TH550/THP550

Industrial Robot

Manual for TH500 and THP550 Differences

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STE 80770

Introduction

The THP550 has been designed specifically for high-speed transfer of lightweight objects and features a lightweight and low-inertia arm unit for enabling agility in the 0.2-second cycle time range combined with high durability capable of 24-hour continuous operation at 120 cycles per minute.
[Applications]
The THP550 is ideal for applications involving high-speed continuous transfer between conveyors and box packing such as for crystalline silicon solar cells, foodstuffs, pharmaceuticals, and other items.

This manual describes the differences from the TH550 industrial robot, which has the same arm length.
This manual is divided into the sections below.

Chapter 1: Specifications

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Chapter 5: CN0 Layout and Number of Inputs/Outputs

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1. Specifications

	Name		TH550	**THP550**	Remarks
No	Item		Specification		
1	Type		Horizontal multi-articullation		
2	No. of controlled axes		4 axes		
3	Arm length	Full length	550 (mm)		
		Arm 1	300 (mm)		
		Arm 2	250 (mm)		
4	Working envelope	Axis 1	±120 (deg)		
		Axis 2	±145 (deg)		
		Axis 3	0 to 150 (mm)		
		Axis 4	±360 (deg)		
5	Maximum speed	Axis 1	375 (deg/sec)		
		Axis 2	600 (deg/sec)		
		Axis 3	2,000 (mm/sec)		
		Axis 4	2,000 (deg/sec)		
		Composite	6.21 (m/sec)		
6	Payload mass	Rated	2 (kg)	**1 (kg)**	*1
		Max	5 (kg)	**2 (kg)**	
7	Standard cycle time (when transferring 1 kg)		0.33 (sec)	**0.29 (sec)**	*2
8	Permissible load inertia		0.05 (kg•m^2)	**0.01 (kg•m^2)**	3
9	Positioning repeatability	X–Y	±0.01 (mm)	**±0.015 (mm)**	*4
		Z (axis 3)	±0.01(mm)		
		C	±0.02 (deg)	**±0.02 (deg)**	
10	Drive system		AC servo motor for all axes		
11	Robot body	Mass	29 kg	**26 kg**	
12	Hand wires and pipes		5 inputs and 4 outputs 4mm diameter x 4	**8 inputs and 8 outputs 4mm diameter x 4**	
13	Options		• Ceiling suspension model • Z-axis long stroke • Top cap model	• **Ceiling suspension model** • **Z-axis long stroke** • **Top cap model** • **IP** • **Cleanroom model**	*5

*1 : In the TH550, the rated transportable weight is 2 kg, and the maximum transportable weight is 5 kg.
In the **THP550**, the rated transportable weight is 1 kg, and the maximum transportable weight is 2 kg.

*2 : In the TH550, the cycle time is based on a rated weight of 2 kg. An overload error can occur if continuous operation is performed.
The TH550 is suitable for continuous operation on workpieces of 2 to 5 kg where the robot takes time to stop.
In the **THP550**, the cycle time is based on a rated weight of 1 kg. It is capable of 24-hour continuous operation at 120 cycles per minute.
The **THP550** is suitable for continuous operation on lightweight workpieces of 1 to 2 kg without stopping.

*3 : Because the THP550 has a smaller maximum transportable weight than the TH550, the permissible load inertia is also smaller.
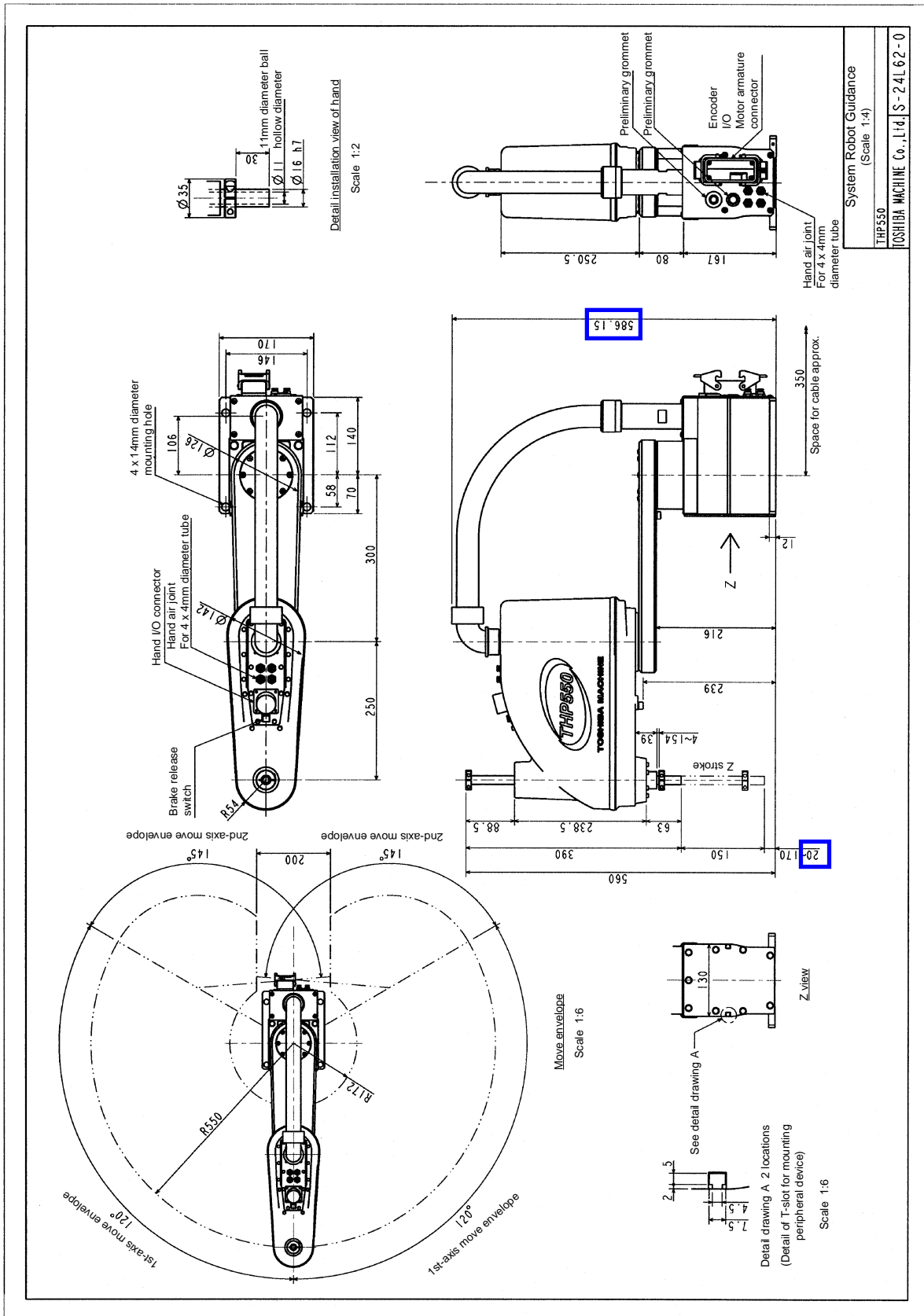
*4 : The THP550 is a robot whose primary purpose is high-speed continuous operation, and so its positioning repeatability accuracy is lower than the TH550.

