CKD

SCARA Robot
KSL Series
（TP5100 Operator's Manual）

INSTRUCTION MANUAL

SM-A78392-A

- Read this Instruction Manual before using the product.
- Read the safety notes carefully.
- Keep this Instruction Manual in a safe and convenient place for future reference.

CKD Corporation

This operation manual is for controllers in the KSL3000 series.

Introduction

Thank you for purchasing this CKD Machine robot system.
The descriptions in this manual cover only the sections where the operation and display of the TP5100 teach pendant are different from the TP1000 and assume that the user already has the TP1000 operation manual "SM-20049-A Operation Manual".
For operation procedures that are identical to the TP1000, refer to the TP1000 operation manual "SM-A20049-A Operation Manual".

This manual is organized as follows.

Part 1: Basic
This section explains the basic information for TP5100 operation.

Part 2: Functions
This section describes the additional and modified functions in the TP5100.

Table of Contents

Usage Scope

This system was designed for supporting automation of a wide range of operations, including transportation operations such as workpiece movement and alignment and assembly operations such as part insertion and screw tightening.
We ask that customers use this system for the purpose of supporting automation of these operations and incorporating into automation equipment.

This system was not designed for use in operations where contact is made with people (operations in medical treatment, nursing care, etc.), for incorporating into equipment used for sustaining human life (life support devices, infant incubators, etc.), for incorporating into equipment used for transporting people (automobile and other transportation equipment, airplanes and other aerospace equipment, roller coasters and other amusement park equipment), for equipment used for protecting human life or the human body (safety devices, etc.), or similar equipment.
This system was also not designed for incorporating into equipment for the purpose of controlling high amounts of heat (nuclear control equipment, combustion furnace control equipment, etc.).
In cases where a fault or malfunction of this product could directly threaten human life or cause an injury, its use in operations or incorporating into equipment is prohibited. If this product is used, the customer assumes all responsibility for ensuring safe operation.

Operating Procedures

This describes the operating conditions for TS5100. Usage under different conditions could expose the user to unexpected risks. Be sure to follow the required conditions.

1. Main Specifications of Product   Refer to the robot manual or the installation and transportation manual for the robot that you are using.

Usage Restrictions   Tables 1 to 6 each show the "Restricted Specifications Sheet," in which the usage restrictions are described.

Table 1. Restricted Specifications Sheet

1. Purpose and application for using product (usage restrictions)	
1) Intended use	To make the robot perform operations for specific purposes (item transport, assembly, inspection, machining, etc.)
	(1) Transportation
	[1] Obtain a transportation route to the unpacking site.
	[2] Use a forklift or other equipment to lift the packing box.
	[3] Move the packing box to the unpacking site.
	(2) Unpacking
	[1] Obtain the space required for unpacking.
	[2] Cut the packing straps and unpack.
	[3] Cut the packing straps securing the robot.
	[4] Peel off the tape from the controller packing box, and unpack.
	[5] Check that the robot and controller are not damaged.
	[6] Check the accessories and their quantities.
	- When transferring the robot to the installation site
	[7] Dispose of, or store and manage the packing materials.
	- When storing the robot
	[7] Secure in place in the same way as the state at delivery, and repack.
	[8] Move the packing box to the storage site.
	(3) Transfer
	- Robot
	[1] Check the orientation of the robot during transfer.
	[2] Check that the robot fixing jigs are mounted.
	[3] If using a crane, mount the supplied eyebolts.
	[4] Check the tightness of the robot fixing jig fixing bolts.
	[5] Use a crane or cart to transfer to the installation site.
	- Controller
	[1] Use a cart to transfer to the installation site.

Table 1. Restricted Specifications Sheet (continued)

1. Purpose and application for using product (usage restrictions)	
1) Intended use (continued)	(4) Installation [1] Use bolts to secure the robot to the frame and other parts. [2] Fabricate any needed cables. [3] Remove the robot fixing jigs and eyebolts. [4] Install the controller and connect it to the robot. [5] Press the robot by hand to move to a location where it is easy to perform work. [6] Mount the end effector. [7] Connect the required external devices. (5) Teaching [1] Move the robot to the desired position or orientation by guiding it with a teach pendant or pushing it by hand. [2] Teach the position where the robot will operate. [3] Create the operation sequence (program, etc.). [4] Make sure that the signals and data are transferred to and from the external equipment. [5] Check operation at low speed (250 mm/sec or less). [6] While gradually increasing the operating speed, make sure that the operation matches the specific purpose. (6) Operation [1] Start robot operation. [2] Make sure that operation is being performed to match the specific purpose at the specified speed. [3] Stop robot operation. (7) Repacking [1] Remove the end effector. [2] Move the robot to the position and orientation where the fixing jig can be mounted by guiding it with a teach pendant or pushing it by hand. [3] Mount the fixing jig. [4] Turn off the power, and remove the wiring. [5] Obtain the space needed for packing. [6] Use a crane to transfer the robot, and mount the supplied eyebolts. [7] Transfer the robot and controller to the packing site. [8] Pack the robot and controller so that they are in the original delivery state. [9] Obtain a transportation route to the transportation equipment (truck, etc.). [10] Use a forklift to lift the packing box. [11] Load the packing box onto the transportation equipment.

