

# TS-S2/TS-SH/TS-X/TS-P

## CE compliance

**TS series are positioner type controllers that only performs point trace. No program is needed. Operation is simple. After setting point data, specify the point number and enter a START signal from host controller such as a PLC. Positioning or pushing operation then begins.**



TS-S2

TS-SH

TS-X

TS-P

## Main functions ▶ P.58



Handy terminal  
▶ HT1/HT1-D  
P.560



Support software for PC  
▶ TS-Manager  
P.552

## Basic specifications

### TS-S2/TS-SH

Item	Model	TS-S2	TS-SH
Basic specifications	Number of controllable axes	Single-axis	
	Controllable robots	TRANSERVO series	
	Current consumption	2.5A (Rating) 4.5A (Max.)	3.5A (Rating) 6.5A (Max.)
	Dimensions	W30 × H162 × D82mm	W30 × H162 × D123mm
Weight		Approx. 0.2kg	
		Approx. 0.3kg	
Input power supply	Control power supply	DC24V +/-10%	
	Motor power supply	DC24V +/-10%	
Control method		Closed loop vector control method	
Operating method		I/O point tracing (Positioning operation by specifying point number) / Remote command	
Operation types		Positioning, merge-positioning, push, and jog operations	
Position detection method		Resolver	Resolver with multi-turn absolute function
	Resolution	20480 pulses/rev. or 4096 pulses/rev. depending on the robot	
Origin search method		Incremental	Absolute / Incremental
Points		255 points	
Point type setting		(1) Standard setting: Set speed and acceleration in percent of the respective maximum settings. (2) Custom setting: Set speed and acceleration in SI units.	
Point teaching method		Manual data input (coordinates input), Teaching, Direct teaching	
I/O interface		Selectable from the following: NPN, PNP, CC-Link, DeviceNet™, EtherNet/IP™, PROFINET	
Input		Servo ON (SERVO), reset (RESET), start (START), interlock (/LOCK) origin search (ORG), manual mode (MANUAL), jog motion - (JOG-), jog motion + (JOG+), Point number selection (PIN0 to PIN7)	
	Output	Servo status (SRV-S), alarm (/ALM), operation end (END), operation in-progress (BUSY), control outputs (OUT0 to 3), Point number output 0 to 7 (POUT0 to POUT7)	
External communications		RS-232C 1CH	
Safety circuit		Emergency stop input, emergency stop contact output (1 system: When the HT1 is used.)	
Options	Handy terminal	HT1, HT1-D (with enable switch)	
	Support software for PC	TS-Manager	
General specifications	Operating temperature / Operating humidity	0°C to 40°C, 35% to 85%RH (non-condensing)	
	Storage temperature/ Storage humidity	-10°C to 65°C, 10% to 85%RH (non-condensing)	
	Atmosphere	Indoor location not exposed to direct sunlight. No corrosive, flammable gases, oil mist, or dust particles	
	Anti-vibration	All XYZ directions 10 to 57Hz unidirectional amplitude 0.075mm 57 to 150Hz 9.8m/s <sup>2</sup>	
	Protective functions	Position detection error, temperature error, overload, overvoltage, low voltage, excessive position deviation, overcurrent, motor current error, motor cable faulty wiring, Excitation power failure error <sup>Note 1</sup>	

Note 1. The excitation power failure error is a protection function that is available only in TS-SH.

Controllable robot	<b>TS-S2/TS-SH ▶ TRANSERVO</b> <b>P.127</b>	<b>TS-X ▶ FLIP-X</b> <b>P.169</b>	<b>TS-P ▶ PHASER</b> <b>P.215</b>
CE marking	Field networks <b>CC-Link</b> <b>DeviceNet</b> <b>EtherNet/IP</b>		

## Model Overview

Name		TS-S2	TS-SH	TS-X/TS-P
Controllable robot		Dedicated compact single-axis TRANSERVO		
Input power	Main power supply	DC24V +/-10%	TS-X: Single-axis robot FLIP-X TS-P: Linear motor single-axis PHASER	
	Control power supply	DC24V +/-10%	● AC100V specifications Main power supply AC100 to 115V+/-10% Control power supply AC100 to 115V+/-10%	● AC200V specifications Main power supply AC200 to 230V+/-10% Control power supply AC200 to 230V+/-10%
Operating method		I/O point tracing / Remote command / Operation using RS-232C communication		
Maximum number of controllable axes		Single-axis		
Origin search method		Incremental	Absolute / Incremental	TS-X: Absolute / Incremental TS-P: Absolute / Semi-absolute

