

SCARA ROBOT THL SERIES

⚠ Safety warnings

- Before using, read through and completely understand the appropriate instruction manuals.
- The contents of this catalog may be subject to change without prior notice.

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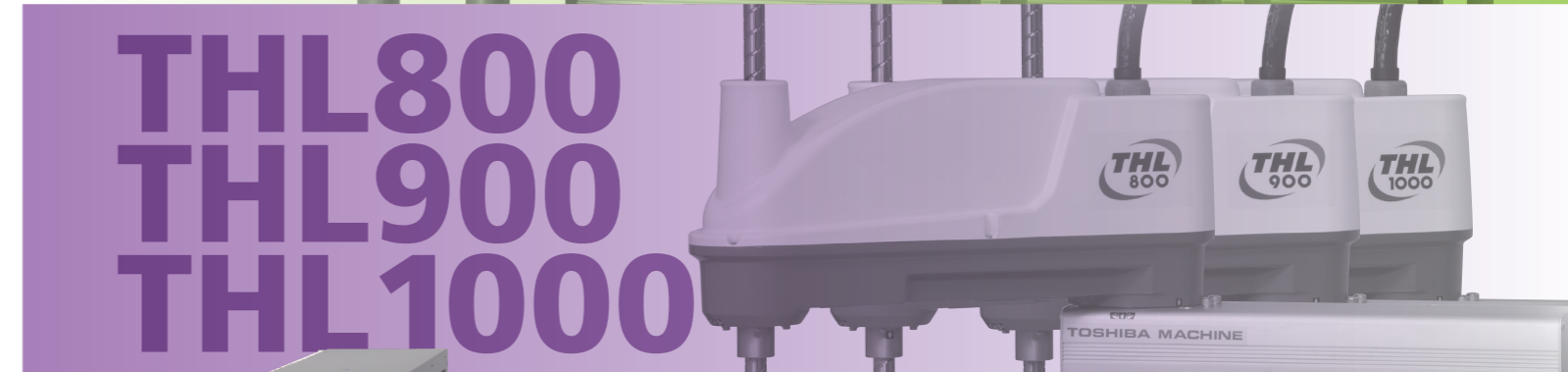
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Distributor



Controller
TSL3000

Achieving Reliable Quality and Superior Performance

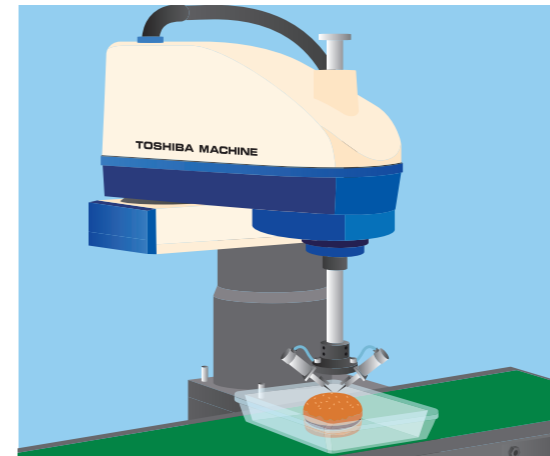
SCARA ROBOT THL Series

Low cost
Impressive performance at affordable prices.

Light-weight
Maximum weight reduction of about 60% has been achieved in comparison with our current. Models Capable of reducing environmental impact.

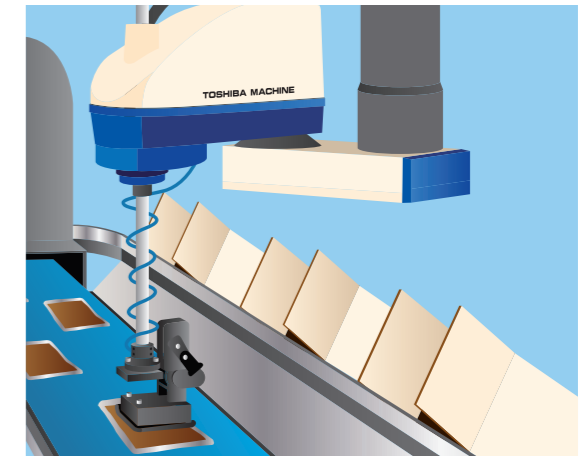
Energy-efficient
Maximum power consumption reduction of about 70% has been achieved in comparison with our current models. Low-power consumption robots ideal for energy conservation era.

Examples of Application and Adoption



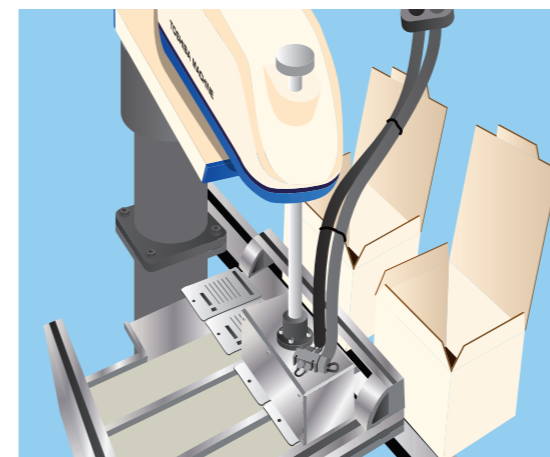
Food Manufacturing

Used for food manufacturing lines to prepare and transport food.



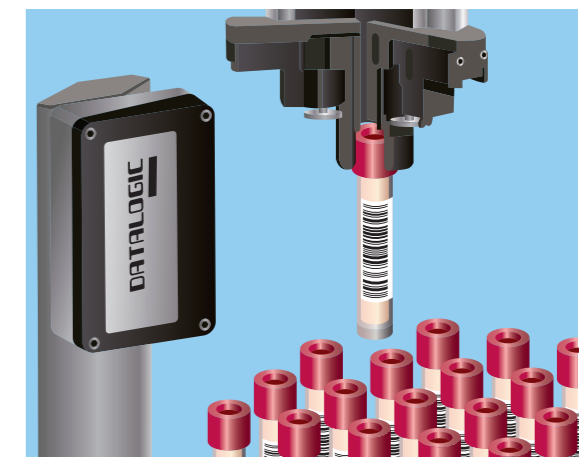
Food

Used for food boxing lines to automatically box ready-packed food being transported on the belt conveyor into boxes.



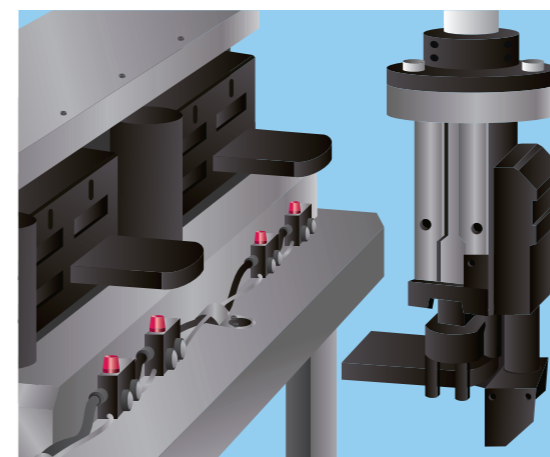
Pharmaceutical and Medical

Used for boxing lines of pharmaceutical and medical products to automatically box finished products being transported on the belt conveyor into boxes.