Table 1. Restricted Specifications Sheet (continued)

1. Purpose and application for using product (usage restrictions)	
1) Intended use (continued)	(8) Maintenance Work performed when the primary power is off: - Robot [1] Check the bolts for any looseness and backlash and re-tighten them. [2] Make sure that the cable clamp is not loose. [3] Check for any damage. [4] Clean off any dust. [5] Inspect and apply corrosion inhibitor. [6] Check for any wear on the cable and air tube. [7] Check the operation of each joint and check origin position for misalignment. - Controller [1] Replace the memory backup batteries in the controller. Work performed when the primary power is on: [1] Check the grease state and apply grease (when the servo power is off). [2] Check for any abnormal vibrations and sounds during operation (when the servo power is on). [3] Check the teaching point for any misalignment (when the servo power is on). [4] Replace the backup batteries for the robot position detector (when the servo power is off). (9) Disposal [1] Remove the end effector. [2] Move the robot to the position and orientation where the fixing jig can be mounted by guiding it with a teach pendant or pushing it by hand. [3] Mount the fixing jig. [4] Turn off the power, and remove the wiring. [5] Use a crane to transfer the robot, and mount the supplied eyebolts. [6] Transfer the robot and controller to the disposal site. [7] Dispose of using a method compliant with your country's laws and regulations.

Table 1. Restricted Specifications Sheet (continued)

Purpose and application for using product (usage restrictions)	
2) Foreseeable misuse	- Use for work which applies excessive impact to the robot or to which excessive impact is applied by the robot - Modification of robot, controller, and optional parts and energization with these covers removed - Operation in other than the specified installation state (floor, suspended, and wall-mounted) - Operation on a frame or other structure that does not satisfy the specified strength - Operation under conditions not satisfying the specified installation requirements - Entry into the hazard zone of the robot by mistakenly assuming that operations would have stopped although the stop is just for waiting for an operation signal during operation - Usage under conditions where the specification values are exceeded or usage under improper settings - Stop of the robot caused by power off during operation or when the servo power is on - Unintended operation caused by inadvertently pressing of a button - Operating without checking operation in MANUAL mode - Operating without checking the tightness of the robot and hand set bolts - Unintended operation due to improper wiring - Unintended operation due to incorrect program selection - Riding on or leaning against the robot or hanging on the arm
3) Unexpected start	- Malfunction due to excessive noise - Robot start due to start signal unexpectedly sent from peripheral equipment to the robot - Unintended start due to abnormal communication data - Malfunction due to voltage fluctuation - Power on due to powering after power outage - Malfunction due to failure or other cause

Table 2. Restricted Specifications Sheet

2. Replacement or other modification of program components (time restrictions)	
1) Mechanical restrictions	- Before operating the robot, perform operation at a low speed (20% or less of maximum speed) for five (5) minutes
2) Electrical restrictions	- Replace consumable parts as required or periodically by conducting daily inspection, regular inspection (every 3 and 6 months and every year) and overhauls (every 5 years).

Table 3. Restricted Specifications Sheet

3 Movable range of product (restriction on space)		
1) Work envelope	1st axis 2nd axis 3rd axis 4th axis Additional axis - -	Based on the specifications table in the robot manual or in the installation and transportation manual. Compliant with individual specifications. - -
2) Interface	Transportation: Unpacking: Transfer: Installation: Teaching: Operation: Repacking: Disposal:	The packing box shall be able to be transferred by a transportation worker. The packing box shall be able to be carried in. Space of at least 2 m³ shall be secured. The robot shall be able to be hoisted by a crane. The robot shall be able to be lifted by two or more people and loaded onto a cart or similar device. There shall be no obstacles on the route from the unpacking site to the installation site. The product shall be installed at a location suitable for the outline and work envelope of the robot. The product shall be installed at a location suitable for the outline and that provides adequate ventilation of the controller. The cable shall be installed at a location where it will not be stepped on by operators. Teaching work shall be able to be performed from outside the hazard zone of the robot. Space shall be secured to prevent a worker from being caught in the robot and peripheral equipment if an entry is made into the dangerous range. A fence or enclosure shall be installed to prevent any operator from approaching the hazard zone of the robot. The robot shall be able to be operated from outside the hazard zone of the robot. An operator in the fence or enclosure shall be visible from the operation location. Work shall be able to be performed to remove the hand, mount the fixing jig, separate the robot and controller, and remove the robot and controller from the frame. The robot shall be able to be moved from the installation site to the packing site. The repacking work shall be able to be performed. A forklift or other equipment shall be able to be used to lift the packing box. Maintenance: Space required for maintenance shall be obtained. After maintenance, operation shall be able to be checked from outside the hazard zone of the robot. In the dangerous range, space shall be secured to prevent a worker from being caught in the robot and peripheral equipment. Work shall be able to be performed to remove the hand, mount the fixing jig, separate the robot and controller, and remove the robot and controller from the frame. The robot shall be able to be moved from the installation site to the disposal location.

Table 3. Restricted Specifications Sheet (continued)

3. Movable range of product (restriction on space)	
3)	- A fence, enclosure, or other protection shall be provided that surrounds the

Work environment	hazard zone of the robot to prevent people from entering the zone during operation. - A display indicating the robot operation status shall be provided to indicate whether the robot is operating or stopped. - Lighting shall be provided for enabling visual checks by operators. - To prevent operators from slipping, the floor shall not be covered with oil or similar substances. - No noises that impair attention shall be emitted.

Table 4. Restricted Specifications Sheet

4. Life cycle of product
In the product life cycle of assembly, shipment testing, transportation, unpacking, transfer, installation, teaching, operation, repacking, maintenance, and disposal, risk assessment is carried out for the life cycle of "transfer and installation" (transportation, unpacking, transfer, installation, and repacking), "use" (teaching, operation, and maintenance), and "disposal."