*5 : For information about the availability of other options, please contact the Sales Department.

2.   Robot Height and Z-axis Position
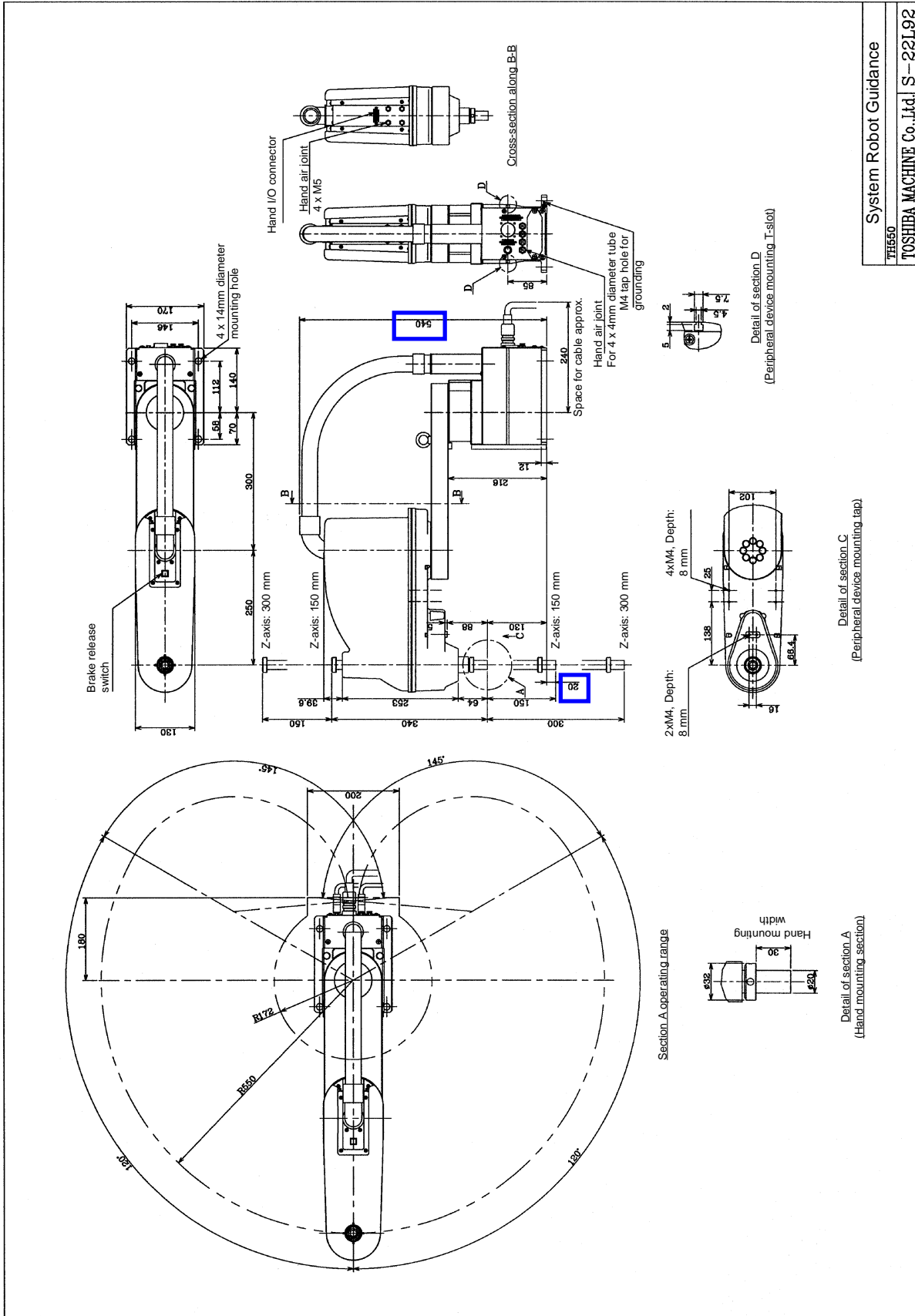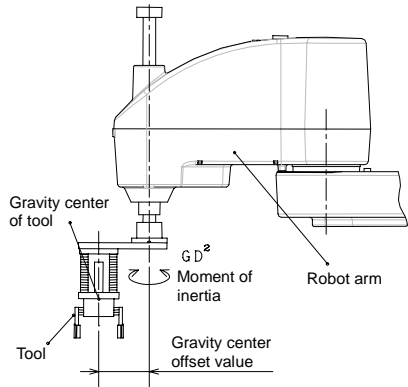
The TH550 has a total height of 540 mm. The **THP550** has a total height of 586.15 mm, which is higher than the TH550.
Also, the Z-axis origin position is -20 mm from the robot mounting surface in the TH550, but it is +20 mm in the **THP550**.

3. Permissible Load Conditions

The differences between the permissible load conditions in the TH550 and THP550 are shown below.