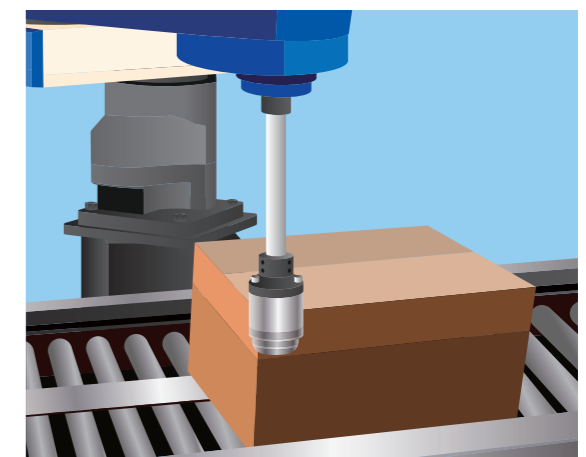
Medical Examination

Used to automate the processing of a large quantity of specimen samples at medical institutions. Test tubes picked up by the SCARA robot are read by a barcode reader, allowing uniform work and secure repeatability.



Assembling and Inspection

Used to assemble and inspect electronic devices. The SCARA robot has been adopted for manufacturing of precision machines.



Cutting

Used as a cutting device. Cardboard boxes being transported by the conveyor are cut by the cutter attached to the SCARA robot.

Diverse Lineup to Meet Your Application Needs



Model	THL300	THL400
Type	Horizontal multi-joint	Horizontal multi-joint
No. of controlled axes	4	4
Arm length	300mm (125mm+175mm)	400mm (225mm+175mm)
Working envelope		
Axis 1	±125°	±125°
Axis 2	±145°	±145°
Axis 3 (Z axis)	0~160mm	0~160mm
Axis 4 (Z-axis rotation)	±360°	±360°
Maximum speed*1		
Axis 1	660°/s	660°/s
Axis 2	660°/s	660°/s
Axis 3 (Z axis)	1120mm/s	1120mm/s
Axis 4 (Z-axis rotation)	1500°/s	1500°/s
Composite	5.1m/s	6.3m/s
Standard cycle time (with 2 kg load)*2	0.48s	0.47s
Maximum payload mass	5kg (rated: 2 kg)	5kg (rated: 2 kg)
Allowable moment of inertia	0.05kg·m ²	0.05kg·m ²
Positioning repeatability*3		
X-Y	±0.01mm	±0.01mm
Z (Axis 3)	±0.015mm	±0.015mm
Axis θ (Z-axis rotation)	±0.007°	±0.007°
Hand wiring	8 inputs / 8 outputs	8 inputs / 8 outputs
Hand pneumatic joints*4	φ 4 x 3 pcs.	φ 4 x 3 pcs.
Position detection	Absolute	Absolute
Robot controller cable	3.5m	3.5m
Power capacity	0.7kVA	0.7 kVA
Mass	12kg	13kg

Order model code

THL400-Z-C-S

Special design
Optional specifications
Z-axis long stroke
Arm length

With cap : C
With protective bellows : B
Ceiling-mount type : T

Model	THL500	THL600	THL700
Type	Horizontal multi-joint	Horizontal multi-joint	Horizontal multi-joint
No. of controlled axes	4	4	4
Arm length	500mm (200mm+300mm)	600mm (300mm+300mm)	700mm (400mm+300mm)
Working envelope			
Axis 1	±125°	±125°	±125°
Axis 2	±145°	±145°	±145°
Axis 3 (Z axis)	0~150mm	0~150mm	0~150mm
Axis 4 (Z-axis rotation)	±360°	±360°	±360°
Maximum speed*1			
Axis 1	450°/s	450°/s	450°/s
Axis 2	450°/s	450°/s	450°/s
Axis 3 (Z axis)	2000mm/s	2000mm/s	2000mm/s
Axis 4 (Z-axis rotation)	1700°/s	1700°/s	1700°/s
Composite	6.3m/s	7.1m/s	7.9m/s
Standard cycle time (with 2 kg load)*2	0.45s	0.45s	0.50s
Maximum payload mass	10 kg (rated: 2 kg)	10kg (rated: 2 kg)	10kg (rated: 2 kg)
Allowable moment of inertia	0.2kg·m ²	0.2kg·m ²	0.2kg·m ²
Positioning repeatability*3			
X-Y	±0.01mm	±0.01mm	±0.01mm
Z (Axis 3)	±0.015mm	±0.015mm	±0.015mm
Axis θ (Z-axis rotation)	±0.007°	±0.007°	±0.007°
Hand wiring	8 inputs / 8 outputs	8 inputs / 8 outputs	8 inputs / 8 outputs
Hand pneumatic joints*4	φ 6 x 3 pcs.	φ 6 x 3 pcs.	φ 6 x 3 pcs.
Position detection	Absolute	Absolute	Absolute
Robot controller cable	3.5m	3.5m	3.5m
Power capacity	1.4kVA	1.4kVA	1.4kVA
Mass	22kg	23kg	24kg

Model	THL800	THL900	THL1000
Type	Horizontal multi-joint	Horizontal multi-joint	Horizontal multi-joint
No. of controlled axes	4	4	4
Arm length	800mm (350mm+450mm)	900mm (450mm+450mm)	1000mm (550mm+450mm)
Working envelope			
Axis 1	±125°	±125°	±125°
Axis 2	±145°	±145°	±145°
Axis 3 (Z axis)	0~300mm	0~300mm	0~300mm
Axis 4 (Z-axis rotation)	±360°	±360°	±360°
Maximum speed*1			
Axis 1	187.5°/s	187.5°/s	187.5°/s
Axis 2	217.5°/s	217.5°/s	217.5°/s
Axis 3 (Z axis)	2000mm/s	2000mm/s	2000mm/s
Axis 4 (Z-axis rotation)	1700°/s	1700°/s	1700°/s
Composite	4.3m/s	4.6m/s	5.0m/s
Standard cycle time (with 2 kg load)*2	0.47s	0.48s	0.48s
Maximum payload mass	10kg (rated: 2 kg)	10kg (rated: 2 kg)	10kg (rated: 2 kg)
Allowable moment of inertia	0.2kg·m ²	0.2kg·m ²	0.2kg·m ²
Positioning repeatability*3			
X-Y	±0.02mm	±0.02mm	±0.02mm
Z (Axis 3)	±0.015mm	±0.015mm	±0.015mm
Axis θ (Z-axis rotation)	±0.007°	±0.007°	±0.007°
Hand wiring	8 inputs / 8 outputs	8 inputs / 8 outputs	8 inputs / 8 outputs
Hand pneumatic joints*4	φ 6 x 3 pcs.	φ 6 x 3 pcs.	φ 6 x 3 pcs.
Position detection	Absolute	Absolute	Absolute
Robot controller cable	3.5m	3.5m	3.5m
Power capacity	1.4kVA	1.4kVA	1.4kVA
Mass	33kg	35kg	37kg

*1: Acceleration/deceleration rates may be limited according to the motion pattern, load mass and amount of offset.

*2: Horizontal 300 mm, vertical 25 mm, round-trip. Continuous operation is not possible beyond the effective load ratio.

*3: When the environmental temperature is constant 20°C. Positioning repeatability accuracy in one-direction movement. Not absolute positioning accuracy.

*4: Pneumatic joints are provided on the base. Please refer to the drawings for the details of the pneumatic joints. Pipes are to be provided by the customers.

TSL3000

- Space saving and lightweight compared to the TS controllers for the TH-A Series.
- Ethernet is equipped as standard, and expansions of I/O and various networks are supported.



