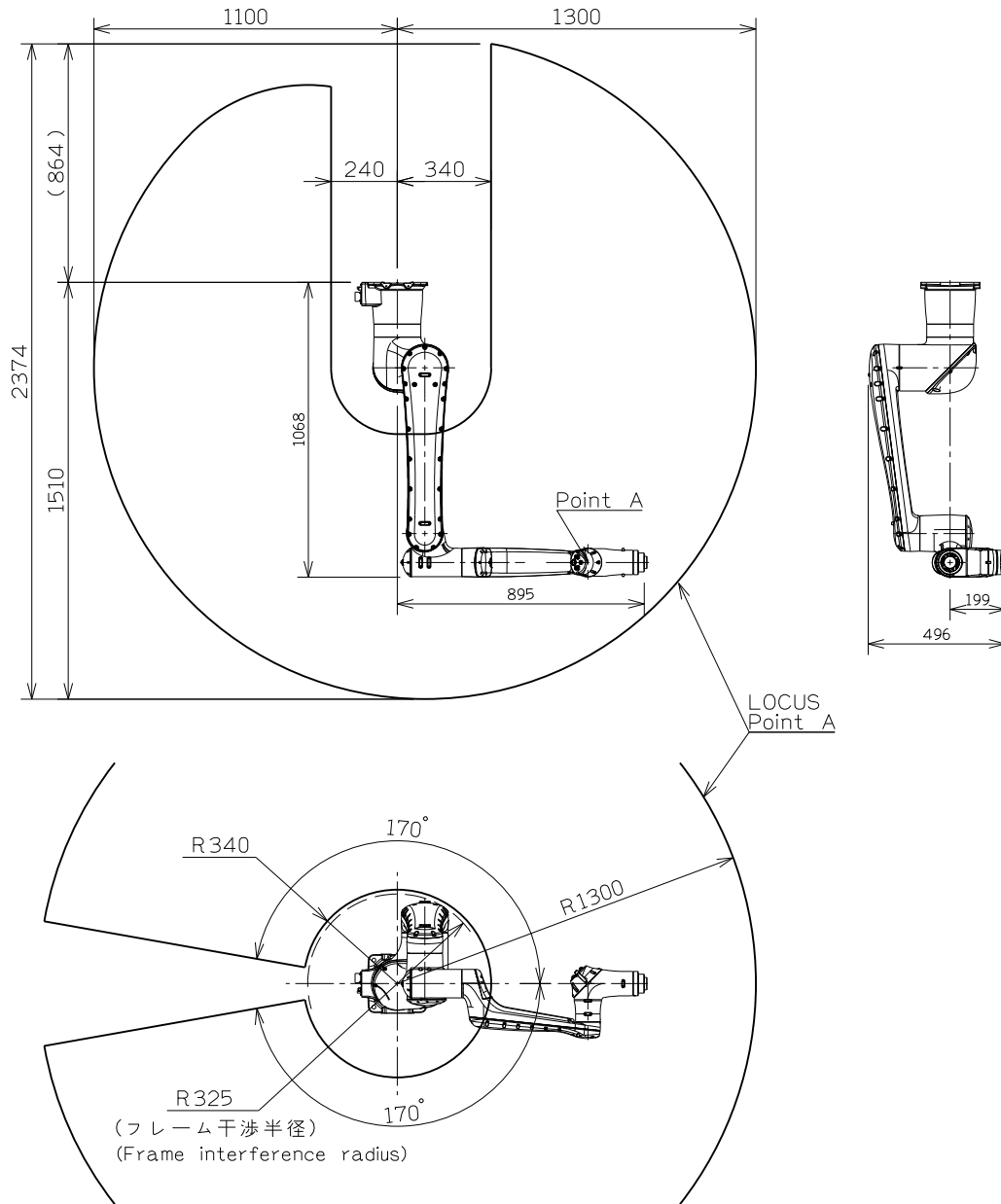
\*The above operation range diagram is the operation range diagram of POINT A when 1<sup>st</sup>, 2<sup>nd</sup> and 3<sup>rd</sup> axis are operated. When the 4<sup>th</sup> and 5<sup>th</sup> axis are operated, the operation range may become smaller than the above.

\*POINT A is the rotation center of the axis 5, and there is 204mm to the tool flange origin. (Refer to the 4.Details of load mounting face.)

\*When using this robot in collaborative mode, robot raiser must be designed as rigid as possible. If raiser has vibration due to the robot movement or environmental condition, CZ10 robot may stop by the interference detection error.

\*When using this robot in collaborative mode, keep the flatness of robot installation smaller than +/- 0.5 degree.

(Mounting condition: Inverted) Operation range is same as floor-mount.




\*When using this robot in collaborative mode, robot raiser must be designed as rigid as possible. If raiser has vibration due to the robot movement or environmental condition, CZ10 robot may stop by the interference detection error.

\*When using this robot in collaborative mode, keep the flatness of robot installation smaller than +/- 0.5 degree.

