

ADVANCED ROBOTICS

TOSHIBA MACHINE



TM ROBOTICS

TH SERIES

compact SCARA Robot series

TH250



Arm length	<input type="checkbox"/>	250mm
Z-axis stroke	<input type="checkbox"/>	120mm
Max. payload	<input type="checkbox"/>	3Kg
Repeatability X, Y	<input type="checkbox"/>	±0.01mm
Repeatability Z	<input type="checkbox"/>	±0.01mm

TS1000



No. of axis	<input type="checkbox"/>	Maximum five
Storage capacity	<input type="checkbox"/>	6400 points
I/O	<input type="checkbox"/>	16 inputs/16 outputs
Controls	<input type="checkbox"/>	TH250/TH350

TH350



Arm length	<input type="checkbox"/>	350mm
Z-axis stroke	<input type="checkbox"/>	120mm
Max. payload	<input type="checkbox"/>	3Kg
Repeatability X, Y	<input type="checkbox"/>	±0.01mm
Repeatability Z	<input type="checkbox"/>	±0.01mm

TH450



Arm length	<input type="checkbox"/>	450mm
Z-axis stroke	<input type="checkbox"/>	150mm(300mm)
Max. payload	<input type="checkbox"/>	5Kg
Repeatability X, Y	<input type="checkbox"/>	±0.015mm
Repeatability Z	<input type="checkbox"/>	±0.01mm

TH550



Arm length	<input type="checkbox"/>	550mm
Z-axis stroke	<input type="checkbox"/>	150mm (300mm)
Max. payload	<input type="checkbox"/>	5Kg
Repeatability X, Y	<input type="checkbox"/>	±0.015mm
Repeatability Z	<input type="checkbox"/>	±0.01mm

SCARA ROBOTS

horizontal multi-joint robots

TH650



Arm length	<input type="checkbox"/>	650mm
Z-axis stroke	<input type="checkbox"/>	200mm (400mm)
Max. payload	<input type="checkbox"/>	10Kg
Repeatability X, Y	<input type="checkbox"/>	±0.015mm
Repeatability Z	<input type="checkbox"/>	±0.01mm

TH1050



Arm length	<input type="checkbox"/>	1050mm
Z-axis stroke	<input type="checkbox"/>	200mm (400mm)
Max. payload	<input type="checkbox"/>	20Kg
Repeatability X, Y	<input type="checkbox"/>	±0.03mm
Repeatability Z	<input type="checkbox"/>	±0.02mm

TS2000/2100



No. of axis	<input type="checkbox"/>	Maximum five
Storage capacity	<input type="checkbox"/>	6400 points
I/O	<input type="checkbox"/>	38 inputs/ 32 outputs
TS2000 controls	<input type="checkbox"/>	HSP, HZ, TH450, TH550
TS2100 controls	<input type="checkbox"/>	TH650, TH850, TH1050

SR-1504HZ



Arm length	<input type="checkbox"/>	1500mm (1950mm)
Z-axis stroke	<input type="checkbox"/>	600mm (1200mm)
Max. payload	<input type="checkbox"/>	70Kg (40Kg)
Repeatability X, Y	<input type="checkbox"/>	±0.2mm
Repeatability Z	<input type="checkbox"/>	±0.2mm


TH850



Arm length	<input type="checkbox"/>	850mm
Z-axis stroke	<input type="checkbox"/>	200mm (400mm)
Max. payload	<input type="checkbox"/>	20Kg
Repeatability X, Y	<input type="checkbox"/>	±0.03mm
Repeatability Z	<input type="checkbox"/>	±0.02mm