TS3000

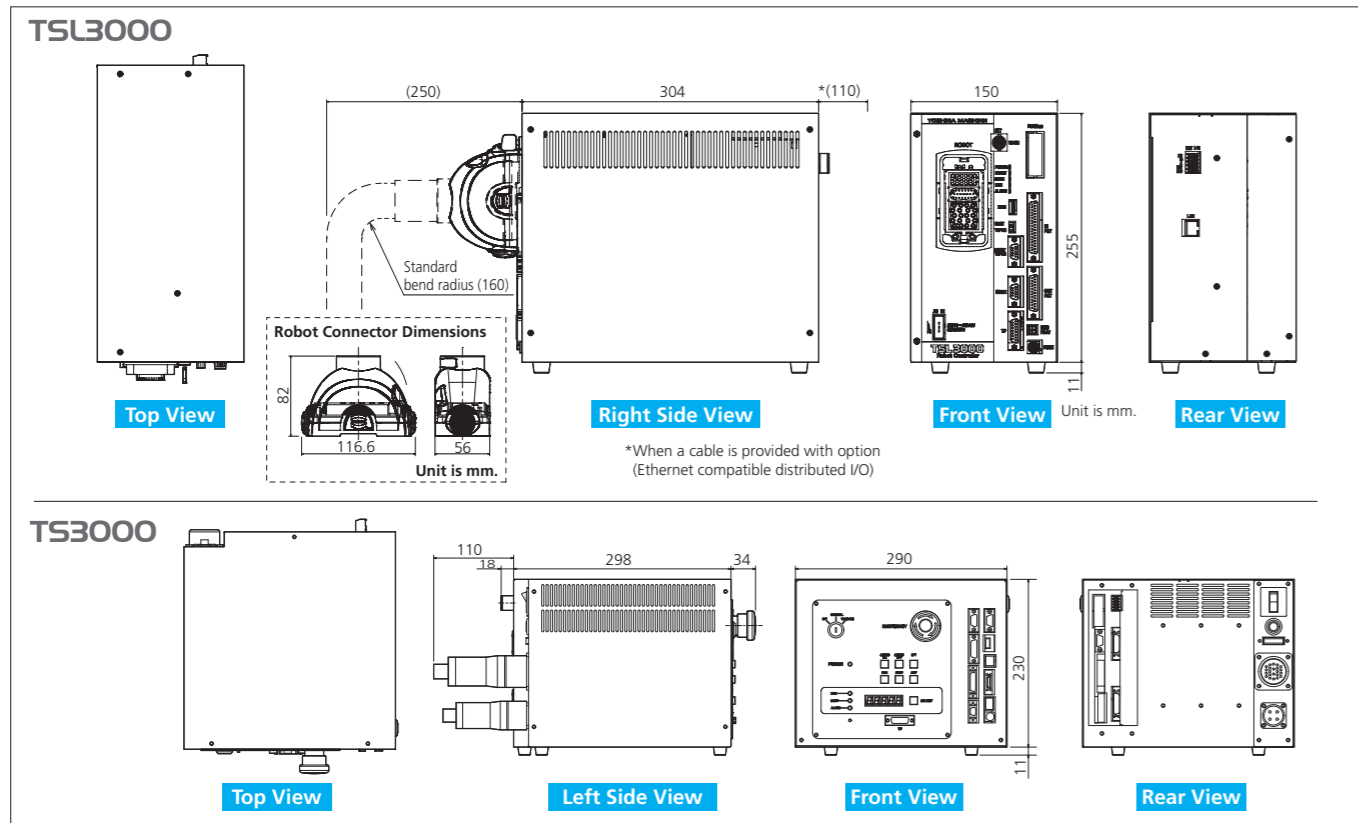
- Special functions, such as vision conveyor synchronization.
- Safety category 3 compliance, in combination with TS3SFB.



Model	TSL3000	TS3000
No. of Controlled Axes	4 axis	Standard 4 axis (Maximum 5 axis)
Motion Modes	PTP, CP (Continuous Path ; Linear, Circular), Short-Cut, Arch Motion	PTP, CP (linear, Circular), Short-cut, Arch motion
Storage Capacity	Approx. Total: 6400 point + 12800 steps 1 program : 2000 point + 3000 steps	Approx. Total: 12800 points + 25600 steps 1 program : 2000 points + 3000 steps
No. of Registrable Programs	Maximum 256 (247 user files+9 system files)	
Programming Language	SCOL (similar to BASIC)	
Teaching Unit(Optional)	Teach pendant TP1000 (Cable length 5m, 3-point enable switch)	
General I/O Signals	8 inputs / 8 outputs	32 inputs / 32 outputs
Hand Control Signals	8 inputs / 8 outputs	
External Operation Signal	Input: cycle operation mode, start, stop. Output: Servo ON, emergency stop, etc.	Input: cycle operation mode, start, stop, program reset, etc Output: Servo ON, operation ready, fault, etc
Serial Communication Ports	RS232C: 2 ports	RS232C: 2ports (HOST, COM1), Ethernet 1port
Other functions	Torque control, Interruptive functions, self-diagnosis, I/O control and communications during motion, Coordinate calculations, Built-in PLC, etc.	
Power Supply	Single phase AC200V~250V , 50/60Hz(±1Hz)	Single phase, AC200V~240V 50/60Hz
Outer Dimensions and Mass	150(W)×255(H)×304(D) [mm], 7kg	290(W)×230(H)×298(D) [mm], 13kg
PC Software for Programming Support (Option)	TSPC: Program editor, teaching, remote operation TCPRGOS: PLC sequence program creation	
Option	I/O extension, Field-network (CC-Link, Devive-Net, PROFIBUS)*5	

*5: CC-Link is a registered trademark of CC-Link Partner Association. DeviceNet is registered trademark of ODVA. Profibus is a registered trademark of Profibus User Organization.

External view



High-performance Teach Pendant TP3000 (Optional)



New sensation!
Equipped with graphic operation keys!
The teach pendant TP3000 is easy to see and operate!

● Adoption of an easy-to-view vivid color screen

Compared to our conventional teaching pendant TP1000, the TP3000 has significantly improved expression capability with the adoption of an LCD color screen.

● Equipped with graphic operation keys

The keyboard display changes dynamically according to the operation. Required keys can be displayed whenever they are necessary.

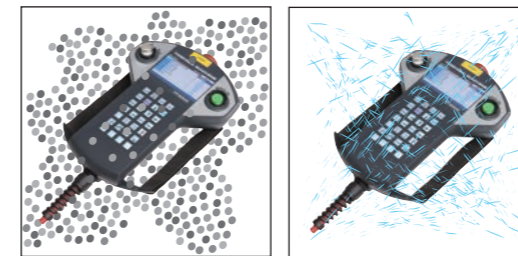
● Equipped with language association function

Language input candidates are displayed according to character input. Compared to the conventional teaching pendant TP1000, the TP3000 makes it easier to input commands more quickly.

● Outline function

The main program, subprograms and labels in the SCOL program can be displayed hierarchically so that the program structure can be viewed quickly.

● Support for IP65



*The images shown are illustration only
 Note: The controller's main body and the parts around the connector do not support the IP.