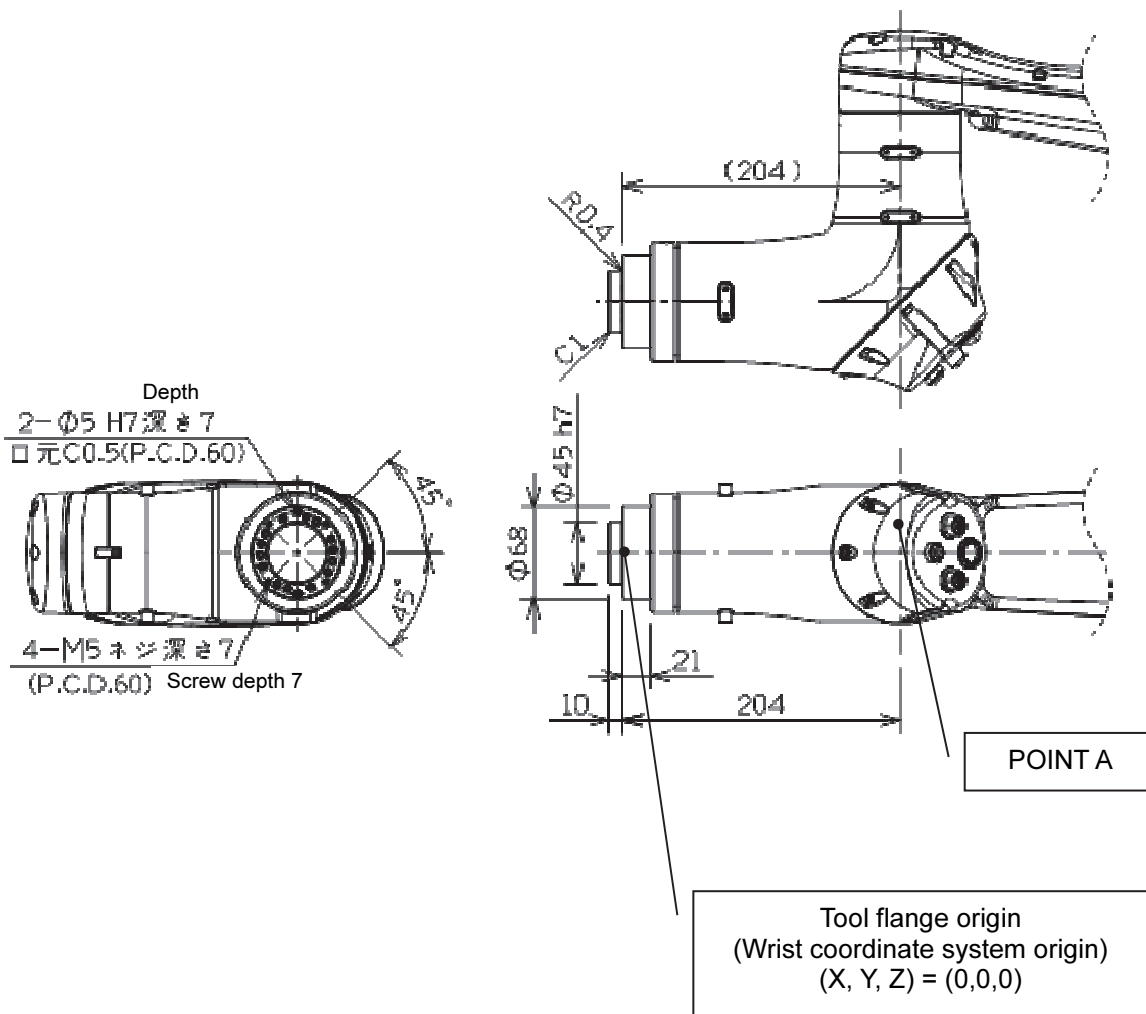


### 4. Details of load mounting face

For the tool fixing bolts, use the mounting P.C.D. shown in the following figures.

 <b>CAUTION</b>	Be sure to screw the depth of the M5 tool installation bolts 5mm or more of bolt diameter and less than the screw depth of the installation face. Screwing the bolts deeper than the screw depth may damage the wrist.
---	--








【CZ10-01】



## 5. Installation procedure

The installation location and the installation procedure of the robot are critical factors to maintain robot functions. The ambient conditions of installation location not only have influence on the life of mechanical sections of the robot, but also get involved in safety issues. Consequently, strictly observe the environmental conditions shown below. Furthermore, utmost care should be exerted for the installation procedure and the foundation for the robot in order to maintain the robot performance. Strictly observe the installation procedure for the robot provided below.



### ■ Safety measures for installation work

 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. If necessary, keep some space outside the operating range in order to secure safety.
 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.
 CAUTION	If ambient temperature is low, vibration, overload error and tracking error may occur at the beginning of starting robot (due to the condition of movement and payload). In such case, please start robot under 30% to 50% velocity override in approximately 5 minutes as test running, and gradually raise the speed up to 100%.
 CAUTION	Installation structures (robot raiser, etc.) may cause problems such as vibration and servo tracking error. If such problem occurs, please promptly improve the installation structure. If installation structures are kept using as they are, reliability and lifetime of not only the robot but also the installation structures may be damaged, due to the vibration and sudden braking of robot.

■ Installation location and ambient conditions

Conditions (temperature, humidity, height and vibration) are written in “Chapter 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.

 IMPORTANT	Our company's robot, controller and related option equipment are designed for general industrial use. Unless otherwise specified in the specifications or manuals, operations in special conditions and environments such as outdoor, X-ray environment, radiation environment, nuclear power control, aerospace equipment, public transportation, medical equipment, etc. are not assumed. Our company and its subsidiaries are not liable for any accidents, failures, etc., that may occur if the robot is used in such an environment without asking our company to do so.
 IMPORTANT	Using mounting condition that does not comply with specifications may cause the robot system to malfunction or fail prematurely. In that case, robot will be out of warranty. Please understand it in advance.

■ Installation procedure

While robot moves, large reaction force is applied to the swiveling base from all directions. Consequently, the robot should be installed in such a manner that the foundation endures reaction force caused by accelerating or decelerating the speed to lock the robot, needless to say that it endures static loads. Repair uneven spots, cracks, and others on the floor, and then install the robot by following the table below. If thickness of floor concrete is less than needed level, an independent foundation should be constructed. Inspect the foundation prior to the robot installation, and then construct the foundation, if necessary.

Female screw is necessary to the installation face. If this screw (M12) is made on the obstacles other than the foundation, we recommend the installation plate. Installation plate needs steel thicker than 25mm. If aluminum plate is used, heri-sert processing is necessary. Installation plate must be fixed to the foundation by anchor bolts.

	Standard mount
Thickness of floor concrete	Not less than 150 mm
Installation parts *1	4 bolts of M12×35 (JIS: Strength class 12.9) 4 plain washers of not less than 3.2 mm in thickness, Outer diameter φ26, and HRC35 in hardness
Tightening torque *2	104 N·m
Allowable repeated tensile *3	Approximately 1900 N



\*1; Installation parts are not accessory of robot. NACHI prepares installation parts as option (OP-F1-050).

\*2; Apply a coating of lubricating oil to the threaded parts of bolts, and then tighten bolts by using torque wrench to the specified tightening torque.

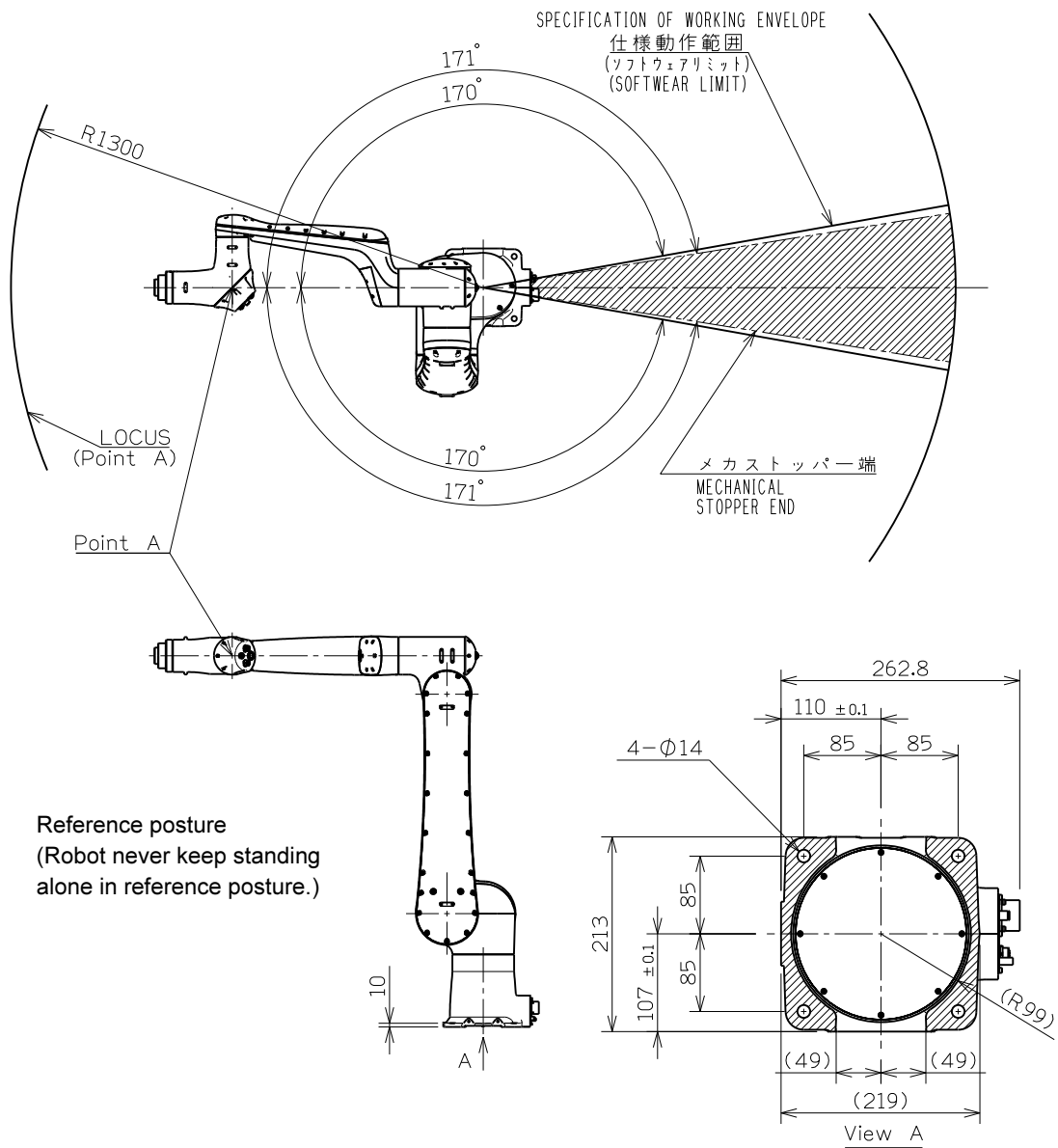
\*3; This tensile is per installation bolt when robot is installed with all bolts written in table above.