SCARA ROBOTS

technical specifications

Model		TH250	TH350	TH450
Horizontal multi-joint robot				
Arm Length	Full length	250mm	350mm	450mm
	Axis 1	125mm	225mm	200mm
	Axis 2	125mm	125mm	250mm
Working Envelope	Axis 1	±115°	±115°	±120°
	Axis 2	±140°	±145°	±145°
	Axis 3 (Z-axis)	120mm	120mm	150mm (300mm)
	Axis 4 (Z-axis rotation)	±360°	±360°	±360°
Maximum speed	Axis 1	480°/sec	300°/sec	600°/sec
	Axis 2	480°/sec	480°/sec	600°/sec
	Axis 3 (Z-axis)	1067mm/sec	1067mm/sec	2000mm/sec
	Axis 4 (Z-axis rotation)	1143°/sec	1143°/sec	2000°/sec
	Composite	3.14m/s	2.88m/s	7.33m/sec
Load	Maximum payload mass	3kg	3kg	5kg
	Allowable moment of inertia at end	0.017kgm ² (With limited acceleration)	0.017kgm ² (With limited acceleration)	0.05kgm ²
Positioning repeatability	X, Y (Plane)	±0.01mm	±0.01mm	±0.015mm
	Z-axis (Vertical)	±0.01mm	±0.01mm	±0.01mm
	Axis 4 (Z-axis rotation)	±0.03°	±0.03°	±0.015°
Input/output signals for hand		5 inputs, 4 outputs	5 inputs, 4 outputs	5 inputs, 4 outputs
Air piping for hand		φ4x4 pcs.	φ4x4 pcs.	φ4x4 pcs.
Position detecting system		Absolute system	Absolute system	Absolute system
Mass of the robot		15kg	15kg	27kg
Controller		TS1000	TS1000	TS2000
External view		see www.tmrobotics.co.uk	see www.tmrobotics.co.uk	see www.tmrobotics.co.uk

Note: An item in parentheses is an option

SCARA ROBOTS

technical specifications

TH550	TH650	TH850	TH1050	SR-1504HZ
				
550mm	650mm	850mm	1050mm	1500mm
300mm	300mm	350mm	550mm	850mm
250mm	350mm	500mm	500mm	650mm
±120°	±160°	±160°	±160°	±110°
±145°	±143°	±145°	±145°	±150°
150mm (300mm)	200mm (400mm)	200mm (400mm)	200mm (400mm)	600mm (1200mm)
±360°	±360°	±360°	±360°	±360°
375°/sec	337.5°/sec	300°/sec	281°/sec	130°/sec
600°/sec	600°/sec	411°/sec	411°/sec	160°/sec
2000mm/sec	2000mm/sec	2000mm/sec	2000mm/sec	1000mm/sec
2000°/sec	1700°/sec	1147°/sec	1147°/sec	300°/sec
6.21m/sec	7.49m/sec	8.03m/sec	8.73m/sec	5.22m/sec
5kg	10kg	20kg	20kg	70kg (arm length 1950:40kg)
0.05kgm ²	0.1kgm ²	0.2kgm ²	0.12kgm ²	3.5kgm ²
±0.015mm	±0.015mm	±0.03mm	±0.03mm	±0.2mm
±0.01mm	±0.01mm	±0.02mm	±0.02mm	±0.2mm
±0.15°	±0.015°	±0.03°	±0.03°	±0.05°
5 inputs, 4 outputs	5 inputs, 4 outputs	5 inputs, 4 outputs	5 inputs, 4 outputs	5 inputs, 4 outputs
φ4x4 pcs.	φ6x4 pcs.	φ6x4 pcs.	φ6x4 pcs.	φ12x2 pcs.
Absolute system	Absolute system	Absolute system	Absolute system	Absolute system
29kg	55kg	72kg	75kg	550kg
TS2000	TS2100	TS2100	TS2100	TS2100
see www.tmrobotics.co.uk	see www.tmrobotics.co.uk	see www.tmrobotics.co.uk	see www.tmrobotics.co.uk	see www.tmrobotics.co.uk

FEATURES & options

Z-axis long stroke

- TH450/TH550 Z-axis stroke can be extended up to 300mm
- TH650/TH850/TH1050 Z-axis stroke can be extended up to 400mm
- Larger margin for upward or downward movement
- Vital in long workplaces