What is IP65? IP (Second characteristic numeral) (First characteristic numeral)

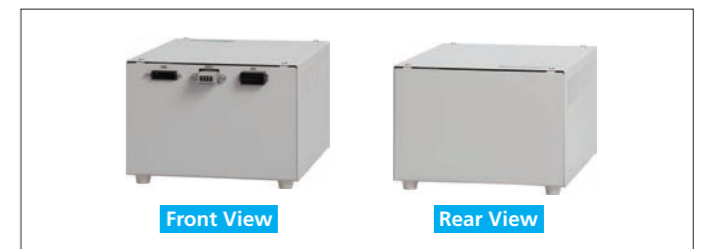
IP (International Protection) rating classifies and rates the degree of protection provided against the ingress of solid foreign objects (including particles and dust) and water in mechanical casings and with electrical enclosures.
 The first characteristic numeral indicates the level of protection that the enclosure provides against the ingress of solid foreign objects (including particles and dust). "6" means "totally dust tight" so that "the enclosure provides against the ingress of solid particles and dust".
 The second characteristic numeral indicates the level of protection that the enclosure provides against the ingress of water. "5" means "protection against water jets" so that "water directly projected by a nozzle against the enclosure from any direction shall have no harmful effects".

Note: Be sure to turn off the main power before attaching or detaching the cable.

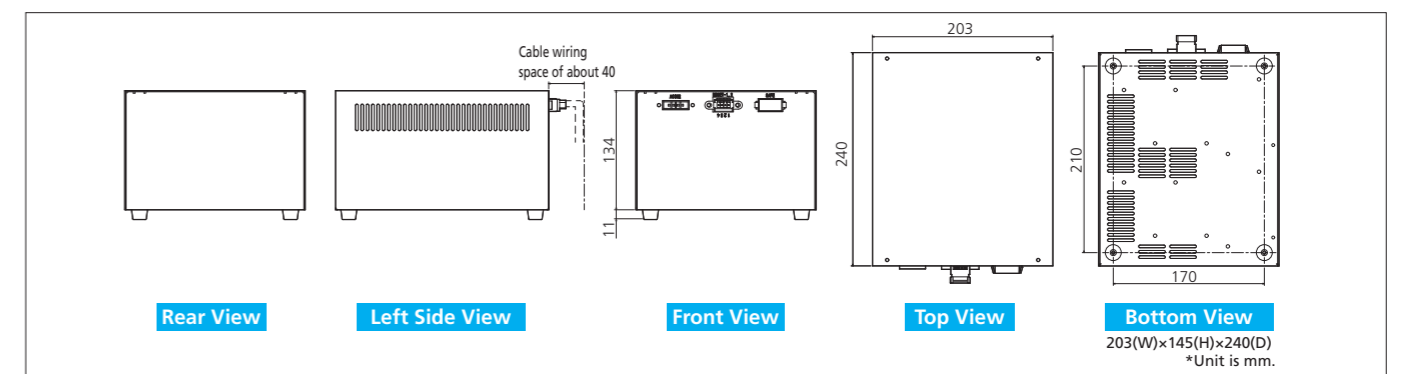
TS3SFB Safety Category 3 compliant safety circuit unit (Optional)

TS3SFB unit realizes Safety Category 3 compliance, required for CE mark.

Note: Applicable controllers are TS3000E and TS3100E. It is necessary to configure safety related set-up.



External view



SCARA ROBOT THL300



Model	THL300
Type	Horizontal multi-joint
No. of controlled axes	4
Arm length	300mm (125mm+175mm)
Working envelope	Axis 1 ±125° Axis 2 ±145° Axis 3 (Z axis) 0~160mm Axis 4 (Z-axis rotation) ±360°
Maximum speed*1	Axis 1 660°/s Axis 2 660°/s Axis 3 (Z axis) 1120mm/s Axis 4 (Z-axis rotation) 1500°/s Composite 5.1m/s
Standard cycle time (with 2 kg load)*2	0.48s
Maximum payload mass	5kg (rated: 2kg)
Allowable moment of inertia	0.05kg·m ²
Positioning repeatability*3	X-Y ±0.01mm Z (Axis 3) ±0.015mm Axis θ (Z-axis rotation) ±0.007°
Hand wiring	8 inputs / 8 outputs
Hand pneumatic joints*4	φ4 x 3 pcs.
Position detection	Absolute
Robot controller cable	3.5m
Power capacity	0.7kVA
Mass	12kg

■For *1 to *4, please see page 5.