■ Installing dimension

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

 WARNING	The mechanical stopper end is located in a position exceeding the specified working envelope (software limit) of axis 1. To install the safety fence, with consideration given to the wrist configuration and the shape of tool.
 WARNING	Installation work should be done in transportation posture (refer to 9. Transport procedure), because robot COG is near the center of axis 1. If robot COG is not near the center of axis 1, such as reference posture written below, robot may fall down. Especially when dismounting installation parts from robot body, robot falls down immediately.

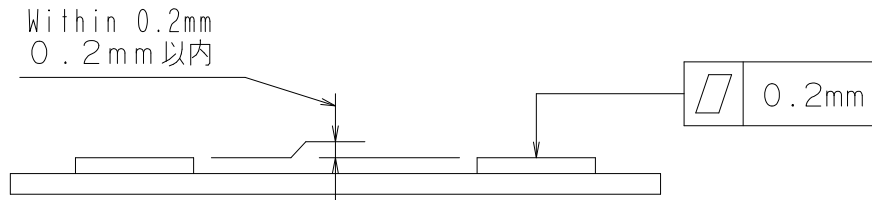
【CZ10-01】



■ Accuracy of installation surface

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

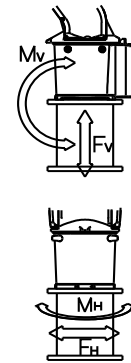
- (1) Keep the flatness of the 4 plates on the robot installation surface within 0.2 mm.
- (2) Keep the mutual error of the height of the plate (4 sheets) on the robot installation surface within 0.2 mm ( $\pm 0.1$  mm) relative to the installation surface.



- (3) When using this robot in collaborative mode, keep the flatness of robot installation smaller than  $\pm 0.5$  degree.

■ Maximum robot generative force




Robot model	Maximum Vertical generative force $F_V$	Maximum horizontal generative force $F_H$	Maximum Vertical generative moment $M_V$	Maximum horizontal generative moment $M_H$
CZ10-01	1,900N	1,200N	1,900Nm	1,400Nm



■ Safety measures for entering in the operation range of the robot when collaborative operation

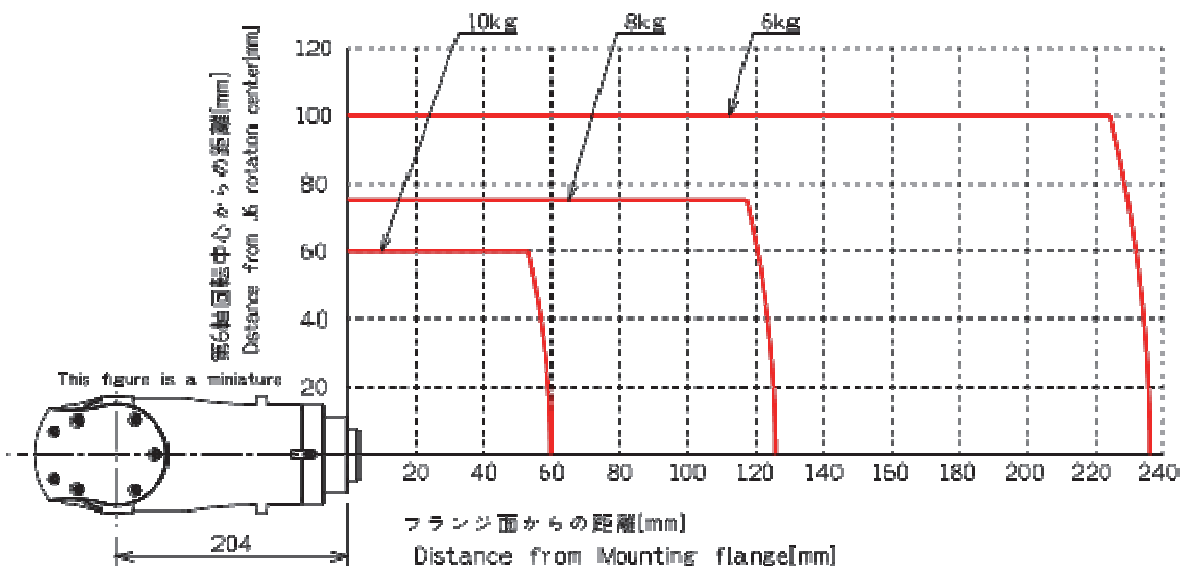
 WARNING	Please install the emergency stop button of the robot to the place where the worker can press immediately. If the emergency stop button is at the unreachable place then, the accidents may occur since the robot cannot be stopped. (There are external emergency stop input signal in the controller.)
 WARNING	Please install the sensor (Photoelectric switch/Mat switch etc.) that can detect the person entered in the robot operation range. If the person entered in, please switch to the collaborative operation automatically or stop the robot.
 WARNING	Please make sure that the robot operation range must be easy to distinguish the risk range by coloring the floor. If necessary, keep some space outside the operating range and paint the floor with different color in order to secure safety.
 WARNING	LED light (refer to 8. Application wiring and piping diagram) will turn on green when collaborative operation. If the LED light will not turn on then, please leave from the operation range of the robot immediately. And install the sign board in order that other person can understand the situation of robot.