Applicable models: TH450, TH550, TH650, TH850, TH1050

Ceiling type

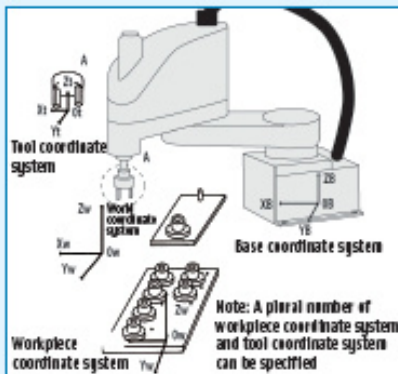
- Can be suspended from the top of the work area
- Makes the best possible use of the available area



Applicable models: All SCARA robots except for the TH250

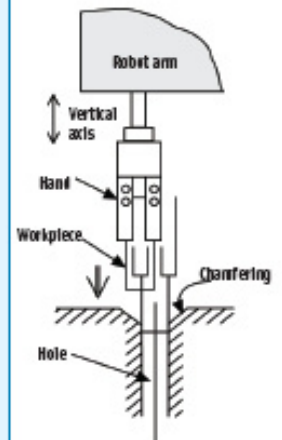
Coordinate system

- Four coordinate systems - world, base, tool and workpiece
- No modification of entire position data after position or tool change



Torque control

- Allows robot movement while controlling each axis motor torque
- Applicable in workpiece insertion
- Protects the robot hand and the workpiece
- Features Torque on/off option, allowing unrestricted movement
- Torque limit allows any limit value to be specified for any axis torque



Addition of traverse axis

- Utilises the maximum five axis control option
- Allows the robot itself to move between workstations
- Dramatically improves flexibility



Applicable models: All SCARA robots

Z-axis bellows

- Ideal when using the robot in a hostile environment so as to protect splashing from liquid and abrasive material
- In case of Z-axis 400mm, the height of the robot tool flange is located 10mm lower than the standard type and Z-axis stroke becomes 390mm



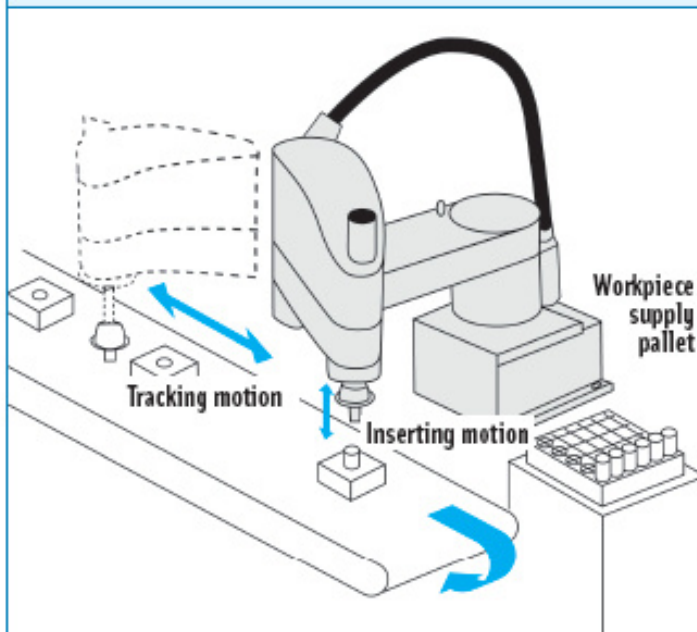
Applicable models: All SCARA robots

Synchronisation with a conveyor

- The robot traces the conveyor's movement
- Allows continuous handling of workpieces
- Allows supply of workpieces to a moving pallet
- Rotational synchronisation available

Compatibility with vision system

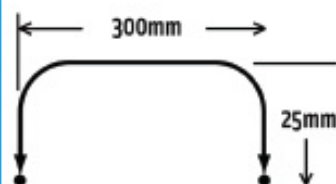
- Guide robot based on machine vision feedback
- Precise timing = high speed accuracy
- Increased flexibility, constant throughput
- Improved return on investment



Cycle time

High-speed arch motion is possible:

- TH250: 0.35 seconds with 1Kg load
- TH350: 0.37 seconds with 1Kg load
- TH450: 0.33 seconds with 2Kg load
- TH550: 0.33 seconds with 2Kg load
- TH650: 0.33 seconds with 2Kg load
- TH850: 0.49 seconds with 2Kg load
- TH1050: 0.48 seconds with 2Kg load



Clean room specifications

- Applications such as semi-conductor & pharmaceuticals
- TH-CR series extends to clean room class 10 (0.3µm)
- Operating speeds of Axis 2 and 3 are restricted to 80%



Applicable models: All SCARA robots

Operation mode

Operation modes include PTP, CP, short cut motion and arch command:

PTP (Point to Point control)

- Moves robot fast to target position, irrespective of path
- All axes are synchronized

CP (Continuous path control)

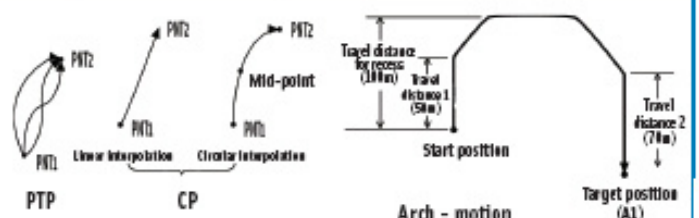
- Moves robot fast to target position, irrespective of path
- Offers linear or circular interpolation
- Three dimensional interpolation can be performed at high speed

Short cut motion

- Robot doesn't stop at taught positions but passes nearby before arriving at its target position
- Avoids an obstruction and shortens the cycle time

Arch motion

- Performs pick and place functions quickly
- The robot moves on an arch shaped path to a target position
- Any travel distance can be specified



CONTROLLER specifications

TS1000



- Built in PLC
- Enhanced monitoring facilities
- Complete system control
- Handles the TH250 and TH350 robots
- Optional fieldbus connectivity (Profibus, Devicenet and CC-link)
- Easy interface to peripheral products
- Maximum five-axis simultaneous control
- 16 inputs and 16 outputs

CONTROLLER	TS1000
No. of axis	Standard 4-axis simultaneous control (max five-axis)
Operation mode	PTP, CP (linear, circular), shortcut
Position detection	Absolute encoders system
Storage capacity	Total: 6400 Points + 12800 Steps One Programme: 2000 Points + 3000 Steps
Number of Programmes	Maximum 256 (247 User files & 9 System files)
Programming Language	SCOL (proprietary, similar to basic)
Teaching Unit	Teach Pendant TP1000 (programmes can be written on PC)
External inputs/outputs	16 inputs/16 outputs (8/8 can be switchable with system)(Expandable) (I/O selectable between plus-common and minus-common)
End-effector control systems	5 inputs/4 outputs
External operation signals	Inputs: Cycle operation modes, start, stop, program reset, etc Outputs: Servo-On, emergency stop, malfunction, etc
Serial communication	RS-232C: 2 ports
Other functions	Torque control, Interruptive functions, self-diagnosis, I/O control & communications during motion, Coordinate calculations, Constant-speed control, Built-in PLC, etc
Options	I/O extension, I/O cables, Field network (Devicenet, Profibus, Ethernet & CC-link) Position data latch function, PC software for programming (TSPC), Separation of operational panel, cable length
Power supply & capacity	Single-phase: AC240V -200V 50/60 Hz (+/-10%) 1.1KVA
Dimensions & Mass	170W x 290H x 270D(mm), Approx. 10kg

TS2100



- Suitable for TH650, TH850 and TH1050
- Built in PLC
- Increased servo drive capacity
- Constant speed control
- Optional fieldbus connectivity (Profibus, Ethernet, Devicenet and CC-link)
- Easy interface to peripheral products
- 38 inputs and 32 outputs

TS2000:

- Equivalent controller available for TH450 and TH550 robots
- Single phase power: AC190 to 250V
- Power capacity: 2.3KVA
- Dimensions - 290Wx230Hx280D(mm) 12kg