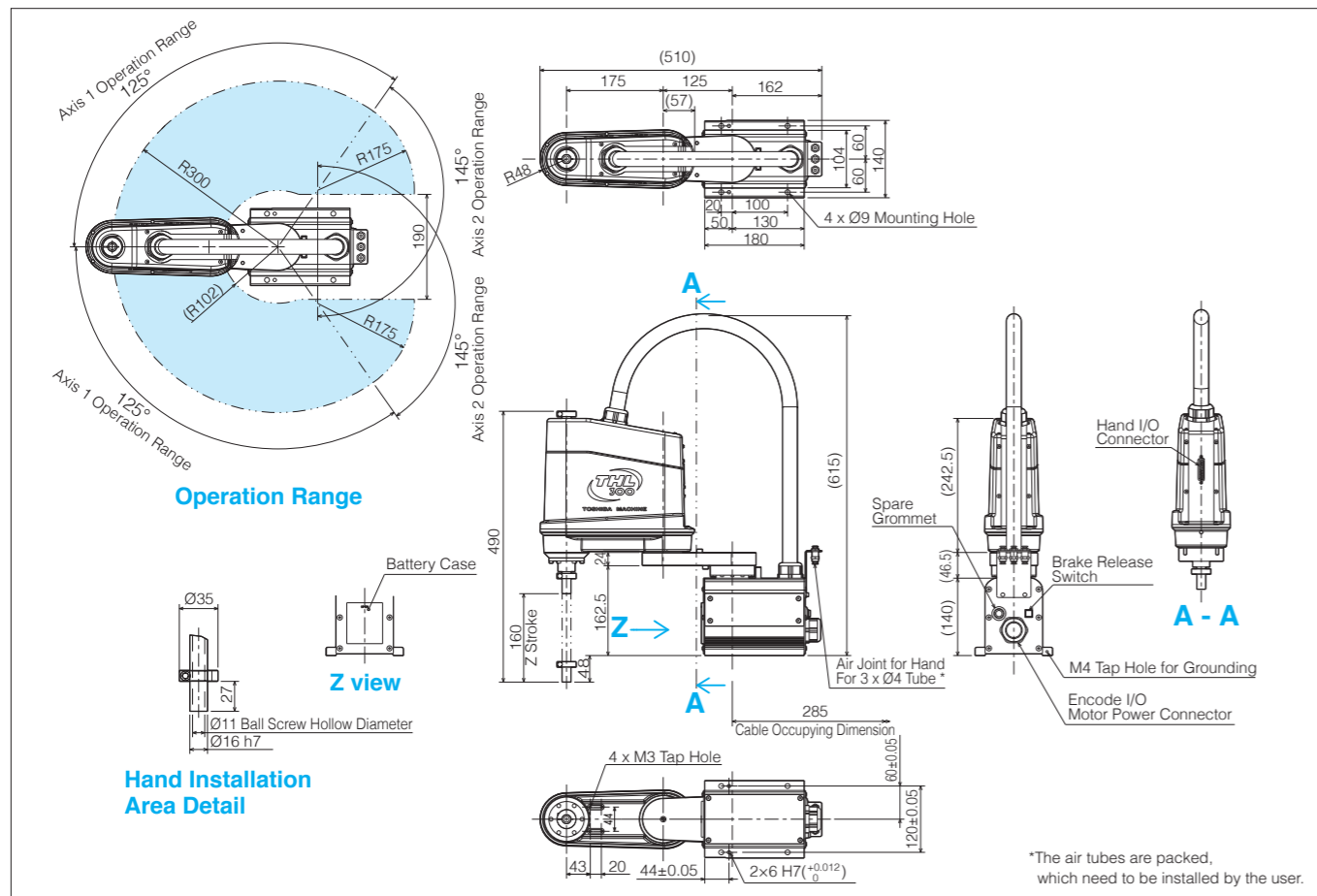
SCARA ROBOT THL400



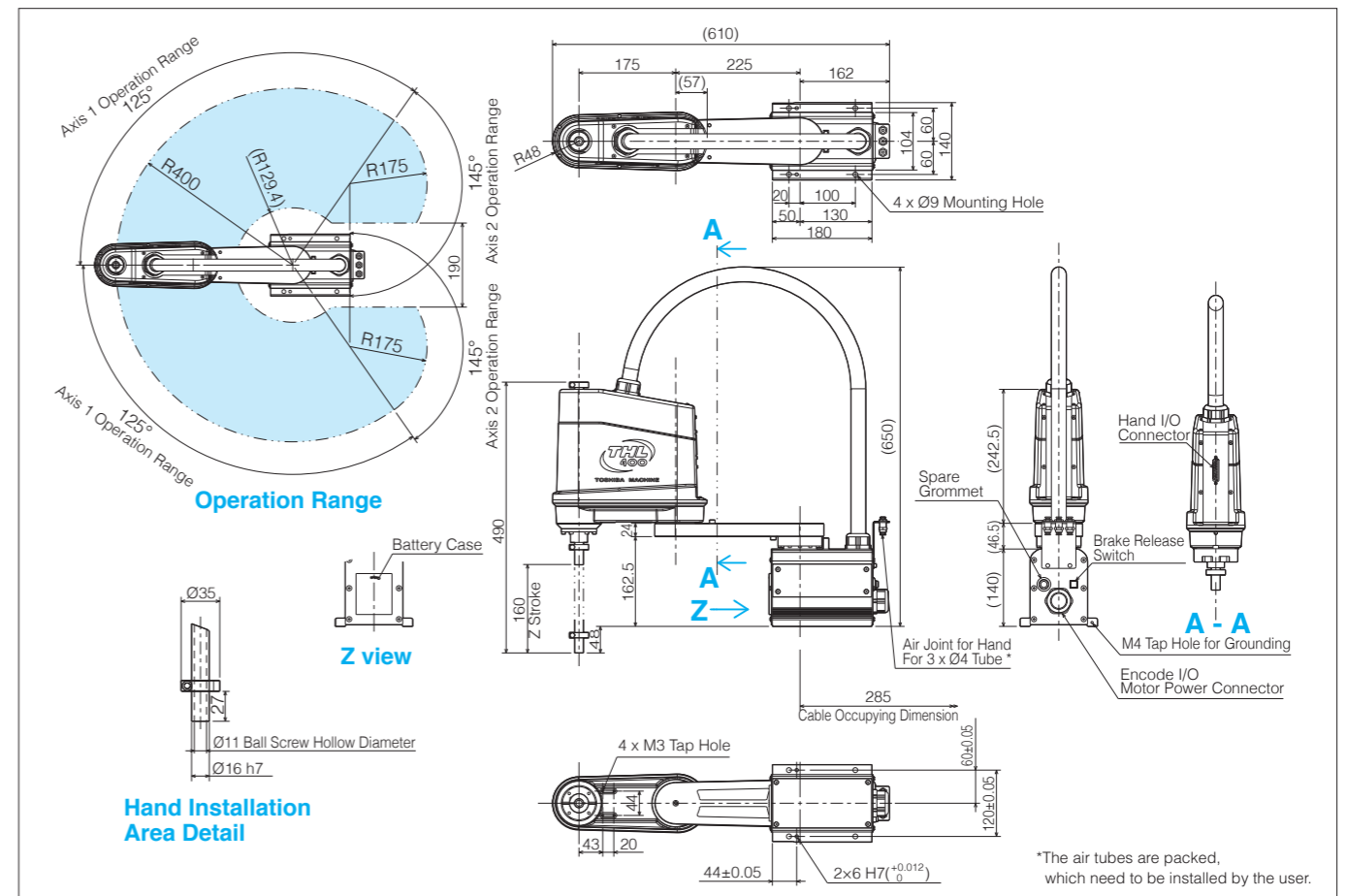
Model	THL400
Type	Horizontal multi-joint
No. of controlled axes	4
Arm length	400mm (225mm+175mm)
Working envelope	Axis 1 ±125° Axis 2 ±145° Axis 3 (Z axis) 0~160mm Axis 4 (Z-axis rotation) ±360°
Maximum speed*1	Axis 1 660°/s Axis 2 660°/s Axis 3 (Z axis) 1120mm/s Axis 4 (Z-axis rotation) 1500°/s Composite 6.3m/s
Standard cycle time (with 2 kg load)*2	0.47s
Maximum payload mass	5kg (rated: 2kg)
Allowable moment of inertia	0.05kg·m ²
Positioning repeatability*3	X-Y ±0.01mm Z (Axis 3) ±0.015mm Axis θ (Z-axis rotation) ±0.007°
Hand wiring	8 inputs / 8 outputs
Hand pneumatic joints*4	φ4 x 3 pcs.
Position detection	Absolute
Robot controller cable	3.5m
Power capacity	0.7kVA
Mass	13kg

■For *1 to *4, please see page 5.

External view



External view



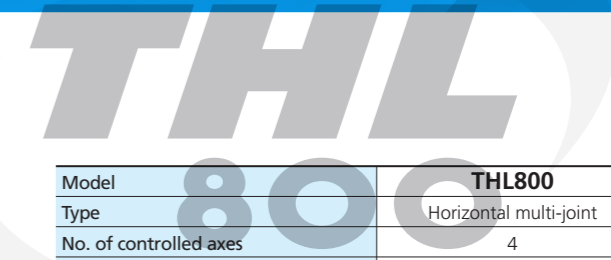
SCARA ROBOT THL700



Model		THL700
Type	Horizontal multi-joint	
No. of controlled axes	4	
Arm length	700mm (400mm+300mm)	
Working envelope	Axis 1	±125°
	Axis 2	±145°
	Axis 3 (Z axis)	0~150mm
	Axis 4 (Z-axis rotation)	±360°
Maximum speed*1	Axis 1	450°/s
	Axis 2	450°/s
	Axis 3 (Z axis)	2000mm/s
	Axis 4 (Z-axis rotation)	1700°/s
	Composite	7.9m/s
Standard cycle time (with 2 kg load)*2	0.50s	
Maximum payload mass	10kg (rated: 2kg)	
Allowable moment of inertia	0.2kg·m ²	
Positioning repeatability*3	X-Y	±0.01mm
	Z (Axis 3)	±0.015mm
	Axis θ (Z-axis rotation)	±0.007°
Hand wiring	8 inputs / 8 outputs	
Hand pneumatic joints*4	φ6 x 3 pcs.	
Position detection	Absolute	
Robot controller cable	3.5m	
Power capacity	1.4kVA	
Mass	24kg	

■For *1 to *4, please see page 5.