## 6. Allowable wrist load

 CAUTION	<p><b>Make sure that the load fixed on the tip of the wrist stays in the allowable range of "Maximum payload", "Maximum static load torque" and "Maximum moment of inertia". If wrist load exceeds the allowable value, this is out of guarantee.</b></p> <p>Please refer to "2. Basic specifications" and following figures for the numeric value of the each condition.</p>						
 CAUTION	<p>Before using the robot, please register the "weight", "COG (center of gravity) position" and "inertia Moment" of wrist payload as the load condition. Robot is controlled to minimize the operating time according to the registered value.</p> <p>Therefore, even if the load condition was within the specifications, if that is incorrect, excessive acceleration will be generated, and reliability and life may be damaged.</p> <p>Even if the correct value is registered, vibration or servo tracking error may occur due to the insufficient rigidity of the payload. If such problem occurs, please adjust the "speed", "acceleration" and "smoothness". Those factors can be adjusted in every step. See the instruction manual for details.</p> <div style="border: 1px solid black; padding: 5px; margin: 10px 0;"> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="text-align: center;">Speed</td> <td style="text-align: center;">Acceleration(D)</td> <td style="text-align: center;">Smoothness(S)</td> </tr> <tr> <td style="text-align: center;"><b>10.0 mm/s</b></td> <td style="text-align: center;"><b>LIN A1 T1</b></td> <td style="text-align: center;"><b>D3S3</b></td> </tr> </table> </div> <p> CFD/CFDL/CCZ controller instruction manual BASIC OPERATIONS (TCFEN-160) 4.3 Teaching</p>	Speed	Acceleration(D)	Smoothness(S)	<b>10.0 mm/s</b>	<b>LIN A1 T1</b>	<b>D3S3</b>
Speed	Acceleration(D)	Smoothness(S)					
<b>10.0 mm/s</b>	<b>LIN A1 T1</b>	<b>D3S3</b>					



### ■ Torque map for wrist load

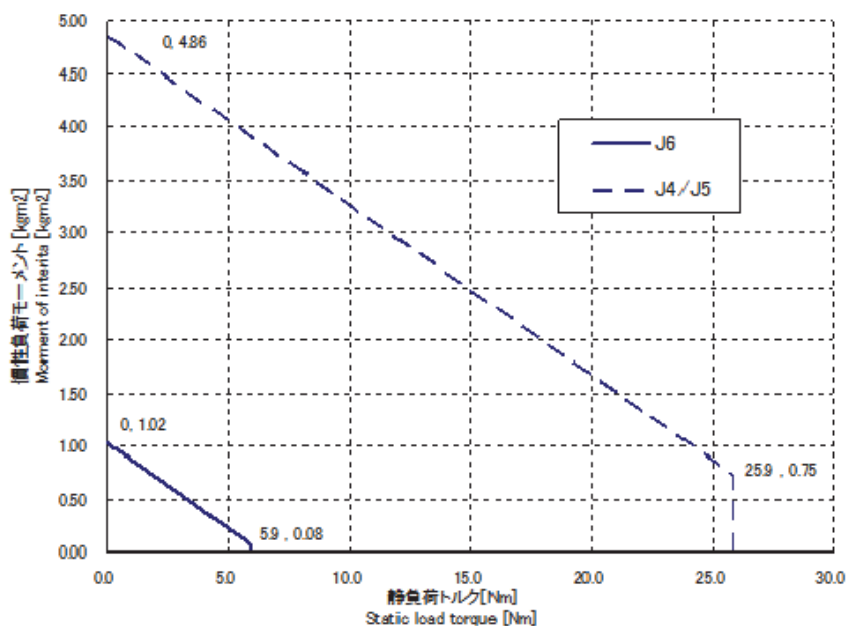
Use the robot under condition that COG of wrist load falls in the range shown in the torque map.



■ Moment of inertia map for wrist load

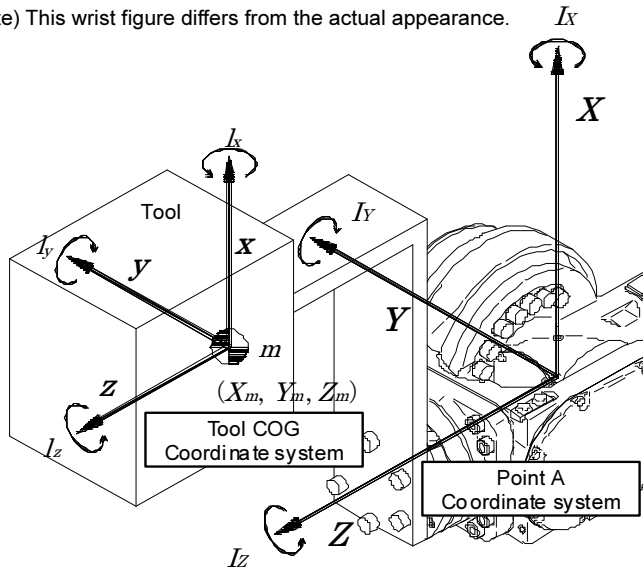
Use the robot under condition that static load torque and moment of inertia fall in the range shown in the figures below.

 <b>IMPORTANT</b>	<p>By setting the tool weight and COG (utilizing "Automatic COG setting") and setting the tool's moment of inertia correctly in advance, robot speed is automatically limited when the generated moment of inertia is going to be over the permitted level in high speed. Especially in case that tool's moment of inertia was high and that proper setting was not completed, robot lifetime may be shorter. It is strongly recommended to set the correct tool's moment of inertia.</p> <p>Please refer to the following instruction manual for detail.</p> <p> CFD/CFDL controller instruction manual "SETUP" "3.5.5 Tool's moment of inertia"</p>
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■ How to find the inertia moment of each axis

Note) This wrist figure differs from the actual appearance.



Point A coordinate system

Origin is Point A (intersection point of axis 6, 4 rotation center and axis 5 rotation center) and its X, Y and Z direction are defined as

- X: Perpendicular coordinate with Y, Z
- Y: Axis 5 rotation center when wrist is in reference position
- Z: Axis 6 and 4 rotation center when wrist is in reference position

Tool COG coordinate system

Origin is COG of tool, and parallel to point A coordinate system

- x: Parallel to X
- y: Parallel to Y
- z: Parallel to Z

Inertia moment

- I<sub>x</sub>: Around X on point A coordinate system
- I<sub>y</sub>: Around Y on point A coordinate system
- I<sub>z</sub>: Around Z on point A coordinate system
- I<sub>x</sub>: Around x on tool COG coordinate system
- I<sub>y</sub>: Around y on tool COG coordinate system
- I<sub>z</sub>: Around z on tool COG coordinate system

m: Tool mass

(X<sub>m</sub>, Y<sub>m</sub>, Z<sub>m</sub>): COG of tool on point A coordinate system