CONTROLLER	TS2100
No. of axis	Maximum five-axis simultaneous control
Operation mode	PTP, CP (linear, circular), shortcut
Position detection	Absolute encoders system
Storage capacity	Total: 6400 Points + 12800 Steps One Programme: 2000 Points + 3000 Steps
Number of Programmes	Maximum 256 (247 User files & 9 System files)
Programming Language	SCOL (proprietary, similar to basic)
Teaching Unit	Teach Pendant TP1000 (programmes can be written on PC)
External inputs/outputs	31+7 inputs / 22+10 outputs (7/10 can be switchable with system) (I/O are supplyable between plus-common and minus-common)
Hand control signals	5 inputs/4 outputs
External operation signals	Inputs: Cycle operation modes, start, stop, program reset, etc (6 dedicated inputs + 7 inputs shared with general) Outputs: Servo-On, emergency stop, malfunction, alarm, etc. (2 dedicated Outputs + 10 Outputs shared with general)
Serial communication	RS-232C: 2 ports
Other functions	Torque control, Interruptive functions, self-diagnosis, I/O control & communications during motion, Coordinate calculations, Constant-speed control, Built-in PLC, etc
Options	I/O extension, I/O cables, Field network (Devicenet, Profibus, Ethernet & CC-link) Conveyor synchronization, Position data latch function, PC software for programming (TSPC), Separation of operational panel, cable length
Power supply & power capacity	Three phase: AC190/250V (+/-10%) 50/60Hz (+/-10%) 4.4KVA (varies based on the robot arm type)
Dimensions & Mass	420W x 230H x 300D(mm) 16kg

TEACH PENDANT & software

Using the teach pendant couldn't be simpler



The TP1000 teach pendant makes multiple robot control simple and effective. Robot commands can be entered using either the built in keyboard or the digital menu. There is a three-point deadman's switch to enable manual movement when required. In such situations the robot can be controlled using simple, intuitive guide keys. An emergency stop button is provided to make manual robot shut down completely safe and immediate.

Teach pendant features

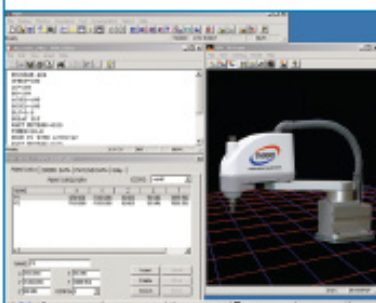
- Allows robot to be moved to taught position
- Position teaching and position data editing
- File operation
- Program creation and editing
- Test operation
- Setting of conditions for automatic operation
- Robot language can be executed directly
- Monitoring of input/output signals and current position
- Display of current error status and error history

Software makes programming simple

Toshiba Machine's TSPC software from TM Robotics makes system integration work simple thanks to its wide range of functions. These include a program editor; grammar check and communications as well as program selection, position teaching and 3D display to check robot motion. As a result, development of the robot programme is far quicker and much simpler. The software also allows variable values to be used on the robot program and I/O status to be checked in real time. This radically improves the debugging process.

Software features

- Cycle time testing, accurate to a fraction of a second, allows verification of all robot programmes in advance
- Grammar check verifies that correct file names are used in programming
- Program execution is displayed in real time
- Allows the use of personal computer instead of an FDD unit
- Simple program storage
- Allows editing, storage and syntax checking via PC
- Communication is performed through a PC



Teaching methods

- Programs are easy to enter via teach pendant
- Uses SCOL robot programming language
- Position data is easy to teach - remote, servo free or MDI coordinate value

Remote

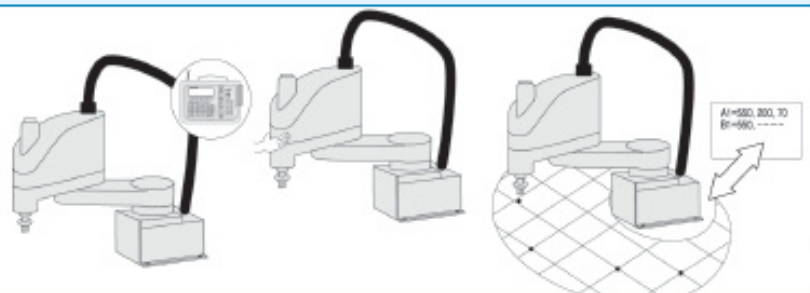
- The arm moves to target position using the teach pendant
- In inching mode, the arm moves a small distance for each keystroke
- In jog mode, the arm moves as long as the key is pressed