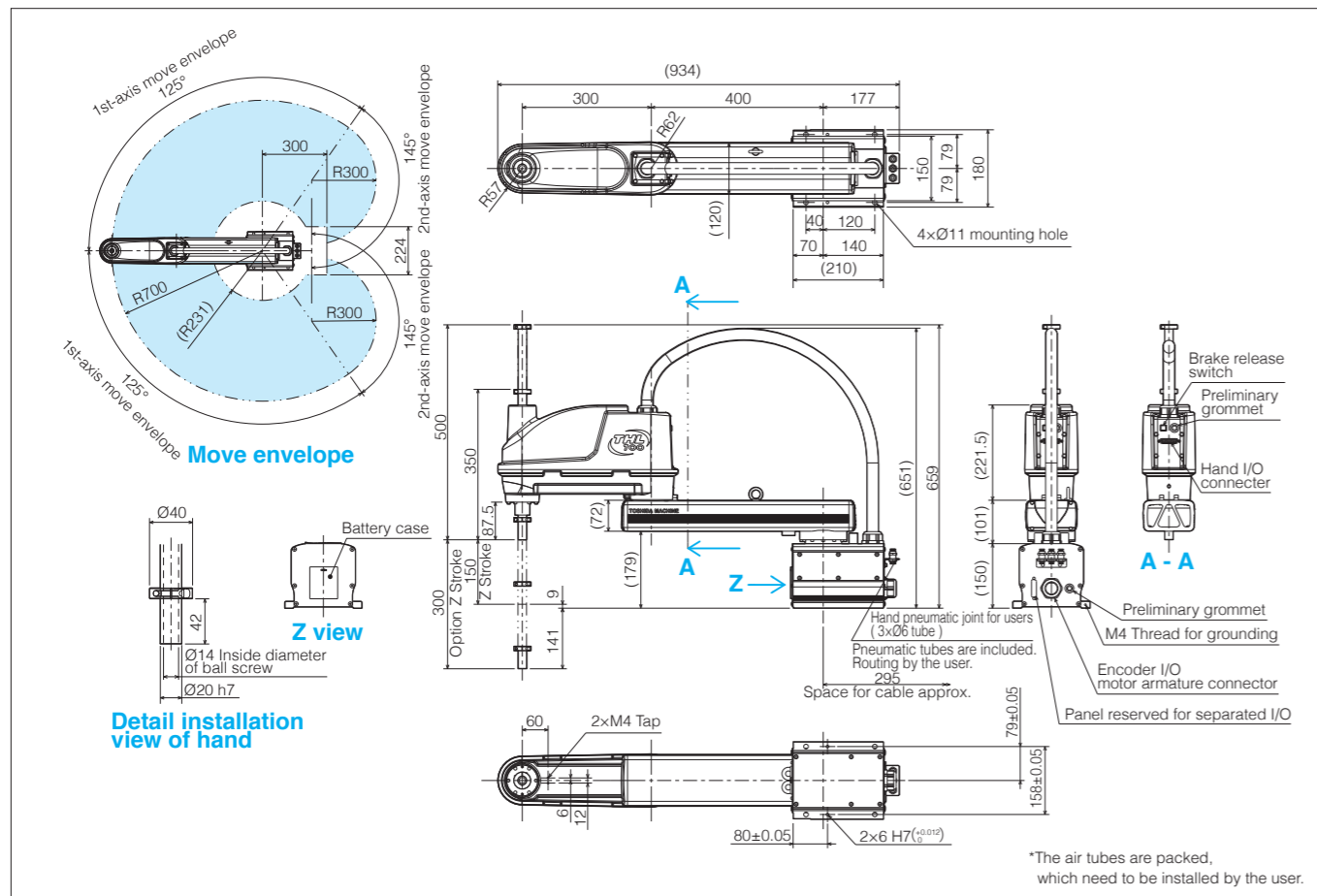
SCARA ROBOT THL800



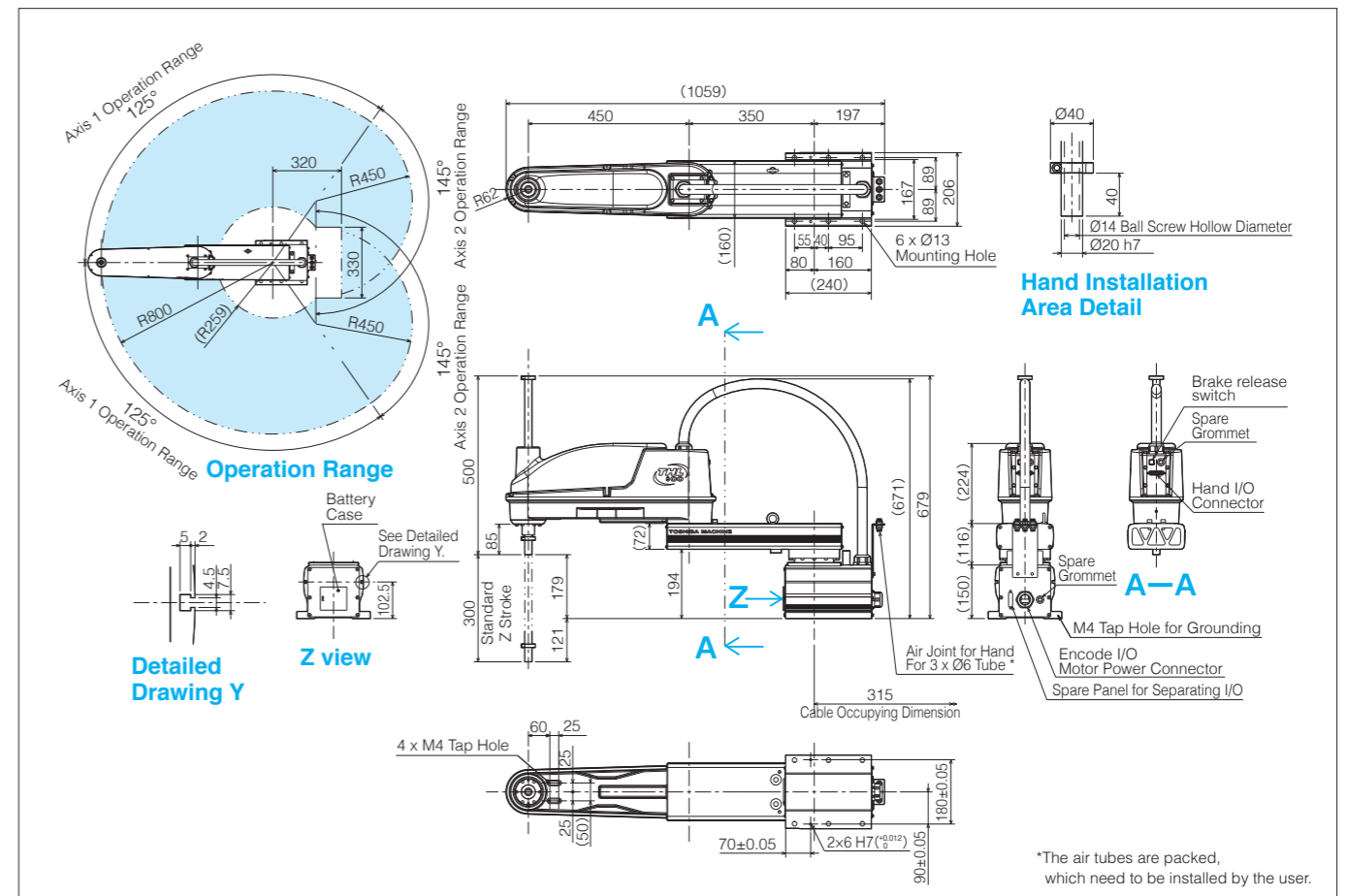
Model		THL800
Type	Horizontal multi-joint	
No. of controlled axes	4	
Arm length	800mm (350mm+450mm)	
Working envelope	Axis 1	±125°
	Axis 2	±145°
	Axis 3 (Z axis)	0~300mm
	Axis 4 (Z-axis rotation)	±360°
Maximum speed*1	Axis 1	187.5°/s
	Axis 2	217.5°/s
	Axis 3 (Z axis)	2000mm/s
	Axis 4 (Z-axis rotation)	1700°/s
	Composite	4.3m/s
Standard cycle time (with 2 kg load)*2	0.47s	
Maximum payload mass	10kg (rated: 2kg)	
Allowable moment of inertia	0.2kg·m ²	
Positioning repeatability*3	X-Y	±0.02mm
	Z (Axis 3)	±0.015mm
	Axis θ (Z-axis rotation)	±0.007°
Hand wiring	8 inputs / 8 outputs	
Hand pneumatic joints*4	φ6 x 3 pcs.	
Position detection	Absolute	
Robot controller cable	3.5m	
Power capacity	1.4kVA	
Mass	33kg	

■For *1 to *4, please see page 5.