<p><b>1</b> Calculate the inertia moment around the tool COG coordinate system (xyz axis). If the tool is regarded as prism, it is calculated as the formula on the right side.</p>	<p>Inertia moment example on tool COG coordinate system</p> <p>If tool is regarded as prism</p> $I_x = \frac{1}{12} m \cdot (A^2 + B^2)$ $I_y = \frac{1}{12} m \cdot (A^2 + C^2)$ $I_z = \frac{1}{12} m \cdot (B^2 + C^2)$ <p>These values (I<sub>x</sub>, I<sub>y</sub>, I<sub>z</sub>) are registered to the controller.</p> <p>Inertia moment on tool COG coordinate system</p> <p>This is different from "allowable moment of inertia" written in the robot specification.</p>
<p><b>2</b> After converting the inertia moment around point A coordinate system (XYZ axis), then calculate the inertia moment around robot wrist joint (axis 4, 5 and 6). Please make sure that this value does not go over the "Allowable moment of inertia" that indicates the robot specification.</p>	<p>Inertia moment on point A coordinate system (XYZ axis) is as below.</p> $I_X = m \cdot (Y_m^2 + Z_m^2) + I_x$ $I_Y = m \cdot (X_m^2 + Z_m^2) + I_y$ $I_Z = m \cdot (X_m^2 + Y_m^2) + I_z$ <p>Axis 4 and 5 inertia moment is larger value of I<sub>X</sub> and I<sub>Y</sub>, because its value changes depend on axis 6 position. Axis 6 inertia moment is I<sub>Z</sub> itself.</p> $I_{J4} = I_{J5} = \max(I_X, I_Y)$ $I_{J6} = I_Z$



## 7. Options

No.	Item	Specification	Parts No.
1	Variable stopper *1	For axis 1 (Operation range: $\pm 140^\circ$ )	OP-S5-040
2	Transportation jig *2	Crane transport jig (Forklift transport is not possible.)	OP-S2-053
3	Inverted installation jig	Jig for inverted installation (Robot reversal jig)	OP-S7-013
4	Accessory tool	Zero point positioning block	OP-T2-104
5	ISO Flange *3	P.C.D.31.5	OP-W2-012
6	Brake release switch *4	Manual brake release option (L : 05,10,15,20m)	CCZ-OP90-A-L
7	Parts for installation	Robot installation bolts and washers	OP-F1-050
8	Robot connection cable set *5	Cable length: 5m	CZ101Z-J1-05-A
		Cable length: 10m	CZ101Z-J1-10-A
9	Cables on arm for CZ *6	Connector: L type, Cable length 1.5m	CZ10-OP02L-1P5M
		Connector: straight type, Cable length 1.5m	CZ10-OP02S-1P5M

\* 1: Since this product is shipped installed inside the robot body, please specify when ordering the robot.

\* 2: This product is included as standard with this robot. When the extra transporting jig is necessary for transport, please make an order by the parts No. above.

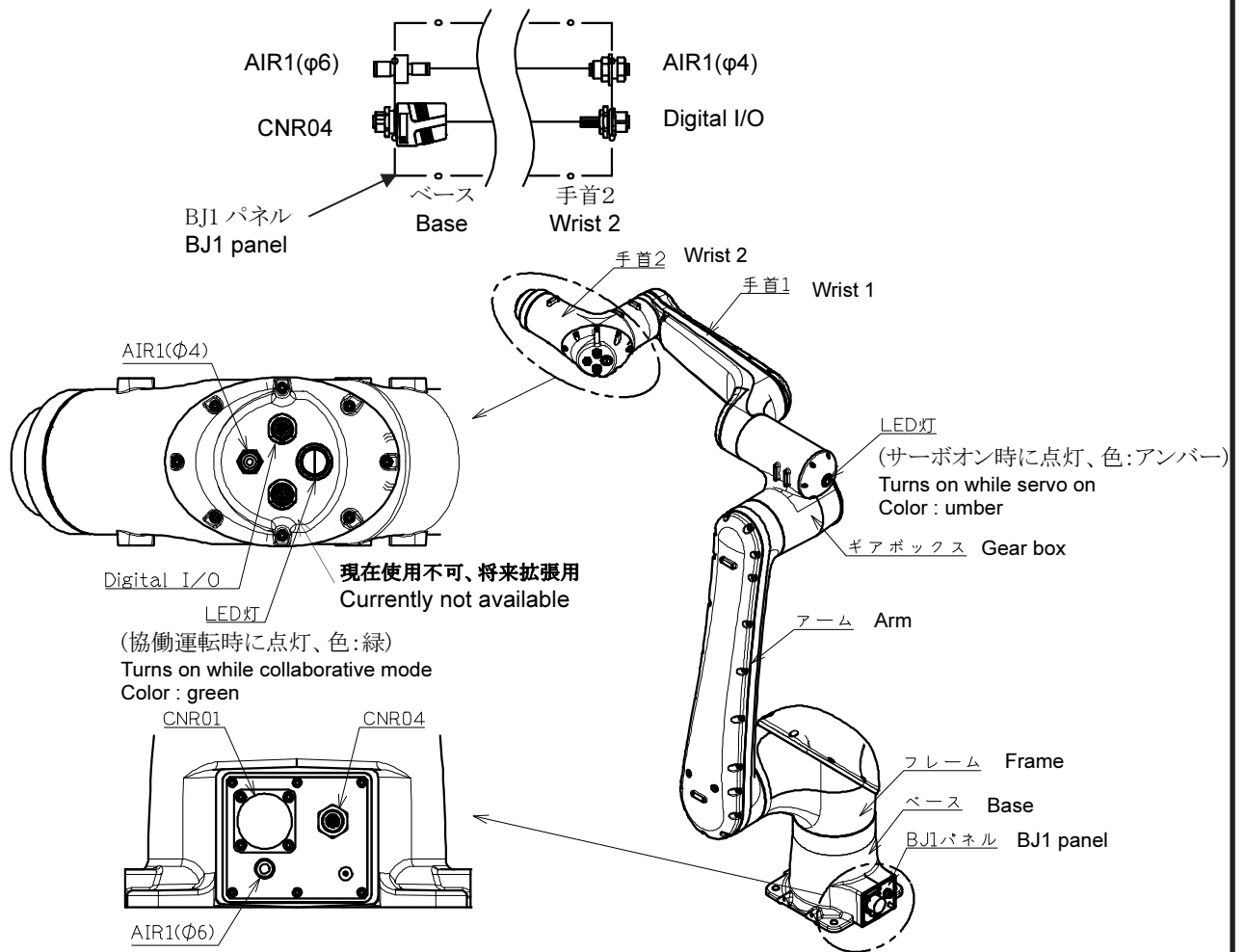
\* 3: Include this product on the tool side and consider "6. Allowable wrist load".

\* 4: When releasing the brake, the arm may fall due to the gravity, so make sure to perform with the release axis supported by the crane or etc. This product is shipped together with the robot. (It's not attached on the robot.)  
EN ISO10218-1 requires that adequate quantity of brake release switch, as robot system, must be prepared.

\* 5: This is the cable to connect between the robot and the controller. This option must be selected. Please select one of them.

\* 6: This is the cable with connector of robot side.