Permissible load conditions

Model	TH550	**THP550**
Conditions	Allowance	**Allowance**
Mass	Rated 2kg (Max. 5kg) Maximum acceleration setting at 2 kg or less	**Rated 1 kg (Max. 2 kg) Maximum acceleration setting at 1 kg or less**
Moment of inertia	Max 0.05 (kg•m^2)	**Max 0.01 (kg•m^2)**
Gravity center offset	Max 100mm (load≤10 kg)	**Max 50 mm (load≤2 kg)**

a)   If there is no offset in the load, the acceleration is limited by the load mass. The figures below show the permissible load conditions when there is no offset.
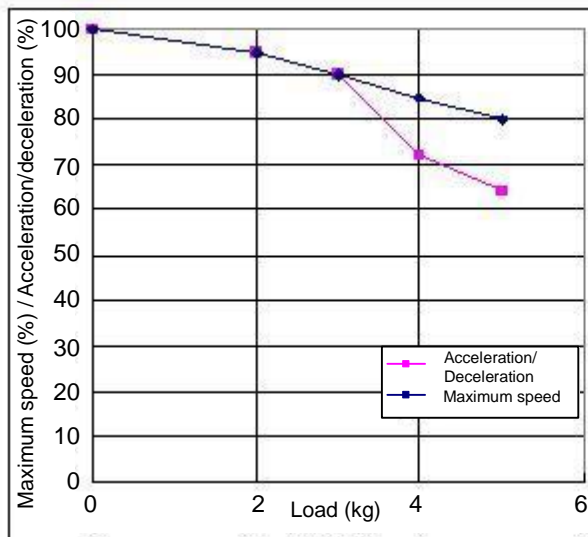
TH550: Setting of maximum speed and acceleration/deceleration in relation to load mass (Axis 1)

THP550: Setting of maximum speed and acceleration/deceleration in relation to load mass (Axis 1)

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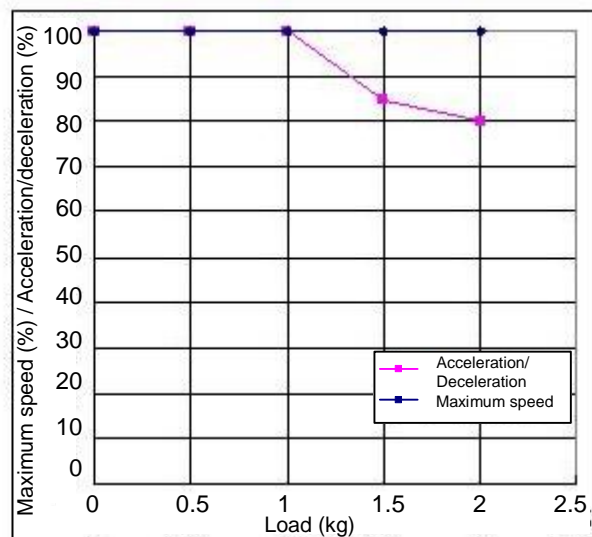
TH550: Setting of maximum speed and acceleration/deceleration in relation to load mass (Axis 2)

THP550: Setting of maximum speed and acceleration/deceleration in relation to load mass (Axis 2)
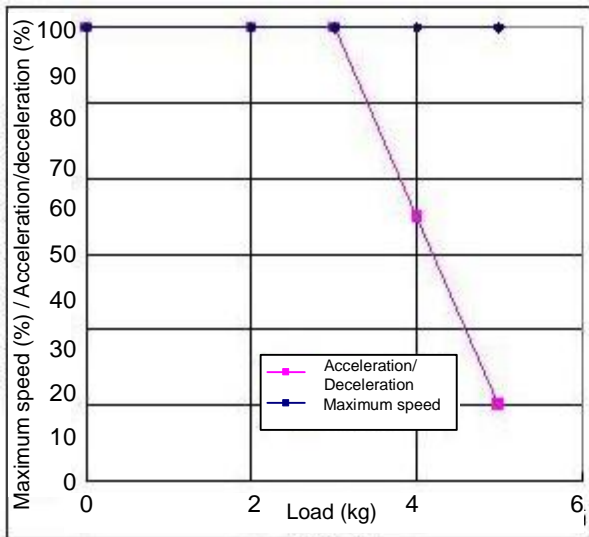
TH550: Setting of maximum speed and acceleration/deceleration in relation to load mass (Axis 3)