Servo free

- The arm can be manually moved into target position when off

MDI: Coordinate value

- Target position can be input by coordinate value
- Useful for entering target position after calculating it from a drawing



Remote

Servo free

MDI: Coordinate value

CARTESIAN

linear actuators

Modular construction makes design simple

The BA series Cartesian linear actuator, more commonly known as the ROlbot, uses a modular building block design, allowing single or multiple axis configuration to be built from the same standard components. Manufactured by Toshiba Machine, this system allows for over 500 configurations whilst the compact design minimises space requirements. With a payload capacity of up to 150kg per axis and an arm length of between 50mm and 2.5m, the BA series is perfect for even the most demanding applications.

Each axis can handle up to 150kg and features AC servomotors, precision ground ball screws and high rigidity linear guides. Motors can be mounted on either side of the axis, or underneath, to reduce its overall length. The junction box unit can be mounted almost anywhere along the axis and allows cable to exit from any of five directions. The ROlbot is supplied with a unique flexible tube carrier system, which can be mounted horizontally or vertically.



Junction Box (CN Box) unit can be mounted almost anywhere along the axis and allows cable to exit from any five directions

Unique flexible tube carrier system can be mounted horizontally (cable track style) or vertically (hoop cable style)

Axis Unit

“T” slots facilitate easy connection of external parts

Axis features

- Absolute positioning - no need for home return
- Building block system - reduces part count
- Slim axes - space saving
- CE markings comply with European directives

Master and Slave units

Cables

Brackets

Slim axis designs available up to 1050mm (41.3 inch)

75
78

CARTESIAN

linear actuators

The controller



The controllers are similar in size to a stand-alone AC servo driver and fit easily into a control panel. Built in I/O can eliminate the need for external PLC or sequencer controls and provides standard support for basic pick and place and palletising routines. Up to four controllers can be connected together in a multitasking system and each one can accept a pulse train input for movement commands, allowing an external motion control system to be easily integrated.

Controller features

- Compact size - fits easily into a control panel
- Easy to use programming language
- Built in I/O - eliminates external PLC or sequencer controls
- WINDOWS based programming tools
- Multitasking capability - up to four controllers can work together
- World wide power supply - AC 100/120/200/240V
- Pulse train input - external motion control can be easily fitted
- Flexible tube system - mount horizontally or vertically
- Cartesian robot compatible with cost effective SCARA TS1000 controller

The belt axis ROlbot - long stroke, high speed

Available in a range of sizes, the new belt axis actuators can handle up to 40kg at speeds of up to 2000mm/s. Both factors depend on motor size, which can be up to 200W, whilst speed is also relative to payload capacity. The stroke range can be up to a maximum of 2500mm on the largest model. Repeatability across the range is $\pm 0.05\text{mm}$.

Further options

- TPH-2A teach pendant - allows manual control
- Host computer software - edit, execute and save programs from a PC
- Communications cable - connect to a PC
- Clean room - for use in pharmaceutical and laboratory applications
- Dust resistant - for use in dirty environments
- Regenerative discharge units



The BA05 and BA07

Compact ball screw actuators for use in high rigidity applications

BA05/BA07 features

- High rigidity and slim frame
- Can be constructed in two-axes or three-axes (orthogonal) combinations
- Easy to use controller is standard for entire BA series
- Maximum effective stroke for the total axis length saves space
- Absolute-encoder eliminates home return
- Encoder backup by commercially available batteries
- Quiet and accurate precision ground ball screw
- Precision Z-phase detection for home positioning (sensor-less)
- Easy maintenance using replaceable components
- Arm length 50mm - 600mm
- Accurate to 0.02mm
- Payload 30kg