## 8. Application wiring and piping diagram

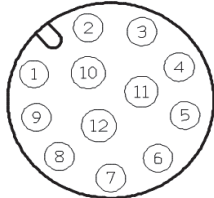


■ Digital I/O connector on arm (standard) and I/O cable on arm (option)

※Max 800mA

Pin and cable color of I/O cable on arm (option)

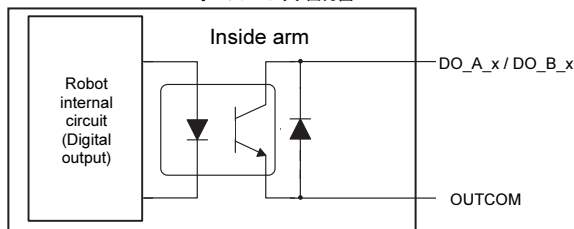
DIGITAL I/O Connector



Type: SACC-E-FS-12CON-M16/0.5 SCO  
 Partner connector: SACC-M12MR-12SOL-PG9-M SH  
 (Phoenix contact)  
 Applicable cable: AWG 28~24 (soldering)

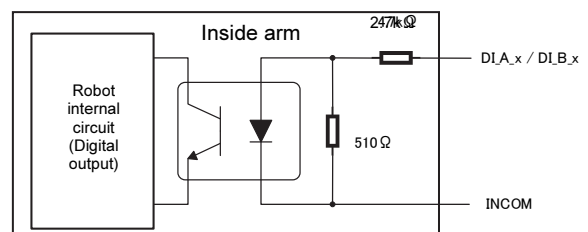
No.	Name	Cable color	
1	FG	BN	Brown
2	DI_A_5	BU	Blue
3	DI_B_5	WH	White
4	DI_A_6	GN	Green
5	DI_B_6	PK	Pink
6	24V※	YE	Yellow
7	OUTCOM	BK	Black
8	DO_A_5	GY	Gray
9	DO_B_5	RD	Red
10	DO_B_6	VT	Violet
11	INCOM	GYPK	Gray + Pink stripe
12	GND	RDBU	Red + Blue stripe

NPN open collector output circuit



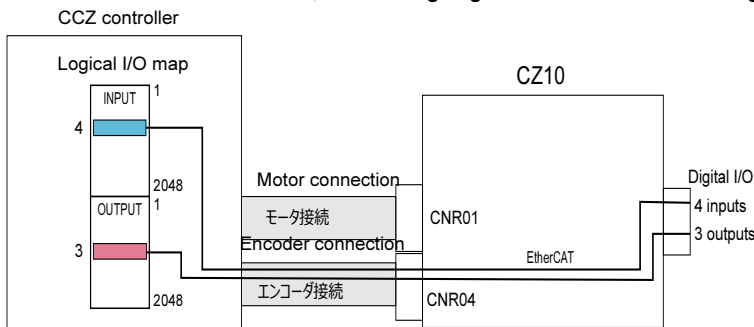
Output: DC24V (NPN max voltage DC30V  
 Current 300mA/1 wire, total current 800mA)

Photo coupler insulation input circuit



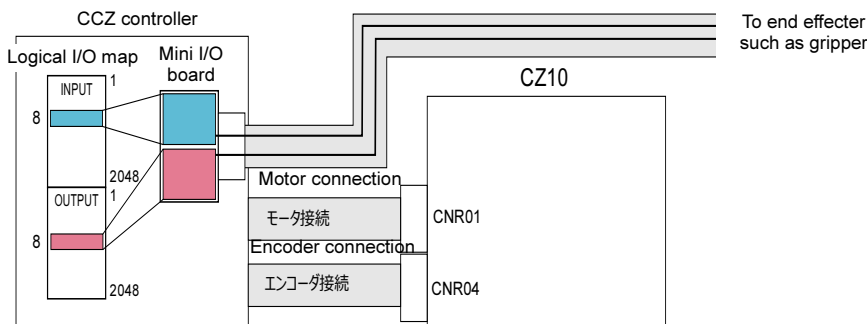
Input: DC24V (input resistance 2.7kΩ)

- NACHI prepares cable on arm as option. (☞ “7. Options”)
- Please refer to Instruction Manual "BASIC OPERATIONS", "Chapter 10 Basic operations and precautions for collaborative robot CZ series, 10.9 Using Digital I/O" for how to use Digital I/O connector on arm.



Example of application wiring, utilizing Digital I/O connector

•Digital I/O is connected directly to the controller with communication cable CNR04, and can be operated with TP. Another I/O cable is unnecessary to connect. Option board, such as digital I/O board, is unnecessary to install in the controller.




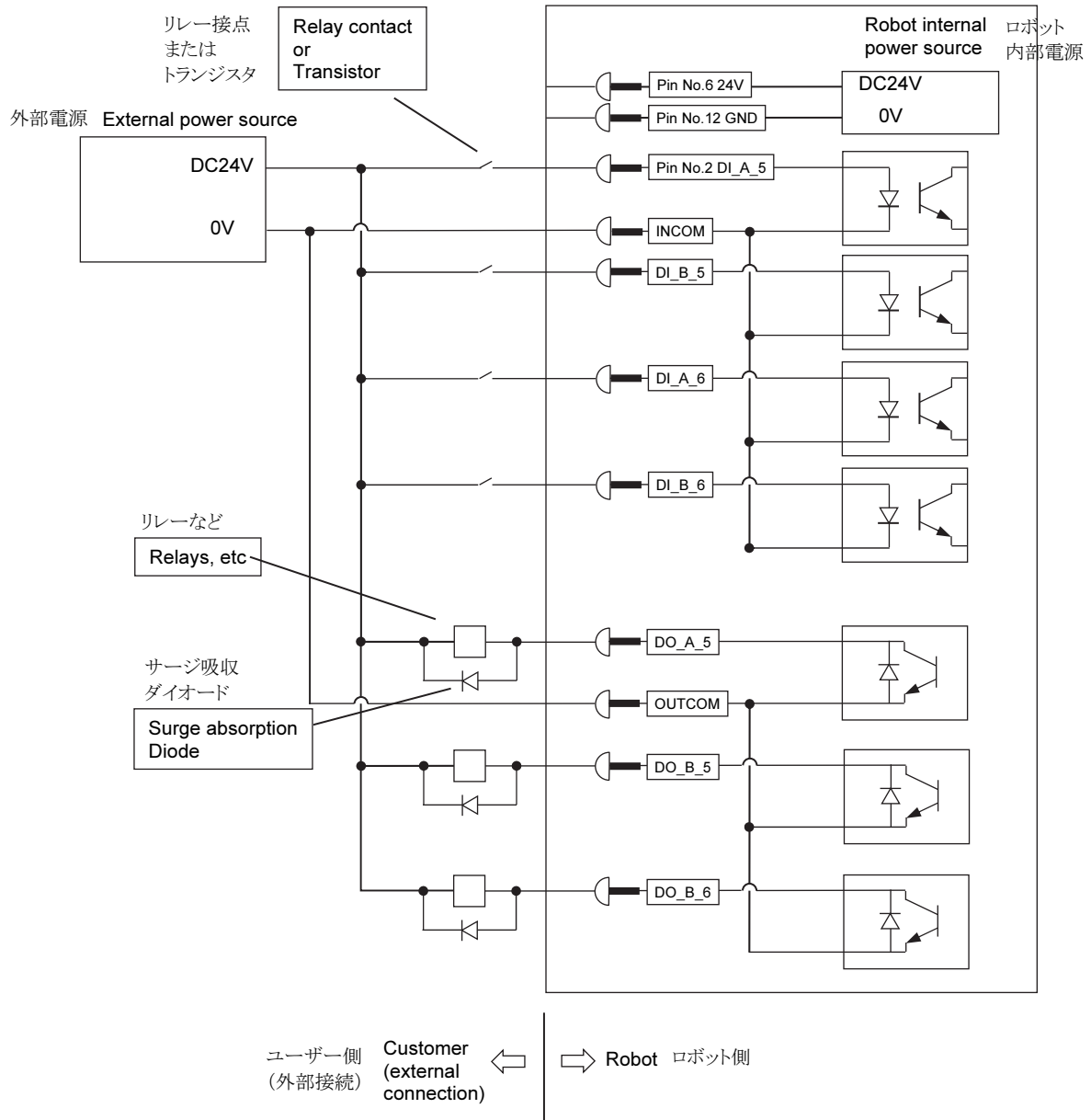
Example of application wiring, when signals were more than Digital I/O capacity (4 inputs, 3 Outputs)