THP550: Setting of maximum speed and acceleration/deceleration in relation to load mass (Axis 3)
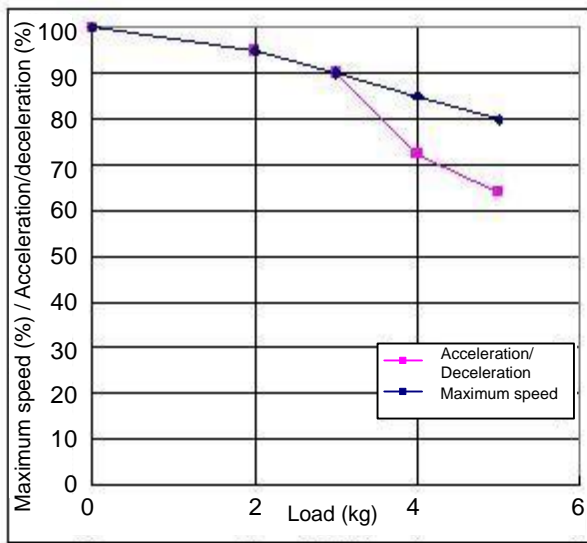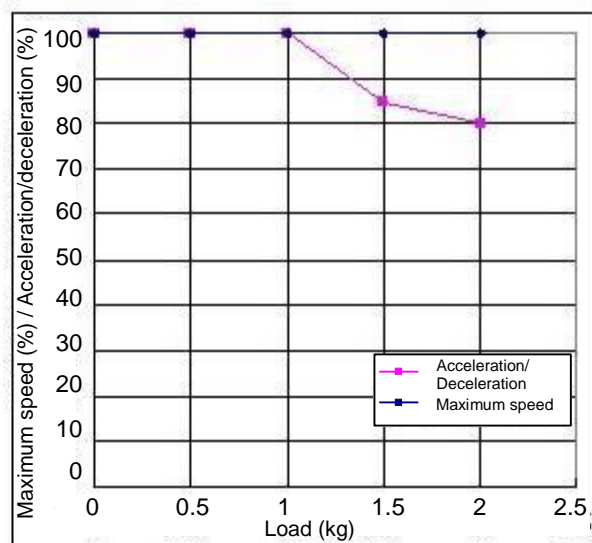
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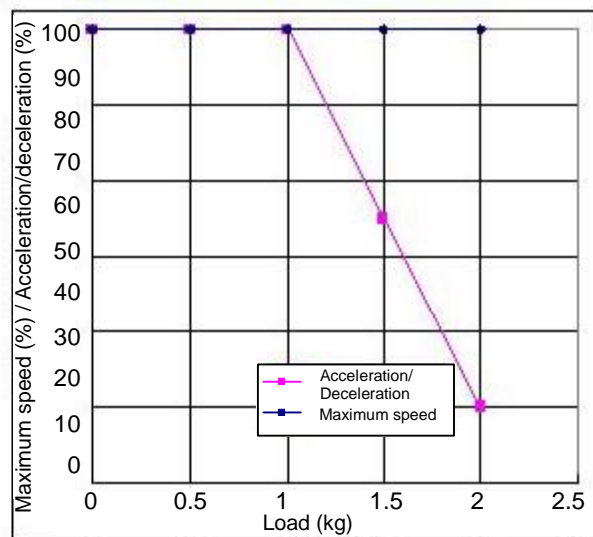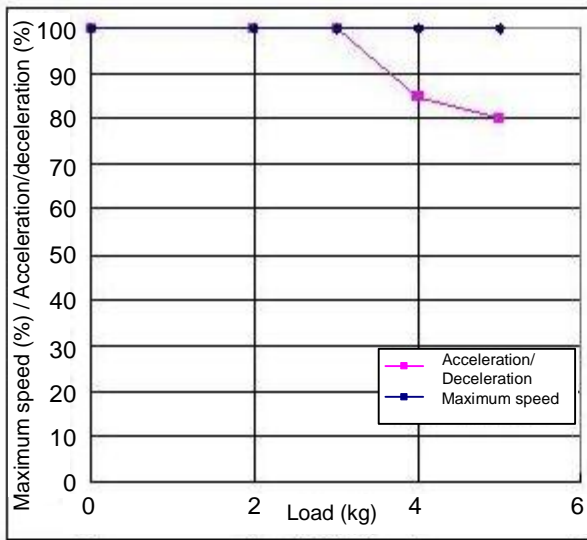
TH550: Setting of maximum speed and acceleration/deceleration in relation to load mass (Axis 4)
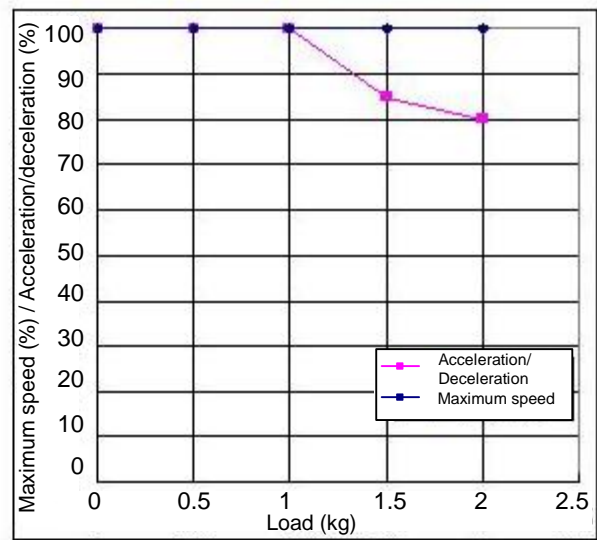
THP550: Setting of maximum speed and acceleration/deceleration in relation to load mass (Axis 4)

b)   If there is offset in the load, the acceleration that is set by the load mass in item a) above is further limited by the offset value. (Axis 3 is not limited by the offset.) The figures below show the rate of decrease (axes 1, 2, and 4) of the acceleration based on the offset value.

TH550: Setting of acceleration/deceleration time in relation to offset value (Axis 1)