Table 5. Restricted Specifications Sheet

5. Person who approaches the machine		
Applicable person	Knowledge and requirements	
1) Transportation worker	Knowledge	Contents of the instruction manual
	Requirement	Person who has received training for forklifts and other transfer equipment work as defined by the respective country's laws and regulations and who has been permitted to perform the work by the employer
2) Unpacking worker	Knowledge	Contents of the instruction manual
	Requirement	—
3) Transfer worker	Knowledge	Contents of the instruction manual
	Requirement	Person who has received training for crane work as defined by the respective country's laws and regulations and who has been permitted to perform the work by the employer
4) Installation worker	Knowledge	Contents of the instruction manual, operating procedures for target robot
	Requirement	When guiding a robot, a person who has received training for robot teaching work as defined by the respective country's laws and regulations and who has been permitted to perform the work by the employer
5) Teaching worker Work supervisor	Knowledge	Contents of the instruction manual, operation procedures for target robot, work regulations, and robot operations
	Requirement	Person who has received training for robot teaching work as defined by the respective country's laws and regulations and who has been permitted to perform the work by the employer
6) Operator	Knowledge	Contents of the instruction manual, operating procedures for target robot, work regulations, and robot operations
	Requirement	—
7) Repacking worker	Knowledge	Contents of the instruction manual, operating procedures for target robot
	Requirement	Person who has received training for crane work as defined by the respective country's laws and regulations and who has been permitted to perform the work by the employer When guiding a robot, a person who has received training for robot teaching work as defined by the respective country's laws and regulations and who has been permitted to perform the work by the employer

Table 5. Restricted Specifications Sheet (continued)

5. Person who approaches the machine		
Applicable person	Knowledge and requirements	
8) Maintenance worker Work supervisor	Knowledge	Contents of the instruction manual, operating procedures for target robot, work regulations, and robot operations Storage procedures for target robot

	Requirement	Person who has received training for robot testing work as defined by the respective country's laws and regulations and who has been permitted to perform the work by the employer
9) Disposal worker	Knowledge	Contents of instruction manual, operating procedures for target robot, and waste disposal methods
	Requirement	Person who has received training for crane work as defined by the respective country's laws and regulations and who has been permitted to perform the work by the employer When guiding a robot, a person who has received training for robot teaching work as defined by the respective country's laws and regulations and who has been permitted to perform the work by the employer
10) People passing nearby Other workers	- Measures shall be taken to prevent entry into the fence, enclosure, or other protection surrounding the hazard zone of the robot. - Measures shall be taken to make the robot stop operation when someone approaches the hazard zone. - If another worker enters the hazard zone of the robot to perform work, robot operation shall be stopped, the drive power turned off, and a teaching worker or maintenance worker shall supervise the situation to ensure safety.	

Table 6. Restricted Specifications Sheet

6. Other

Warranty

This product is provided by SHIBAURA MACHINE after strict testing and inspection and verification that it satisfies our performance standards.
CKD MACHINE provides the following warranty in the event that a fault occurs.

1. Warranty Period
    The warranty period of this product is one of the following periods, whichever is shortest.
    (1)　Period of 18 months from SHIBAURA MACHINE factory shipping
    (2)　Period of 12 months from customer installation

2. Warranty Terms and Conditions
    (1)　The warranty applies to this product. The warranty scope is the specifications and functions described in the product specifications, catalog, instruction manual, and other documents. SHIBAURA MACHINE will not be liable for any secondary or incidental damages arising as a result of faults in this product.
    (2)　Within the warranty period of this product, SHIBAURA MACHINE will repair free of charge only those faults that arise under operation and use in accordance with the instruction manual provided with this product.
    A fee will be charged for all repairs of faults that occur after the warranty period has expired.

3. Disclaimers
    The following cases are outside the scope of the warranty.
    (1)　Faults and damage due to usage that did not follow the instruction manual or due to negligent usage.
    (2)　Problems due to deterioration over time or usage wear (natural fading of the paint coating, deterioration of consumable parts[1])
    (3)　Problems due to sensory experiences (such as occurrence of noise that does not affect functionality)
    (4)　When the product was modified or disassembled without the approval of SHIBAURA MACHINE
    (5)　Faults and damage due to inadequate inspection and maintenance or improper repairs
    (6)　Faults and damage due to natural disasters, fires, and other external factors
    (7)　Internal data such as programs and points created or modified by the customer
    (8)　When this product was purchased in Japan and taken outside the country
1)　Consumable parts refer to the maintenance replacement parts described in the target controller manual.

4. Notes
    (1)　SHIBAURA MACHINE cannot guarantee the basic performance of this product when it is used in an environment outside the specifications.
    (2)　SHIBAURA MACHINE will not be liable for any injuries, damage, faults, or other problems that arise by failing to follow the danger, warning, caution and notice information provided in this instruction manual.
    (3)　Be aware that the danger, warning, caution, notice, and other safety information in this instruction manual apply to the safety risks foreseen by SHIBAURA MACHINE, and they do not cover every possible scenario.

Main standards, laws, and regulations pertaining to the safety of industrial robots

The international industrial standard ISO/DIS 12100 "Safety of machinery" describes the risk reduction measures for machines and equipment.

Step 1) Inherently safe design measures: Limitations on force, speed, energy, etc.

Step 2) Safeguarding and/or complementary protective measures: Installation of safety fence, etc.

Added protective measures: Installation of emergency stop devices, etc.

Step 3) Information for use: Warning signage, alarms, instruction manuals, etc.

Based on this, the guidelines known as "Guide 51" were defined by classifying the various standards for the ISO/IEC international standards in a hierarchical structure.

The safety standards for industrial robots are standardized as type C in the individual safety standards for machinery.

• ISO 10218 and ISO 10218-1

Be sure to follow the standards, laws, regulations established in the country where the industrial robot is used.

Cautions on Safety

The instruction manual for the controller contains important safety information for ensuring the safe and correct operation of this device and for preventing hazards to the operators and others and property damage.

Make sure that you well understand the following details (indications and symbols) before reading this manual.   Always observe the information that is noted.

[Explanation of indications]

Indication	Meaning of indication
⚠ DANGER	Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.
⚠ WARNING	Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.
⚠ CAUTION	Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury[1].
NOTICE	Indicates a situation which could result in physical damage[2] only. Indicates advice for proceeding work.