• But if signals more than Digital I/O capacity (4 inputs, 3 Outputs) is necessary, those wires must be prepared on the outside of arm (customer needs to prepare the wire). Furthermore, option board, such as Mini I/O, needs to be prepared on the controller side.

- On system software version V1.12 or later and firmware version V0.23N or later, Digital I/O output signals is kept low (off) from the controller power on until the operation of output signals.


■ Digital I/O connecting example 1 (using external power source)

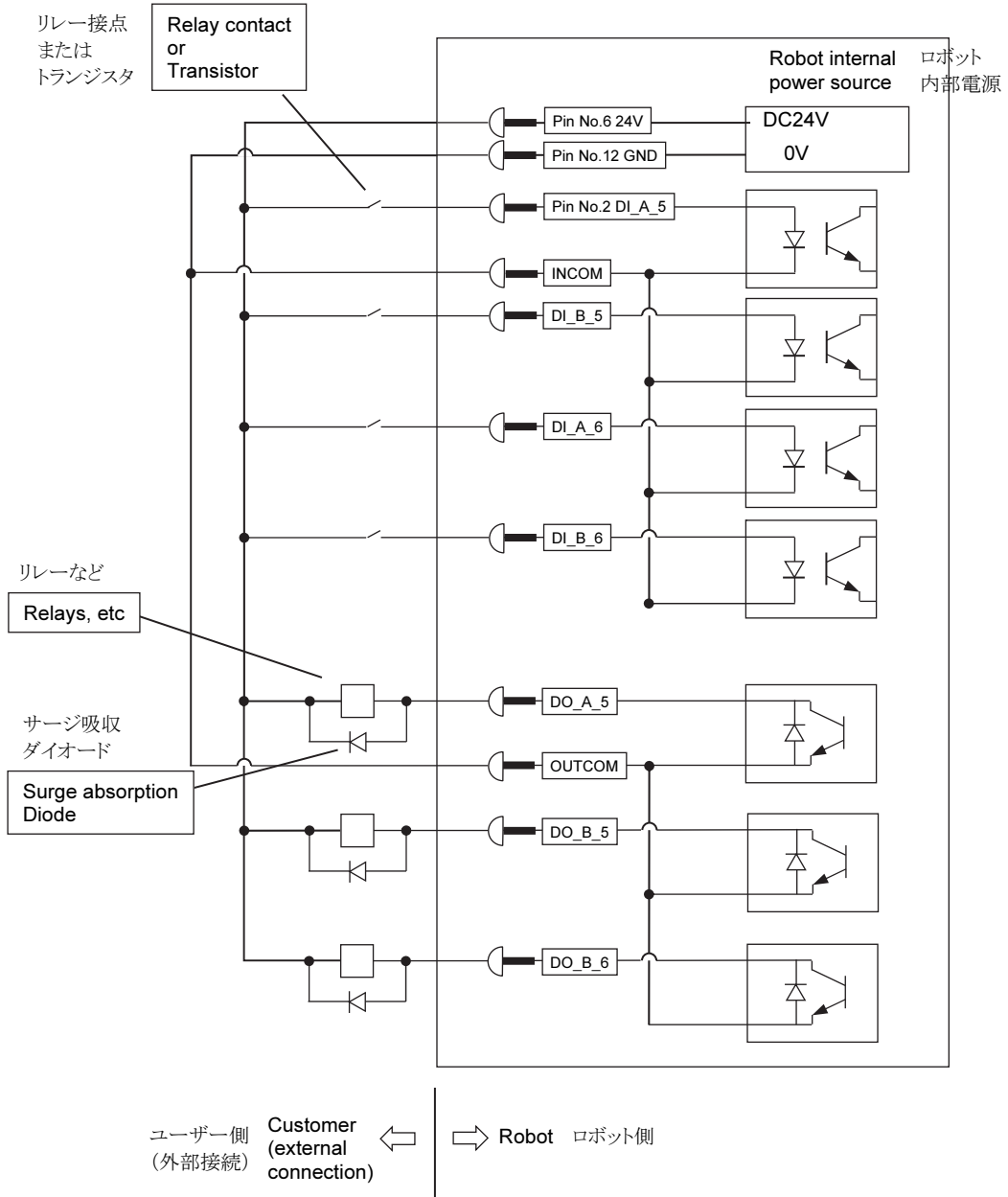
 CAUTION	<ul style="list-style-type: none"> <li>• Please be sure to use a surge Killer for surge absorption.</li> <li>• Please do not make mistake the polarity of power source.</li> <li>• The maximum load current of the output terminal must be 300 mA or less per terminal (Total 800 mA or less).</li> </ul>
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Digital I/O connection example (using external power source)