THP550: Setting of acceleration/deceleration time in relation to offset value (Axis 1)
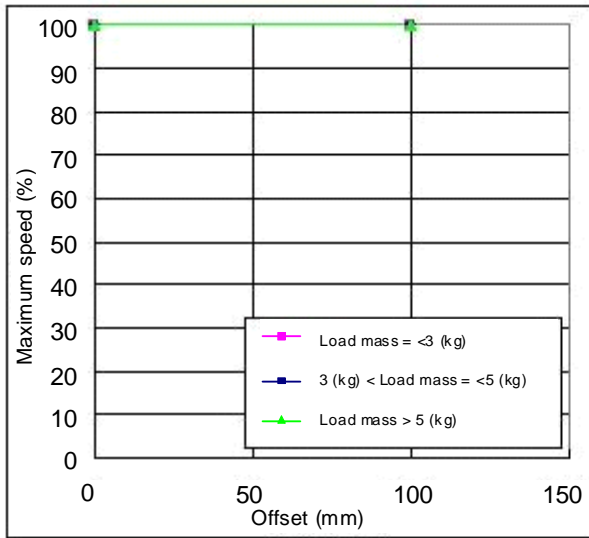
TH550: Setting of maximum speed in relation to offset value (Axis 1)
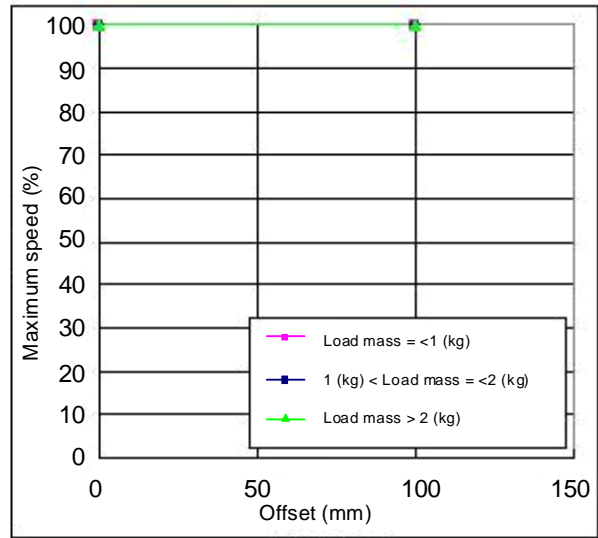
THP550: Setting of maximum speed in relation to offset value (Axis 1)
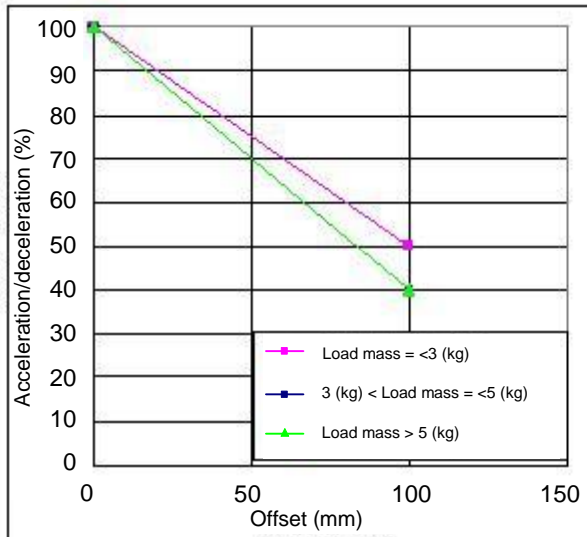
TH550: Setting of acceleration/deceleration time in relation to offset value (Axis 2)
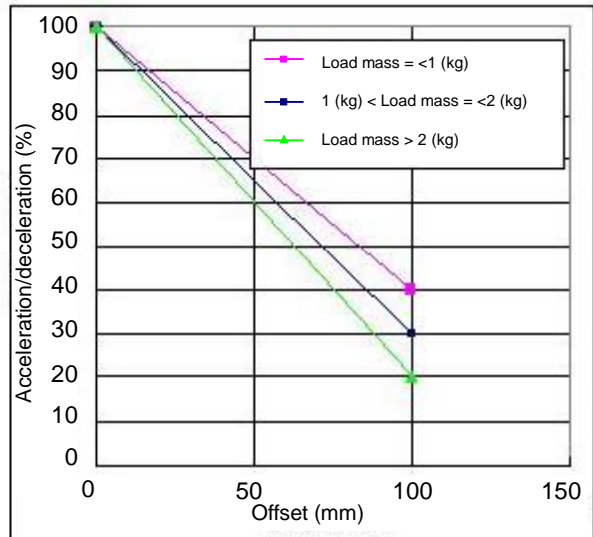
THP550: Setting of acceleration/deceleration time in relation to offset value (Axis 2)
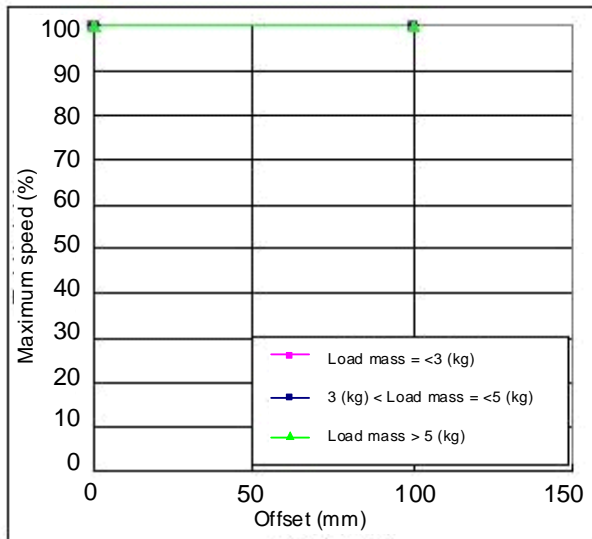
TH550: Setting of maximum speed in relation to offset value (Axis 2)
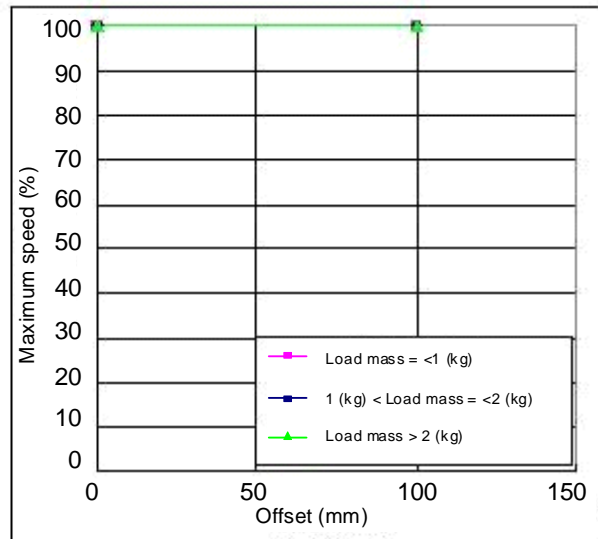
THP550: Setting of maximum speed in relation to offset value (Axis 2)
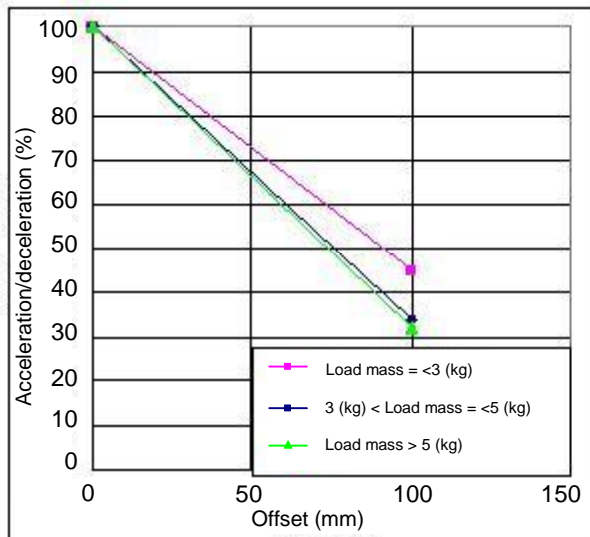
TH550: Setting of acceleration/deceleration time in relation to offset value (Axis 4)

THP550: Setting of acceleration/deceleration time in relation to offset value (Axis 4)