External view



External view



These functional optional specifications are designed with consideration for applications, environment, and system-layout requirements.

Z-Axis Long Stroke (-Z)

Compatible Models: THL500, THL600, THL700

- The Z-axis stroke range is extended.
- Useful in an application with large up-down movements and handling of long workpieces.
- (Note: If a stroke other than the above is desired, please contact us.)

Protective Belliows for Z-Axis (-B)

Compatible Models: THL500, THL600, THL700

- Protection of the Z-axis shaft lower side in an environment where liquid or chips may scatter.
- (Note: The cycle time and Z-axis stroke differ from the standard specifications. Please contact us for details.)



Z-Axis Cap (-C)

Compatible Models: THL500, THL600, THL700

- Protection of the Z-axis shaft upper side in an environment where liquid or chips may scatter. It also prevents intrusion and jamming by cables and other peripheral items.



Ceiling-mount type (-T)

Compatible Models: THL400, THL500, THL600, THL700

- To enable more freedom in system layout and effective use of a space, the robot is suspended from the upper side of the working area.
- (Note: The working envelopes differ from the standard-type robots. Please contact us for details.)



Optional Cables Length

- In all models of the THL Series SCARA robots, the length of the cable between a SCARA robot and its controller can be extended to a maximum of 15m.

Support of Safety Category 3

Compatible Models: THL300, THL400, THL500, THL600, THL700

- The models can be equipped with optional unit TS3FB and by adding necessary safety design, thus conform to the safety category 3 that is required in the ANSI and CE marking.
- *This option is supported when the TS3000 controller is used.

Tool Flange for End Effectors Mounting

- Tool flange for securing the robot's hand is available.
- This optional product can be used in all models of the THL Series.
- *The photo right shows the hand mounting tool flange for the THL500 to THL1000 SCARA robots. The shape of the hand mounting tool flange for the THL300 and THL400 SCARA robots is different from the photo right.



Additional 5th Axis (Traveling axis, Wrist axis, etc.)

Compatible Models: THL500, THL600, THL700

- 5th axis can be added for such usage as wrist axis for workpiece flip-over or moving the robot on a traverse axis.
- *This option is supported when the TS3000 controller is used.

Corresponding Option Table

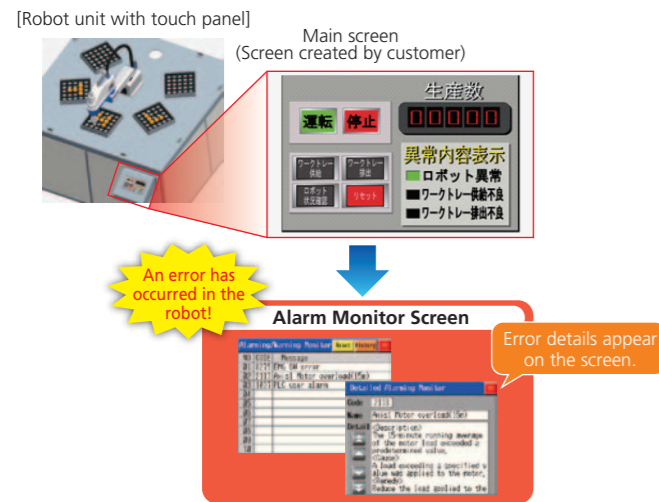
The following shows a convenient corresponding option table. More options will continuously be supported!!

Option Model Name	Z-Axis Long Stroke (-Z)	Protective Belliows for Z-Axis (-B)	Z-Axis Cap (-C)	Ceiling-mount type (-T)	Safety Category 3	Cable Extension (Max)	Dust and Splash-Proof (-IP)	Tool Flange for End Effectors Mounting	Additional 5th Axis (Traveling axis, Wrist axis, etc.)	Cleanroom Design (-CR, -CRB)
THL300	△	△	△	×	△	15m	×	○	△	×
THL400	△	△	△	○	△	15m	×	○	△	×
THL500	○(300mm)	○	○	○	○	15m	×	○	○(Note)	×
THL600	○(300mm)	○	○	○	○	15m	×	○	○(Note)	×
THL700	○(300mm)	○	○	○	○	15m	×	○	○(Note)	×
THL800	△	△	△	△	△	15m	×	○	△	×
THL900	△	△	△	△	△	15m	×	○	△	×
THL1000	△	△	△	△	△	15m	×	○	△	×

- : Can be supported.
 - △: Please contact us.
 - ×: When this option is selected, the TH-A Series is recommended.
- (Note): Cannot be added as a wrist axis, but can be added as a travelling axis.

Functions and Applications

Support for Connection Device Samples



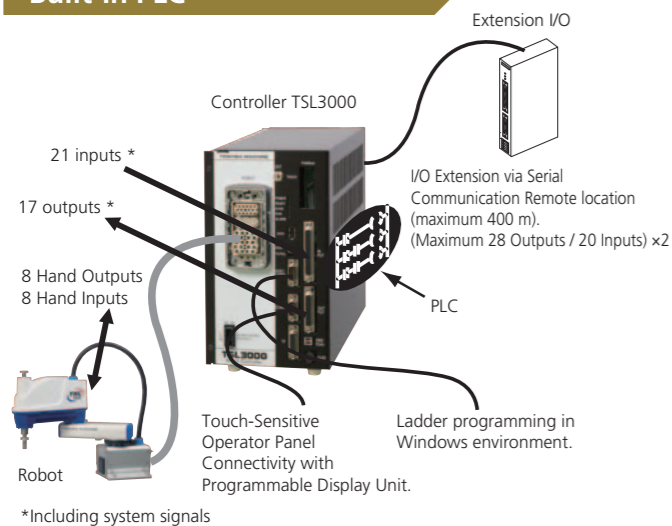
Connection Device Samples is a collaborative system between Toshiba Machine Co., Ltd. and Digital Electronics Corporation. It enables users to check the status of the robot on the touch panel display device.

[Features and advantages]

- When an error occurs in the robot, the error information or details can be checked on the Alarm Monitor Screen (see the left figure).
- Additionally, various other screens for functions including Robot I/O Monitor, Current Position Monitor, I/O Time Chart and Connected Device Data Transfer are provided.
- The above robot screens can be downloaded from the website of Digital Electronics Corporation free of charge. There is no need to create these screens and they can be used immediately after product purchase. http://www.proface.co.jp/otasuke/sample/download/common/connection_robot_con_ts_j.html
- The status of the robot can be checked even by people who cannot operate the teach pendant.
- Because the information about both the robot and the system is displayed on the same display device, troubleshooting is much easier.