1) Minor or moderate Injuries refer to injuries, burns and electric shocks, etc., which do not require hospitalization or long-term medical treatment.
2) Physical damage refers to damages due to destruction of assets or resources.

| ⚠ DANGER |
|---|
| ● To ensure that the procedures from transportation to disposal of the controller are performed safely, be sure to carefully read the safety manual described in the controller manual. Performing the operation that differs from the contents described in this manual could harm persons. |

Service Network

Please refer to our distributor's handouts

Basic Operation

This describes the basic matters for operating the TP5100.

1. TP5100

1.1 TP5100 External View

Enable switch

Emergency stop switch

LCD panel
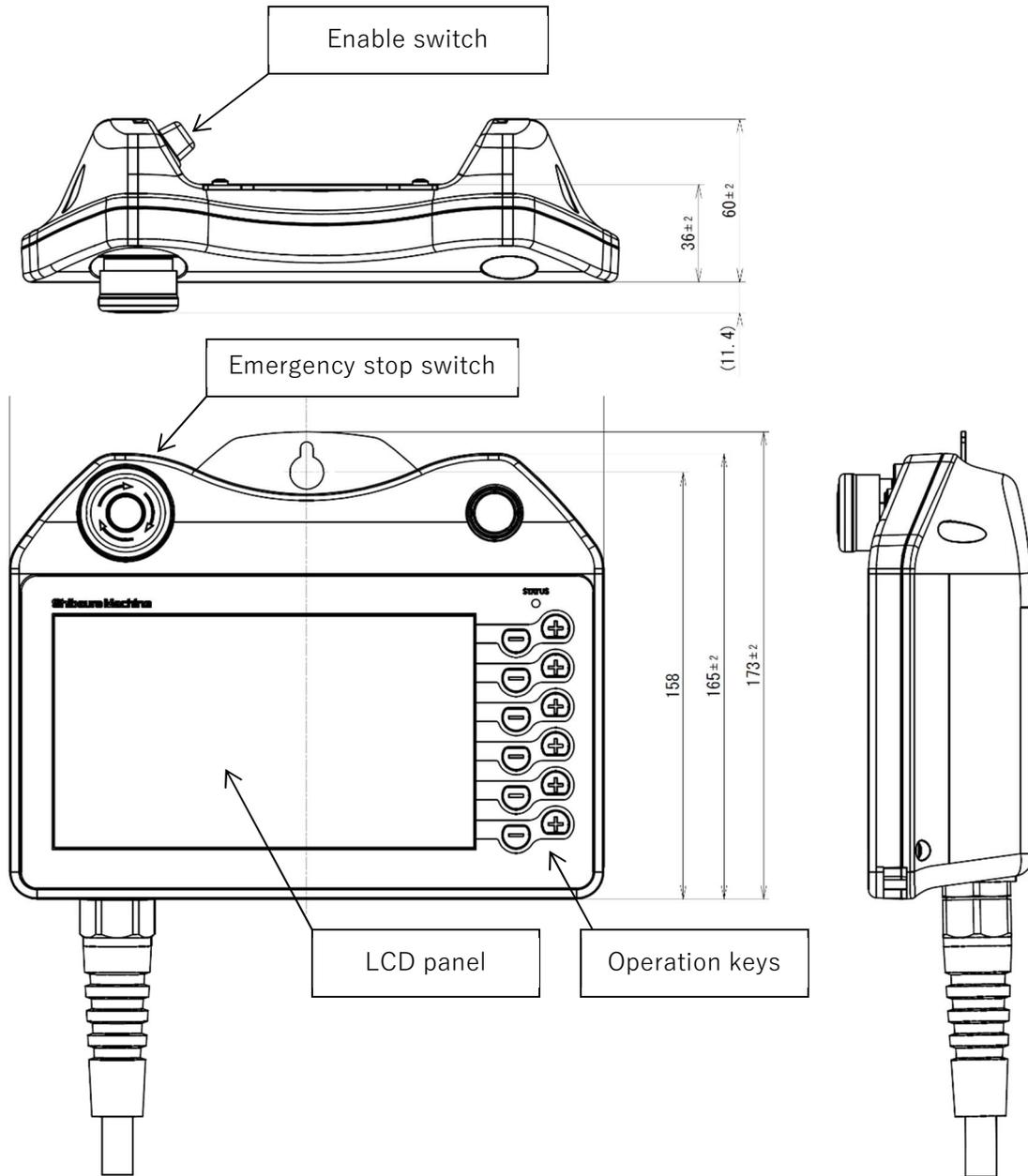
Operation keys

1.2 TP5100 Specifications

No.	Item	Specifications	Notes
1	Ambient operating temperature	0°C to 40°C	
2	Ambient storage temperature	-20°C to 60°C	
3	Ambient operating humidity	10% to 90% RH (no condensation, wet-bulb temperature of 39°C or less)	
4	Ambient storage humidity	10% to 90% RH (no condensation, wet-bulb temperature of 39°C or less)	
5	Atmospheric pressure resistance (operating altitude)	800 to 1114 hPa (1000 m max.)	
6	Vibration resistance	Compliant with JIS B 3502 and IEC61131-2	
7	Protection rating	IP65	
8	Weight	800 g max. (excluding device connection cables)	
9	Dimensions	218(W)×173(H)×60(D) mm	Not including cables, and protrusions such as switches,
10	Cable length	5 m (standard), 10m, 15m (options)	TP5100-5：5m TP5100-10：10m TP5100-15：15m
11	Live cable connection and disconnection	Allowed	
12	Longevity	TFT backlight: 50,000 hours Touch panel: Touch input 10 million times	

MEMO
 · *If the TP5100 is disconnected from the TP connector of the controller, it is in the same state as when the emergency stop switch is pressed.*

1.3 TP5100 supported controller

TP5100 supports the KSL3000controller series.
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1.4 Basic Operation of TP5100

This section describes the operations performed on the TP5100.

1.4.1 Press

This refers to the action of pressing an operation key.
Operations where "pressing" is mentioned in this manual are activated when the specified operation key is pressed.