TH550: Setting of maximum speed in relation to offset value (Axis 4)
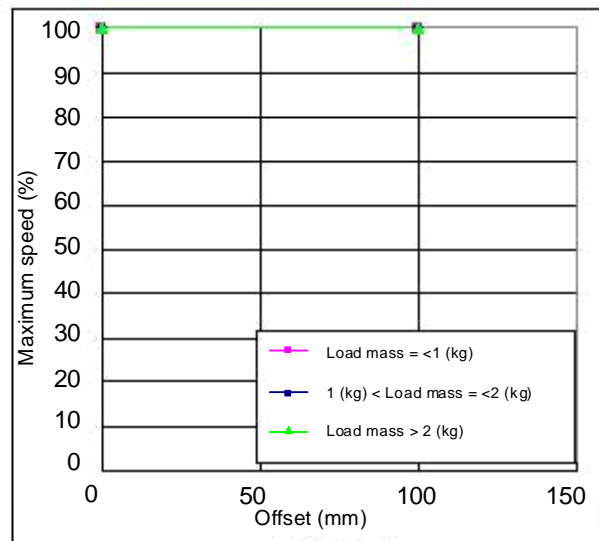
THP550: Setting of maximum speed in relation to offset value (Axis 4)

c) Moment of inertia
Shown below is a model simplifying the robot and load, and arithmetic expression of moment of inertia of load.
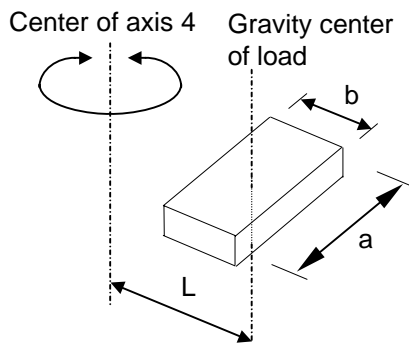
L : Distance from axis 4 center to gravity center of load (m)

a : Width of load (m)

b : Length of load (m)

M : Mass of load (kg)

Moment of inertia (kg•m^2)
$$= \frac{M}{12}(a^2 + b^2) + ML^2$$

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4. Cables Between Robot and Controller

The TH550 uses one Cannon connector and two D-Sub connectors on the robot side.
The **THP550** uses a single integrated connector.

Cannon
connector (motor)

D-Sub connectors
(encoder, I/O)

TH550

Motor, encoder, I/O
integrated connector
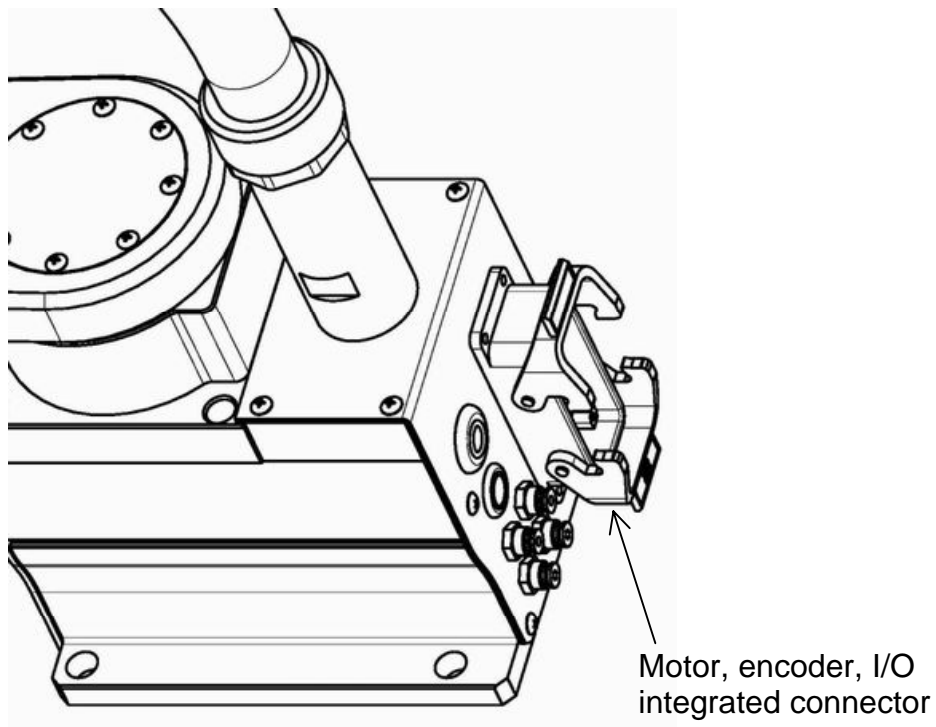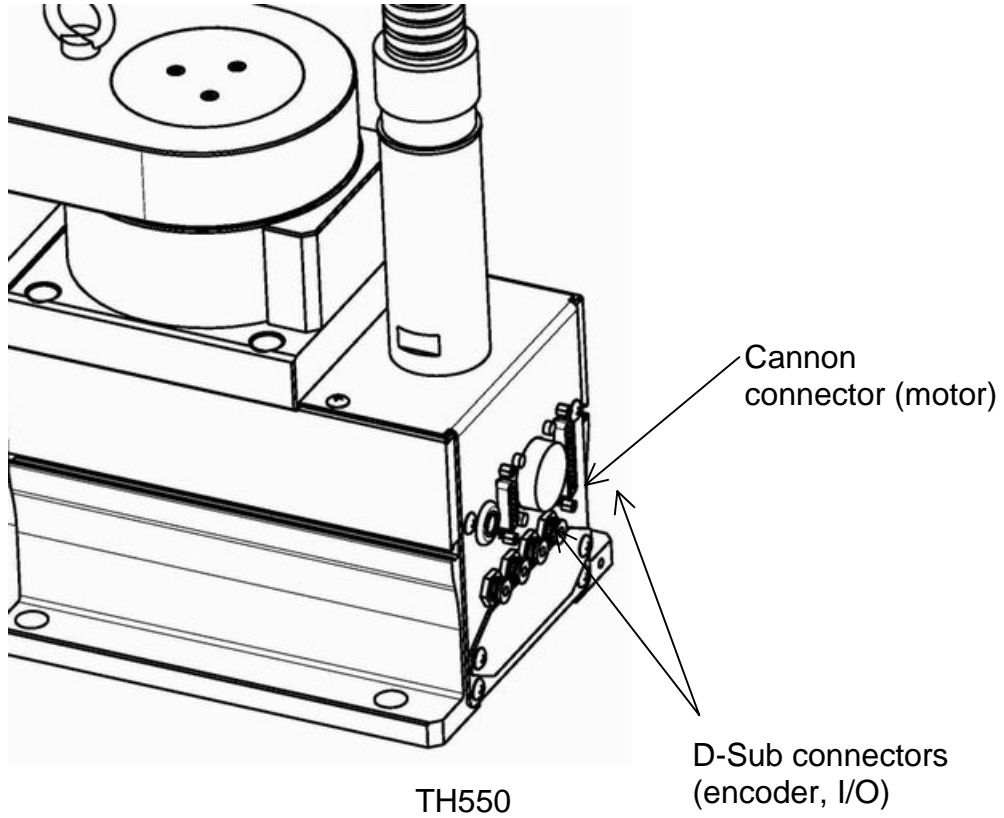
THP550