*For product information about the touch panel that is compatible with this system, please contact Digital Electronics Corporation. http://www.proface.com/otasuke/sample/detail/common/connection_robot_con_ts_e.html

Built-In PLC

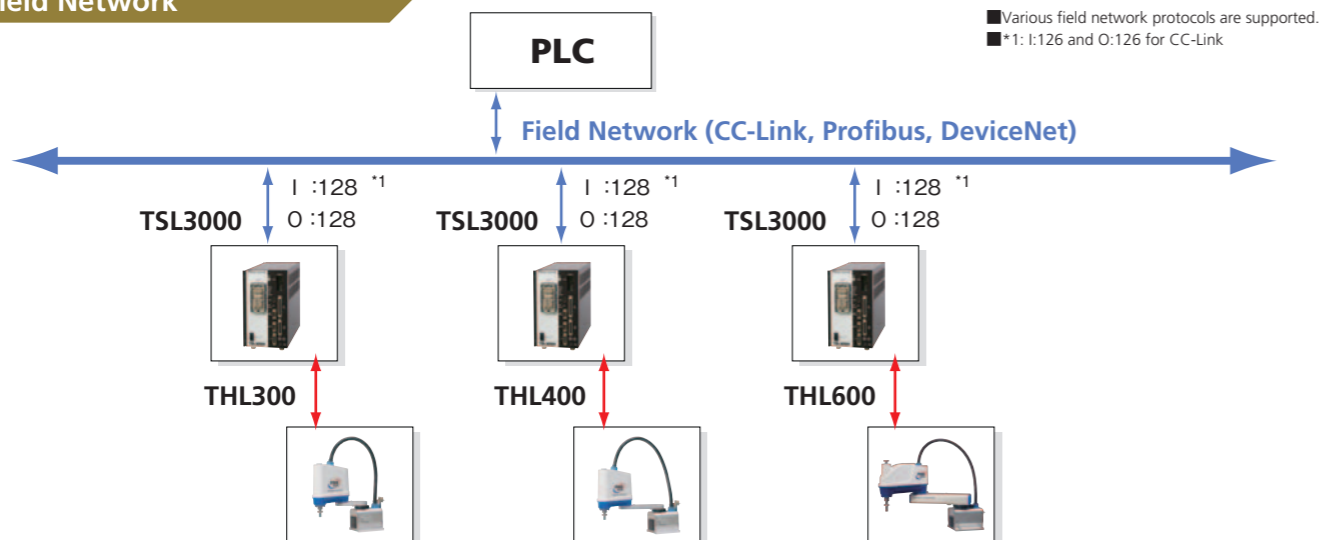


The TSL3000 controller has a built-in simplified sequencer (TCmini). Input and output signals can be handled by ladder-style programming logic, independent from robot motion.

[Features and advantages]

- TCmini controls input/output signals of standard I/O, extension I/O and touch-sensitive panel by ladder program and exchanges data with robot program.
- Thus, flexible system design and control of peripheral equipment is possible without the added cost of an outside host PLC.
- Creation, monitoring and debugging of ladder-logic programming with powerful programming support software TCRGOS-W (optional).
- The scan time is 5ms per 1 K-Word (TSL3000). Connection is possible with various programmable controllers and display units etc.

Field Network

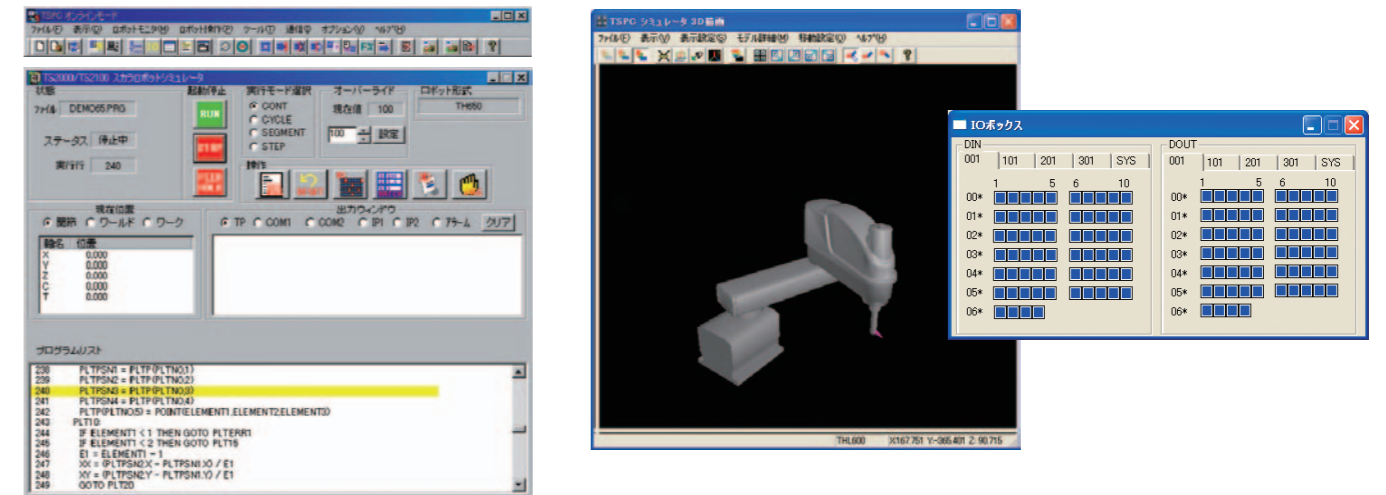


■ Various field network protocols are supported.
■ *1: I:128 and O:126 for CC-Link

PC Software for Programming Support

The following PC software tools are provided to shorten the time and increase the efficiency of system designing and installation work.

● TSPC: For robot programming



1. Powerful Simulation Function:

Off-line robot program creation and simulation, with simulated I/O. Lead time up to the start of robot operation can be shortened. Robot programs can be pre-checked without stopping the production line.

2. User-friendly programming environment:

Extensive help information, powerful grammar check, direct, online editing of programs in the controller memory.

3. Multi-functional monitor and support:

Monitoring functions such as active program display, position display, motion status monitor by 3D model, and alarm history display. Operation from on-screen operation panel. Connection via Ethernet (optional) is also supported.

● TS LayOut: For cycle-time and lay-out review

1. Instant cycle time estimation:

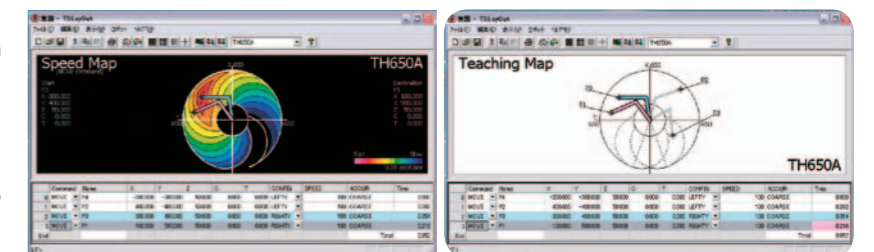
Cycle time is calculated just by pointing at a position, without using the programming language.

2. Guidance for high-speed motions:

Coloured speed map display indicates fast-motion areas from a given start position, guiding you to make the best system layout.

3. Conversion to robot program:

Input positions data can be converted to a robot program just by one click on a menu.



● TCRGOS: For programming the built-in PLC

1. Ladder-style logic programming for the built-in PLC.

In addition to program creation, on-line monitoring of ladder program and I/O status help reduce development and debugging time.

3. Extensive functions such as address map display, comment display and search functions are provided.