1.4.2 Operation Keys

The operation keys refer to the physical operation keys on the right side of the teach pendant.
To use the operation keys displayed on the screen, press the corresponding physical operation key.
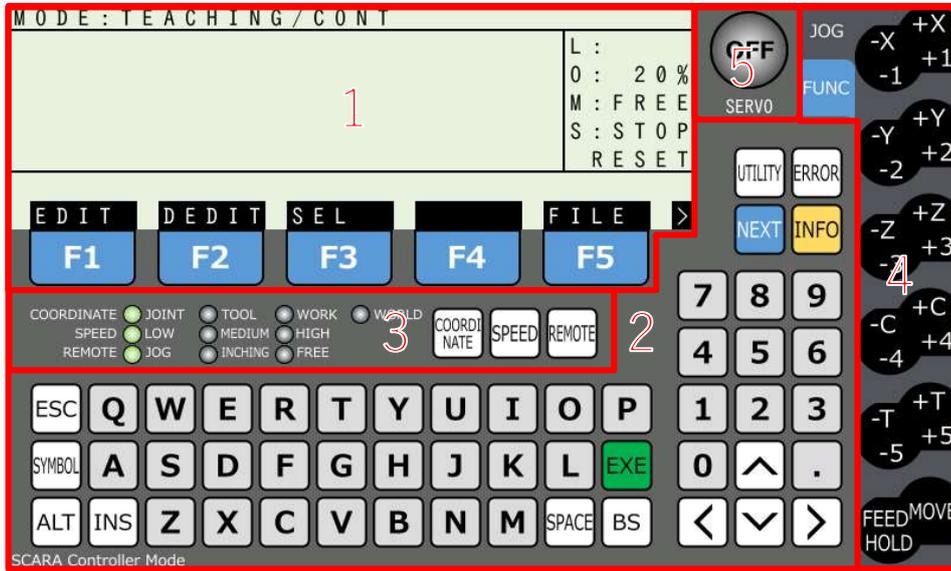For details, refer to "1.4.4 Operation Key Display".
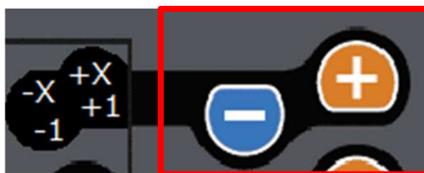
1.5 TP5100 Screen Layout

The layout of the TP5100 screen is as follows.

The displayed screen is switched automatically based on the type of connected controller (robot).

SCARA Robot System

The following table provides descriptions of the elements in the above figure.

No. in Figure	Name	Description
1	Main screen	Enables setting and display of various information about the robot. The displayed information is changed by pressing the function keys ([F1] to [F5]).
2	Keyboard	Characters are entered to the main screen by pressing the keys on the keyboard. For UTILITY and other special keys, the operation specific to each key is performed.
3	Jog operation status indicator	Shows the status of the robot jog operation. In SCARA robot systems, the status can be switched by using [COORDINATE], [SPEED], and [REMOTE]. In vertical articulated robot systems, the status can be switched in the main screen after pressing [JOG].
4	Operation key display	Shows the operation when an operation key is pressed.
5	Servo On button	Pressing this button turns on the servo.

Vertical Articulated Robot Systems

Vertical articulated robot systems differ from SCARA robot systems on the following points.

・Background color (dark blue)

・Information shown on operation key display
・[JOG] appears instead of [COORDINATE], [SPEED], and [REMOTE]
Otherwise, they are identical to SCARA robot systems.
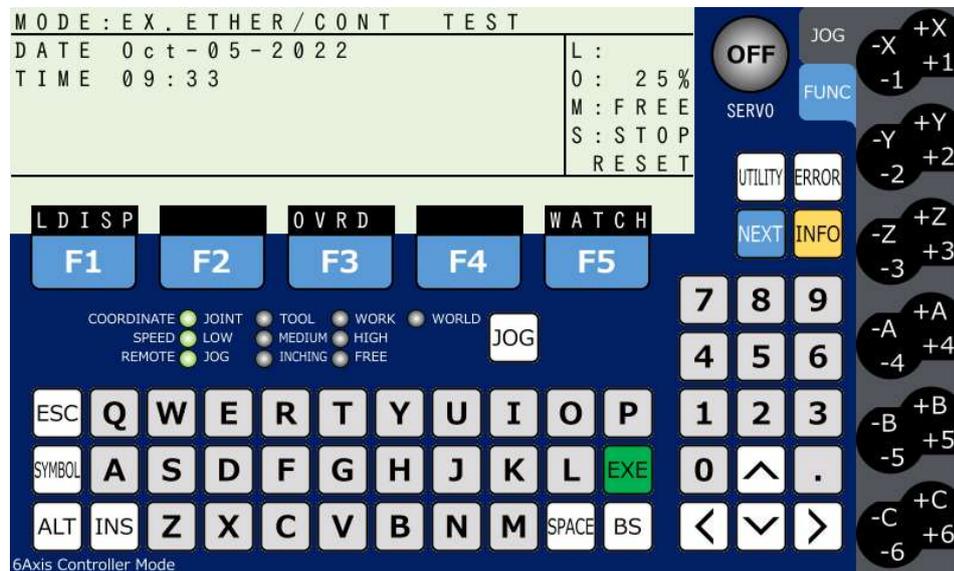
1.5.1 Main Screen