## Ordering method

### TS-S2/TS-SH (TRANSERVO)

<b>Robot positioner</b>	<b>Type</b>	<b>I/O</b>	<b>Battery Note 1</b>
S2: TS-S2 SH: TS-SH	No entry: Standard S: Sensor	NP: NPN PN: PNP CC: CC-Link DN: DeviceNet™ EP: EtherNet/IP™ PT: PROFINET GW: With no I/O board	B: With battery (Absolute model) N: None (Incremental model)

Note 1. Battery can only be selected for TS-SH. (Not provided for TS-S2).

### TS-X/TS-P (FLIP-X/PHASER)

<b>Controller</b>	<b>Driver: Power supply voltage/ Power capacity</b>	<b>Regenerative unit</b>	<b>LCD monitor</b>	<b>Input/Output Selection</b>	<b>Battery Note 2</b>
TSX: TS-X TSP: TS-P	105: 100V / 100W more less 110: 100V / 200W 205: 200V / 100W more less 210: 200V / 200W 220: 200V / 400 to 600W	No entry: None R: With RGT R: With RGU-2	No entry: None L: With LCD	NP: NPN PN: PNP CC: CC-Link DN: DeviceNet™ EP: EtherNet/IP™ PT: PROFINET GW: With no I/O board	B: With battery (Absolute model) N: None (Incremental model)

Note 2. Battery can only be selected for TS-X. (Not provided for TS-P).

## TS-X/TS-P

Item	Model	TS-X / TS-P				
		100V AC input		200V AC input		
Driver model		TS-X105 / TS-P105	TS-X110 / TS-P110	TS-X205 / TS-P205	TS-X210 / TS-P210	TS-X220 / TS-P220
Number of controllable axes		Single-axis				
Controllable robots		TS-X: Single-axis robot FLIP-X series TS-P: Linear motor single-axis robot PHASER series				
Power capacity		400VA	600VA	400VA	600VA	1400VA
Dimensions		W58 × H162 × D131mm				W70 × H162 × D131mm
Weight		Approx. 0.9kg				Approx. 1.1kg
Input power supply	Control power supply	Single phase AC100 to 115V +/-10% 50/60Hz		Single phase AC200 to 230V +/-10% 50/60Hz		
	Motor power supply	Single phase AC100 to 115V +/-10% 50/60Hz		Single phase AC200 to 230V +/-10% 50/60Hz		
Control method		Closed loop vector control method				
Operating method		I/O point tracing (Positioning operation by specifying point number) / Remote command				
Operation types		Positioning, merge-positioning, push, and jog operations				
Position detection method		TS-X: Resolver with multi-rotation absolute function TS-P: Magnetic type linear scale				
Resolution		TS-X: 16384 pulses/rev. or 20480 pulses/rev. depending on the robot TS-P: 1µm				
Origin search method		TS-X: Absolute / Incremental TS-P: Incremental / Semi-absolute				
Number of points		255 points				
Point type setting		(1) Standard setting: Set speed and acceleration in percent of the respective maximum settings. (2) Custom setting: Set speed and acceleration in SI units.				
Point teaching method		Manual data input (coordinates input), Teaching, Direct teaching				
I/O interface		Selectable from the following: NPN, PNP, CC-Link, DeviceNet™, EtherNet/IP™, PROFINET				
Input		Servo ON (SERVO), reset (RESET), start (START), interlock (/LOCK) origin search (ORG), manual mode (MANUAL), jog motion - (JOG-), jog motion + (JOG+), Point number selection (PIN0 to PIN7)				
Output		Servo status (SRV-S), alarm (/ALM), operation end (END), operation in-progress (BUSY), control outputs (OUT0 to 3), Point number output 0 to 7 (POUT0 to POUT7)				
External communications		RS-232C 1CH				
Power supply for brake		DC24V +/-10% 300mA (prepared by the customer)				
Safety circuit		Emergency stop input, main power input ready output, emergency stop contact output (1 system: When the HT1 is used.)				
Handy terminal		HT1, HT1-D (with enable switch)				
Support software for PC		TS-Manager				
Operating temperature / Operating humidity		0°C to 40°C, 35% to 85%RH (non-condensing)				
Storage temperature / Storage humidity		-10°C to 65°C, 10% to 85%RH (non-condensing)				
Atmosphere		Indoor location not exposed to direct sunlight. No corrosive, flammable gases, oil mist, or dust particles				
Anti-vibration		All XYZ directions 10 to 57Hz unidirectional amplitude 0.075mm 57 to 150Hz 9.8m/s <sup>2</sup>				
Protective functions		Position detection error, power module error, temperature error, overload, overvoltage, low voltage, excessive position deviation, overcurrent, motor current error				
Protective structure		IP20				