5. CN0 Layout and Number of Inputs/Outputs

The TH550 is provided with 5 inputs and 4 outputs for the CN0 (D-Sub) connector.
The **THP550** is provided with 8 inputs and 8 outputs for the CN0 (cannon) connector.
The connector position may vary.

Arm 2 rear side of robot

Rear side of robot base

To motor brake

CN0

Pin	Signal name	Color
3	GRP1 OPN	Black
4	GRP1 CLS	Brown
5	GRP2 OPN	Orange
6	GRP2 CLS	Yellow
7	WORK	Purple
8	PGND	Gray
9	FG	Green
10	GRP1	Black
11	GRP1	Brown
12	P24	Orange
13	GRP2	Yellow
14	GRP2	Purple
15	P24	Gray

To robot hand
(To be connected by customer)

JOEP / **JOES**

Color	Signal name	Color	Pin
Black	GRP1 OPN	Black	1
Brown	GRP1 CLS	Brown	2
Orange	GRP2 OPN	Orange	3
Yellow	GRP2 CLS	Yellow	4
Purple	WORK	Purple	5
Gray	PGND	Gray	6
Green	FG	Green	7

JOFP / **JOFS**

Color	Signal name	Color	Pin
Black	GRP1	Black	1
Brown	GRP1	Brown	2
Orange	P24	Orange	3
Yellow	GRP2	Yellow	4
Purple	GRP2	Purple	5
Gray	P24	Gray	6

CN4

Pin	Signal name	Color
1	BRAKE	Purple
2	P24	Gray
3	GRP1 OPN	Black
4	GRP1 CLS	Brown
5	GRP2 OPN	Orange
6	GRP2 CLS	Yellow
7	WORK	Purple
8	PGND	Gray
9	FG	Green
10	GRP1	Black
11	GRP1	Brown
12	P24	Orange
13	GRP2	Yellow
14	GRP2	Purple
15	P24	Gray

To TS2000

Customer's side: D-sub connector
CN0:XM2A-1501*OMRON
Hood ;XM2S-1501*OMRON

Customer's side: Plastic connector
JOES:SMP-07V-BC*JST
JOFS:SMP-06V-BC*JST
Contact: BHF-001T-0.8SS*JST

Grommet inner diameter: 7mm

To PLS, etc.
(To be connected by customer)

TH550 Tool Wire

To TS3000

Rear side of robot base

To motor brake

To PLS, etc.
(To be connected by customer)

Rear side of robot base connector (To TS3000)

c	Signal name	Color		C	Signal name	Color
c1	D-IN0	Black		C1	D-IN0	Black
c2	D-IN1	Brown		C2	D-IN1	White
c3	D-IN2	Orange		C3	D-IN2	Red
c4	D-IN3	Yellow		C4	D-IN3	Green
c5	D-IN4	Purple		C5	D-IN4	Yellow
c6	D-IN5	Gray		C6	D-IN5	Brown
c7	D-IN6	Black		C7	D-IN6	Blue
c8	D-IN7	Brown		C8	D-IN7	Gray
c9	D-OUT0	Orange		C9	D-OUT0	Orange
c10	D-OUT1	Brown		C10	D-OUT1	Pink
c11	D-OUT2	Orange		C11	D-OUT2	Light green
c12	D-OUT3	Yellow		C12	D-OUT3	Light blue
c13	D-OUT4	Purple		C13	D-OUT4	Black/White
c14	D-OUT5	Gray		C14	D-OUT5	
c15	D-OUT6	Black		C15	D-OUT6	Red/White
c16	D-OUT7	Brown		C16	D-OUT7	Green/White
c17	P24	Orange		C17	P24	Yellow/White
c18	P24	Yellow		C18	P24	Brown/White
c19	PGND	Orange/Green		C19	PGND	Blue/White
c20	FG	Yellow/Green		C20	FG	Green
c21	BRAKE	Yellow		C21	BRAKE	Black/White
c22	P24	White		C22	P24	Black
c23	PGND	Red/Green		C23		
c24				C24		
c25				C25		

JOEP

Pin	Signal name	Color
1	D-IN0	Blue
2	D-IN1	White
3	D-IN2	Yellow
4	D-IN3	White
5	D-IN4	Green
6	D-IN5	White
7	D-IN6	Red
8	D-IN7	White
9	PGND	Purple
10	FG	Green

JOES

Pin	Signal name	Color
1	D-IN0	Black
2	D-IN1	Brown
3	D-IN2	Orange
4	D-IN3	Yellow
5	D-IN4	Purple
6	D-IN5	Gray
7	D-IN6	Black
8	D-IN7	Brown
9	PGND	Yellow
10	FG	

JOFP

Pin	Signal name	Color
1	D-OUT0	Blue
2	D-OUT1	Brown
3	D-OUT2	Yellow
4	D-OUT3	Brown
5	D-OUT4	Green
6	D-OUT5	Brown
7	D-OUT6	Purple
8	D-OUT7	Brown
9	P24	Purple
10	P24	Brown
11		Orange