This screen enables setting and display of various information about the robot and display and editing of programs.
In the same way as the TP1000, the displayed information is changed by pressing the function keys. Status switching and display information when the function keys are pressed are identical to the case of the TP1000.
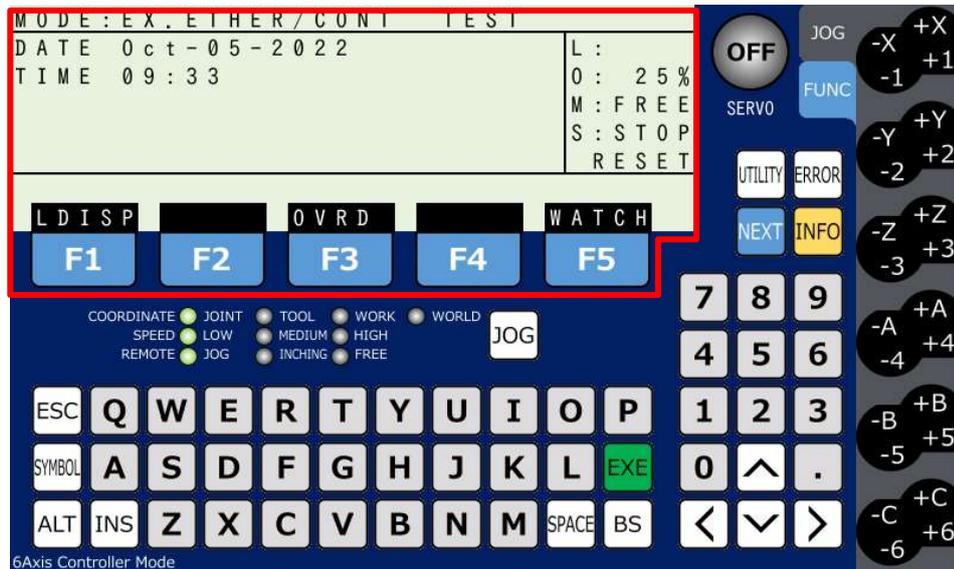
1.5.2 Keyboard

This section describes the keyboard that appears at the bottom of the screen and how to edit basic text.
The keyboard always appears at the bottom of the screen.

You can use the keyboard to enter letters and numbers into text boxes and other locations that you are editing.

Keyboard

Each time that [ALT], [INS], or [SYMBOL] is pressed, it toggles between enabled and disabled, and the key appears orange when enabled.

If an operation appears as [ALT] + [key], press the indicated key after enabling [ALT].

To disable [ALT], press [ALT] again.

When [INS] is enabled, it is insert mode; when disabled, it is overwrite mode. [INS] is enabled by default.

When [SYMBOL] is enabled, the letter keys are switched to symbols keys.

	When Disabled	When Enabled
[ALT]	ALT	ALT
[INS]	INS	INS
[SYMBOL] and keyboard display		

Keyboard operation example: Using [ALT] + [↓] to move to the next page.

1. Press the [ALT] key, and check that it is enabled (key color has changed).
2. Press the [↓] key.
3. The screen is switched to the next page.

> *MEMO*
> *・The [NUM/ALPHA] key (for switching between display of numbers and letters) that was on the TP1000 no longer appears on the keyboard.*
> *・Two or more keys cannot be pressed simultaneously.*

These keys are not found on the keyboard.
Except for the [INFO] key, operation is the same as for the TP1000.

	Key	Description
[UTILITY]	UTILITY	In the same way as the TP1000, pressing this key will switch to utility mode. This enables display of the external input/output signals, display of the current position, and selection of work/tool coordinates.
[ERROR]	ERROR	In the same way as the TP1000, pressing this key shows the code and explanation of the currently detected error or the error that has not been reset.
[NEXT]	NEXT	In the same way as the TP1000, this key switches to the next page.
[INFO]	INFO	This shows the TP5100 version information and enables screen calibration. For details, refer to "2.1 Viewing the Version Information" and "2.3 Screen Calibration".

1.5.3 Jog Operation Status Display

The keys in this section are used to select and display the guidance type, guidance coordinates, and guidance speed during robot jog operation.

Press these buttons to make the respective selections.
The displayed keys vary depending on the robot system type.
In vertical articulated robot systems, the selection is made from the screen displayed in the main screen after [JOG] is pressed.

	Key	Description	System
[COORDINATE]	COORDI NATE	The coordinate system can be selected from JOINT, TOOL, WORK, and WORLD.	SCARA robot systems only
[SPEED]	SPEED	The speed can be selected from LOW, MEDIUM, and HIGH.	
[REMOTE]	REMOTE	Remote operation can be selected from JOG, INCHING, and FREE.	
[JOG]	JOG	This opens the JOG SETTING screen.	Vertical articulated robot systems only

Each time that the [COORDINATE], [SPEED], or [REMOTE] button is pressed, the displayed status changes in order from the left, and the corresponding LED turns on.

	Display	Description

COORDINATE	● JOINT ● TOOL ● WORK ● WORLD	This shows the selected coordinate system. The default status is JOINT.
SPEED	● LOW ● MEDIUM ● HIGH	This shows the selected speed or movement amount. The default status is JOG.
REMOTE	● JOG ● INCHING ● FREE	This shows the selected mode. The default status is LOW.

MEMO
・*In vertical articulated robot systems, the "FREE" option under [REMOTE] cannot be selected.*

1.5.4 Operation Key Display

The operation key display shows the operation executed when an operation key located on the display right side is pressed.

Shows the operation when the + key is pressed

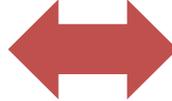Shows the operation when the - key is pressed
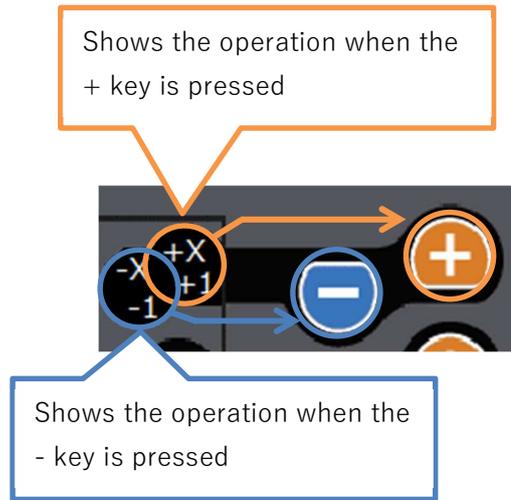
Switching Tabs

Each time that the [JOG/FUNC] tab is pressed, the operation key indicator on the screen right end switches between the JOG key and FUNCTION key, and the background color also changes.