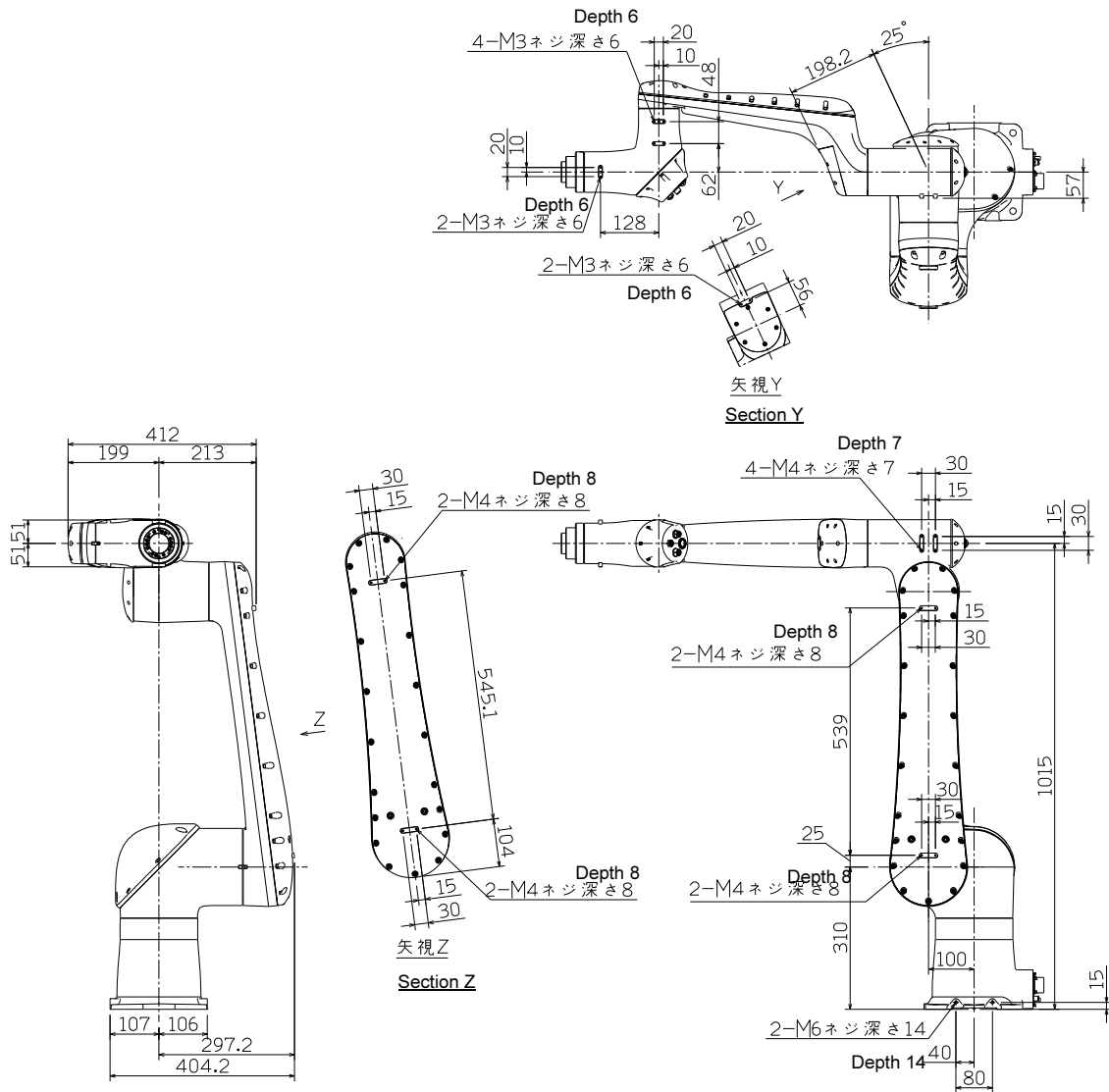
■ Digital I/O connecting example 2 (using robot internal power source)

 CAUTION	<ul style="list-style-type: none"> <li>• Please be sure to use a surge Killer for surge absorption.</li> <li>• Please do not make mistake the polarity of power source.</li> <li>• The maximum load current of the output terminal must be 300 mA or less per terminal (Total 800 mA or less).</li> </ul>
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Digital I/O connection example (using robot internal power source)

■ Service taps to fix the wiring/piping

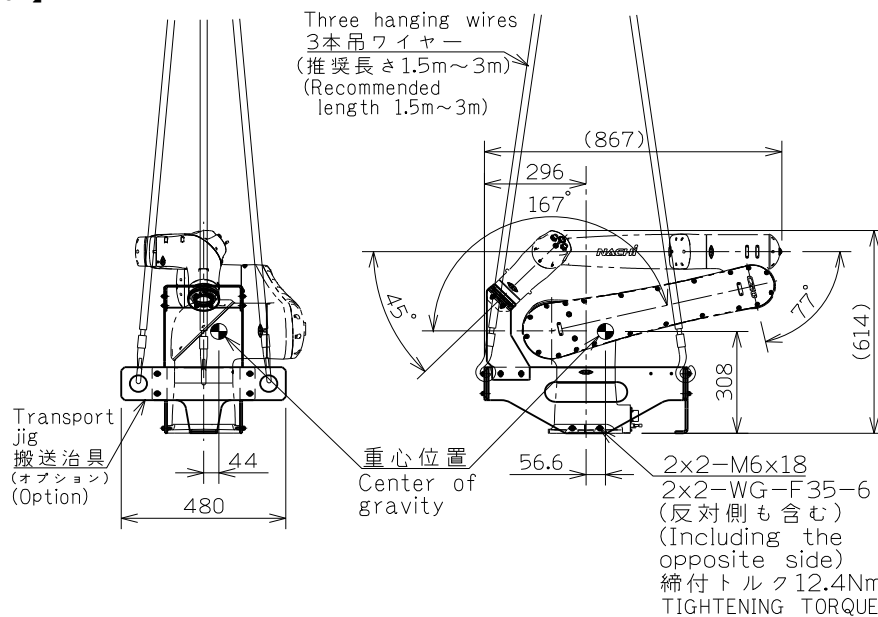


## 9. Transport procedure



 <b>WARNING</b>	The robot and controller must be transported by personnel who have licenses required for slinging work, crane operation, forklift truck operation, and others. If the transportation works are not performed by the qualified person, accidents may occur. (E.g. turnover, fall and etc.)
 <b>WARNING</b>	Before transporting the robot and the controller, be sure to check the weight and the transportation procedures which are described in the Maintenance Service Manual of the robot. If the transportation works are performed by the unspecified procedures, accidents may occur. (E.g. turnover, fall, etc.)
 <b>WARNING</b>	During transport of the robot and controller, pay utmost care not to cause damage to wirings. Furthermore, after installing the robot, take protective measures such as using protective covers so that the wirings will not be damaged by workers or other persons, or forklift trucks or else.

As a general rule, please use a crane to transport the robot body. As for the transporting method, first set the robot to the posture shown in the figure, attach a specialized transport jig (OP S2-053) to the robot and lift it with three wires. Recommended wire length is 1.5m to 3m. If wire is too long, wire may interfere with robot body. In this case robot body needs to be protected.

### 【CZ10-01】



軸 Axis	角度 Angle
1	0°
2	167°
3	-77°
4	0°
5	-45°
6	0°

 <b>WARNING</b>	Place the robot on the horizontal position. Robot can stand by alone with its transportation posture. But if robot is placed on the position where inclines 8 degrees or more, robot may fall down and resulting in serious injury.
 <b>WARNING</b>	After the robot installation, make sure to remove the transporting-jig. Without removing the transporting jig, there is a possibility that the transporting-jig and the robot may interfere when the robot operates.

## 10. Delivery /Service (Specification including a robot)

1. There are three services available as shown below.

	Services	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 provided. (Teaching with work piece is not included.)
3	Delivery after installation and teaching with work piece	Besides no.2, teaching with work piece is provided.

The costs differ depending on the service, so please consider enough before making a decision.

2. Operation and maintenance education

The special operation/ maintenance guide are not included in the estimates. Consult with each NACHI-FUJIKOSHI office for the details of the training.

## 11. Consuming power (Robot + Controller)

1.0 kVA at maximum (may vary according to the application and operation pattern.)

## 12. Paint color

Standard color	Robot base	Munsell N2.5
	Inner part of arm	Munsell N5.5
	Others	Munsell 6.5PB9/1






## 13. Warranty

Elapse of 1 year after delivery. (8 hours/day running)

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





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