JOFS

Pin	Signal name	Color
1	D-OUT0	Black
2	D-OUT1	Brown
3	D-OUT2	Orange
4	D-OUT3	Yellow
5	D-OUT4	Purple
6	D-OUT5	Gray
7	D-OUT6	Black
8	D-OUT7	Brown
9	P24	Orange
10	P24	Yellow
11		

Customer's side: Plastic connector

JOES : SMP-10V-BC*JST
JOFS : SMP-11V-BC*JST
Contact : BHF-001T-0.8SS*JST

Arm 2 rear side of robot

CN0

Pin	Signal name	Color
A	D-IN0	Black
B	D-IN1	Brown
C	D-IN2	Orange
D	D-IN3	Yellow
E	D-IN4	Purple
F	D-IN5	Gray
G	D-IN6	Black
H	D-IN7	Brown
J	PGND	Orange
K	FG	Yellow
L		
M		
N		
P		
Q	D-OUT0	Black
R	D-OUT1	Brown
S	D-OUT2	Orange
T	D-OUT3	Yellow
U	D-OUT4	Purple
V	D-OUT5	Gray
W	D-OUT6	Black
X	D-OUT7	Brown
Y	P24	Orange
Z	P24	Yellow

Customer's side: Cannon connector

CN0 : N/MS3102A24-28P*JAE
Customer : N/MS3106B24-28S*JAE
Clamp : N/MS3057-16A*JAE

To robot hand
(To be connected by customer)

THP550 Tool Wire
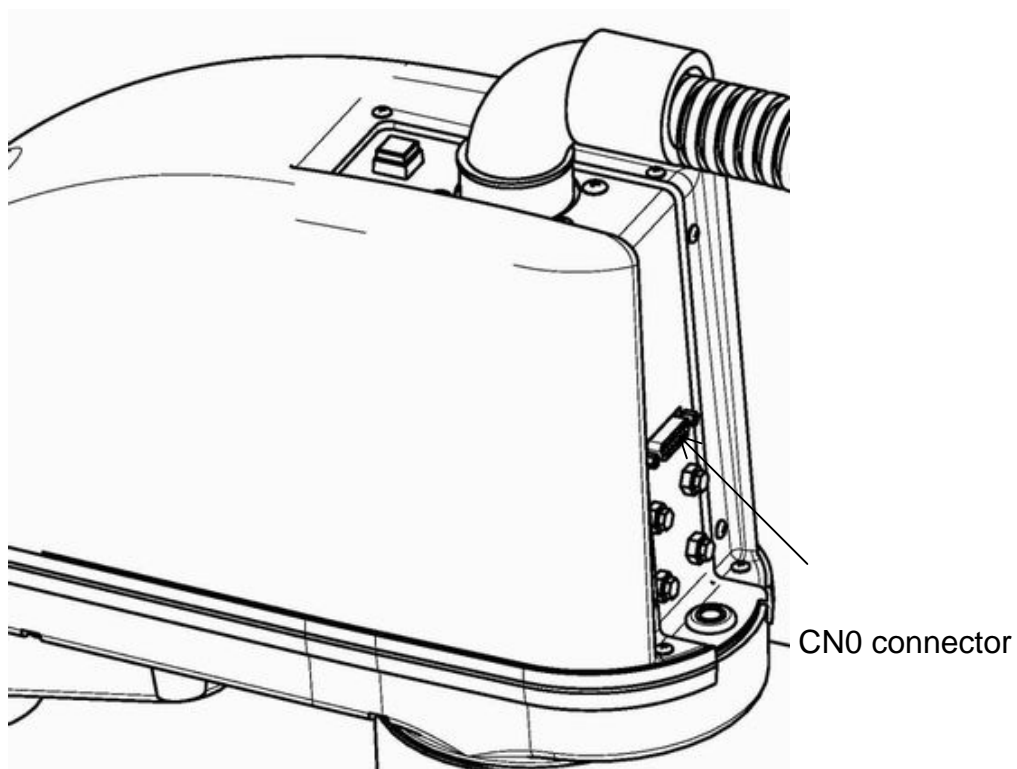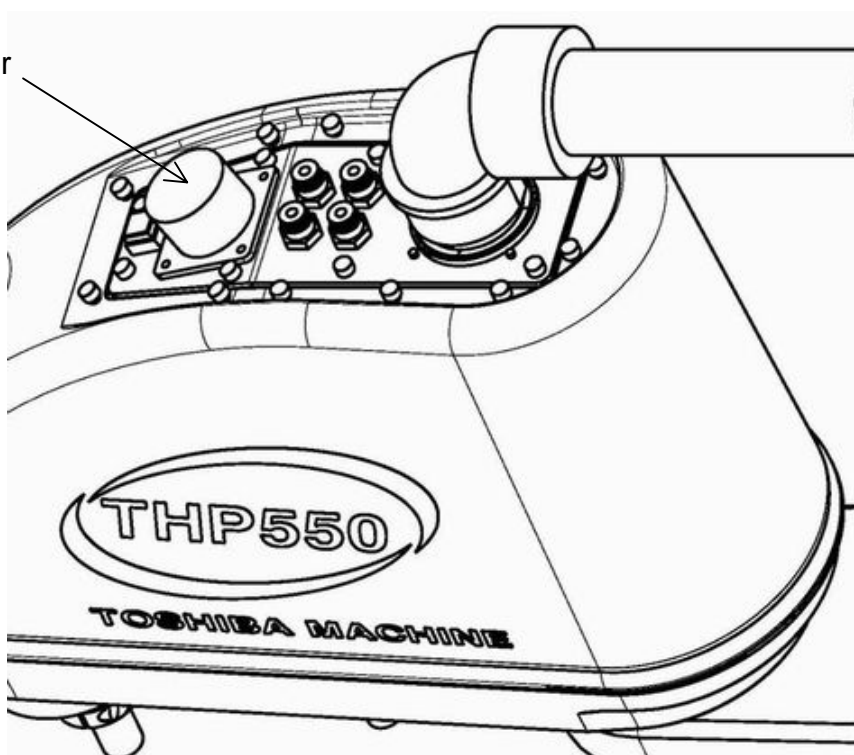
TH550

THP550

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