When JOG is selected   When FUNC is selected

Operation Keys

The displayed keys and their locations vary between SCARA robot systems and vertical articulated robot systems.

Display		Operation when an operation key is pressed
SCARA robot system	Vertical articulated robot system	While the operation key is held down, the robot moves in the axis direction corresponding to the selected key for the joint axis or the guidance coordinates (world coordinates, tool coordinates, or work coordinates). In vertical articulated robot systems, [FEED HOLD] and [MOVE] do not appear on this screen.

Display	Operation when an operation key is pressed
	The same operation are performed as when the [F1] to [F5] keys displayed on the main screen, the [ESC] key and [EXE] key on the keyboard, the [NEXT] special key, [UTILITY] special key, and [ERROR] special key are pressed.
	While the [MOVE] key is held down, the robot performs PTP operation towards the preset target position.
	When the [FEED HOLD] key is pressed, robot peration and program execution are held. If this command is issued during robot operation, the robot immediately decelerates and comes to a stop. During the FEED HOLD state, the display color of the operation keys are changed.

MEMO
・*The robot will not operate even if the operation key indicator section of the screen is pressed.*

1.5.5 Servo On Button

The servo is turned on by **long-pressing [SERVO] for about 1 second** while holding down the enable switch when the controller is in TEACH mode.
While the servo is turned on, the lamp is lit green. While the servo is turned off, the lamp is off.

	Servo on state	Servo off state
[SERVO]		

MEMO
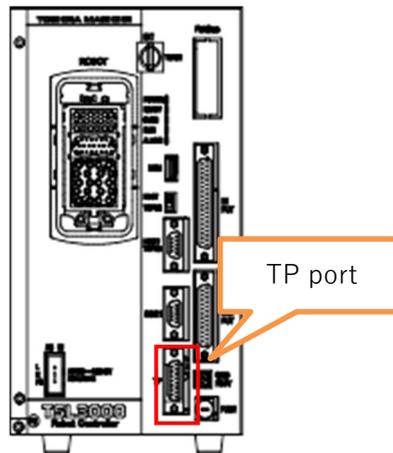・*The servo is not turned off even if the SERVO On button is pressed.*

1.6 Starting the TP5100

This section describes how to connect the TP5100 and the controller and the operations up to turning on the TP5100.

1.6.1 Connecting the TS5100 and Controller

Connect the connector of the teach pendant TP5100 to the TP port of the controller.

Example: TSL3000

TP port

1.6.2 Starting the TP5100

If the controller power is turned on while the TP5100 is connected to the controller, the TP5100 will automatically start up.
The T5100 internally automatically identifies whether the system is a SCARA robot system or vertical articulated robot system, and the corresponding system screen is displayed.

When the TP5100 is started, a black screen appears for a few seconds, and then the top screen is displayed.
After startup, a screen like the one shown below appears.
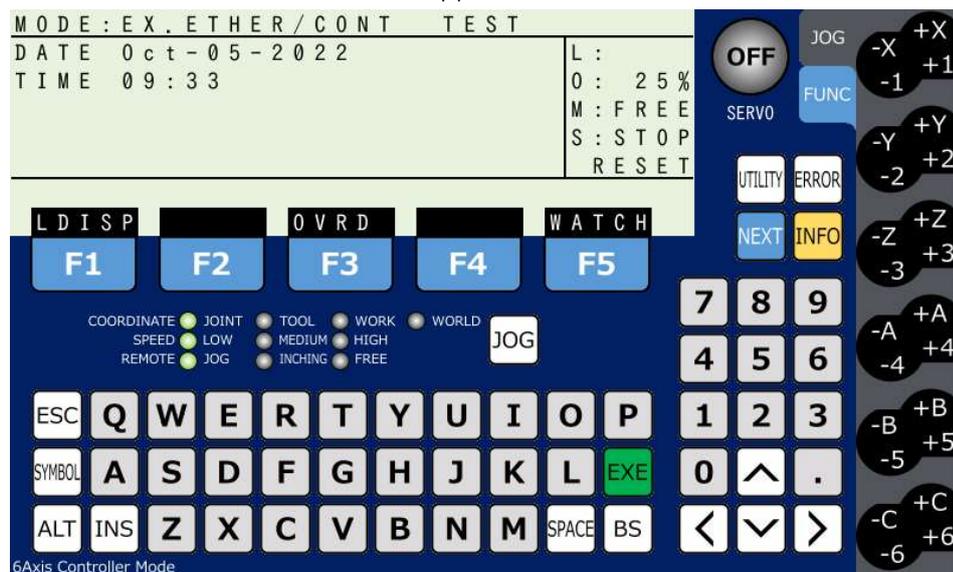
Functions

This section describes the additional and modified functions in the TP5100.

2. Additional Functions in the TP5100

This section describes the additional functions in the TP5100.
For details about existing functions, the operation procedure remains unchanged, and so refer to the "ST80720 TS3000 Operation Manual" or "ST80730 TS3000 Operation Manual (Vertical Articulated Robot System)".

2.1 Viewing the Version Information

This screen shows the TP5100 version information and enables screen calibration.
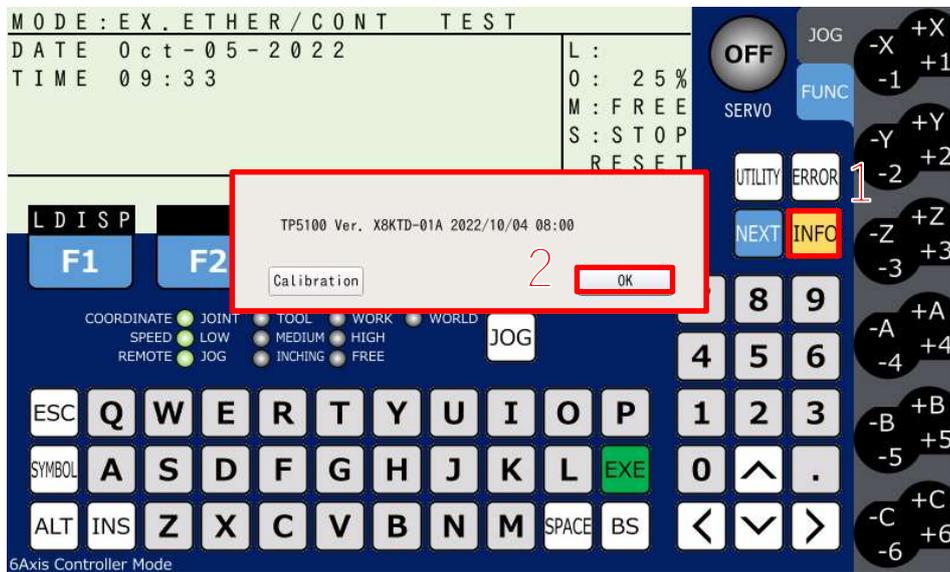For details on screen calibration, refer to "2.3 Screen Calibration".

<Viewing the version information>

1   Press [INFO].

The TP5100 version information is displayed in a pop-up window.

2   Press [OK] to close the pop-up window.

MEMO

The TP5100 version information only is displayed.

The controller version can be checked from [Utility] - [VER].

2.2 Screensaver

To prevent burn-in of the screen and extend the life of the backlight, the TP5100 is provided with a screensaver function.

The screensaver is activated if no operation is performed for 120 seconds. If no further operations are performed for an additional time period, the backlight turns off.

When an operation is performed, the backlight turns on, and the screensaver is deactivated.

MEMO

An operation refers to touching the screen, pressing an operation key, using an emergency stop switch, or turning on an enable switch.

2.3 Screen Calibration

The position where the TP5100's LCD panel responds to touch (screen calibration) can be adjusted.

<Screen calibration procedure>

1   Press [INFO] to open a pop-up window, and then press [Calibration].
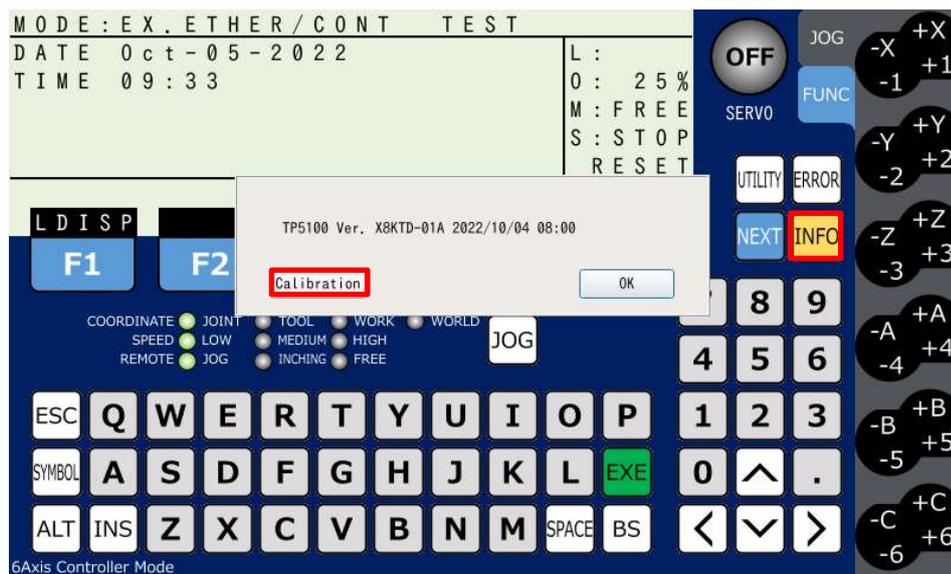
2　The message "Start the screen calibration? " appears, and so press [OK].

The calibration screen appears.

3　Press the red mark displayed on the screen four times.

The pressed position is adjusted based on the position where the mark was pressed.
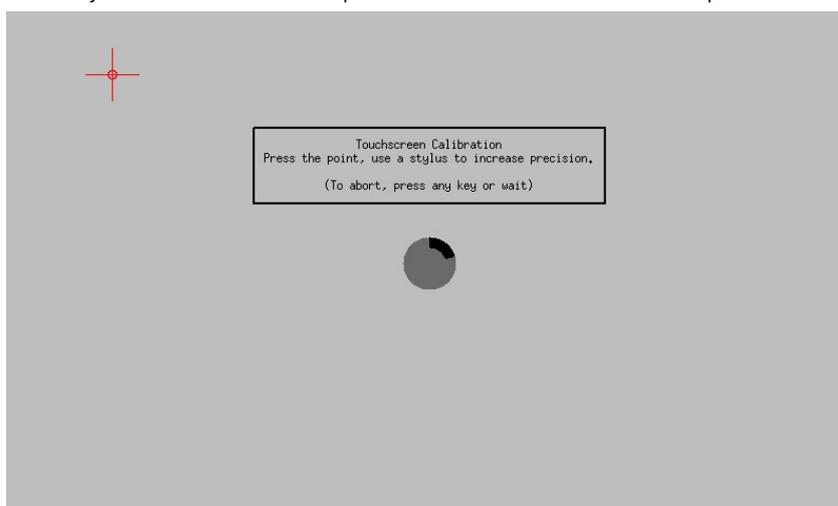
MEMO

・If a certain time passes without touching the screen for screen calibration, the screen calibration process will be canceled and will return to the original screen.

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