Articulated robots  
**YA**  
 Linear CONVEYOR modules  
**LCM100**  
 Compact single-axis robots  
**TRANSERVO**  
 Single-axis robots  
**FLIP-X**  
 Linear motor single-axis robots  
**PHASER**  
 Cartesian robots  
**XX-X**  
 SCARA robots  
**YK-X**  
 Pick & place robots  
**YP-X**  
**CLEAN**  
**CONTROLLER**  
**INFORMATION**  
 Robot positioner  
 Pulse string driver  
 Robot controller  
 I/V/A/V/Z Electric gripper  
 Option

## TS-X / TS-P specification selection table

Some specifications are automatically determined by the robot model.

### TS-X

		T4LH/ C4LH	T5LH/ C5LH	T6L/ C6L	T9	T9H	F8/ C8	F8L/ C8L	F8LH/ C8LH	F10/ C10	F10H	F14/ C14	F14H/ C14H	GF14XL	F17/ C17	F17L/ C17L	GF17XL	F20/ C20	F20N	N15/ N15D	N18/ N18D	B10	B14	B14H	R5	R10	R20	
Power supply voltage / Current sensor	TS-X	105	●	●	●		●	●	●	●		●		●								●	●	●	●	●		
		110				●					●																●	
		205	●	●	●	●		●	●	●	●		●										●	●	●	●	●	
		210				●						●		●														●
	220										●		●	●					●	●								
Regenerative unit	No entry (None)				(1)	(2)				(1)	(2)	(1)	(2)	●	(3)		(6)	(3)	(4)			●			(5)			
	R (RGT)				(1)	(2)				(1)	(2)	(1)	(2)	●	(3)	●	(6)	(3)	(4)	●	●				(5)			

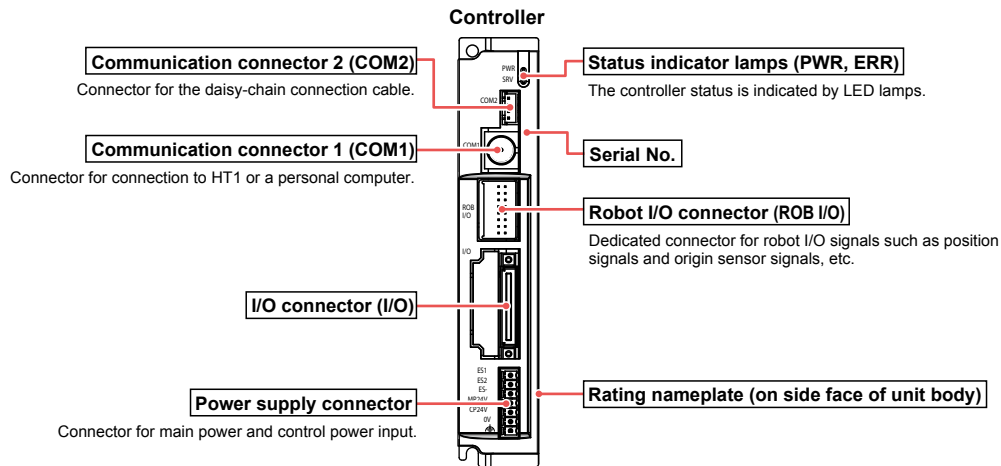
- (1) Regenerative unit is needed if using in a perpendicular position and movement stroke is 700mm or more.
- (2) Regenerative unit is needed if using in a perpendicular position.
- (3) Regenerative unit is needed if using in a perpendicular position, using at maximum speeds exceeding 1000mm per second, or if using high leads (40).
- (4) Regenerative unit is needed if using at maximum speeds exceeding 1000mm per second.
- (5) Regenerative unit is needed if using at maximum speeds exceeding 1250mm per second.
- (6) Regenerative unit is needed if using at maximum speeds exceeding 750mm per second.

### TS-P

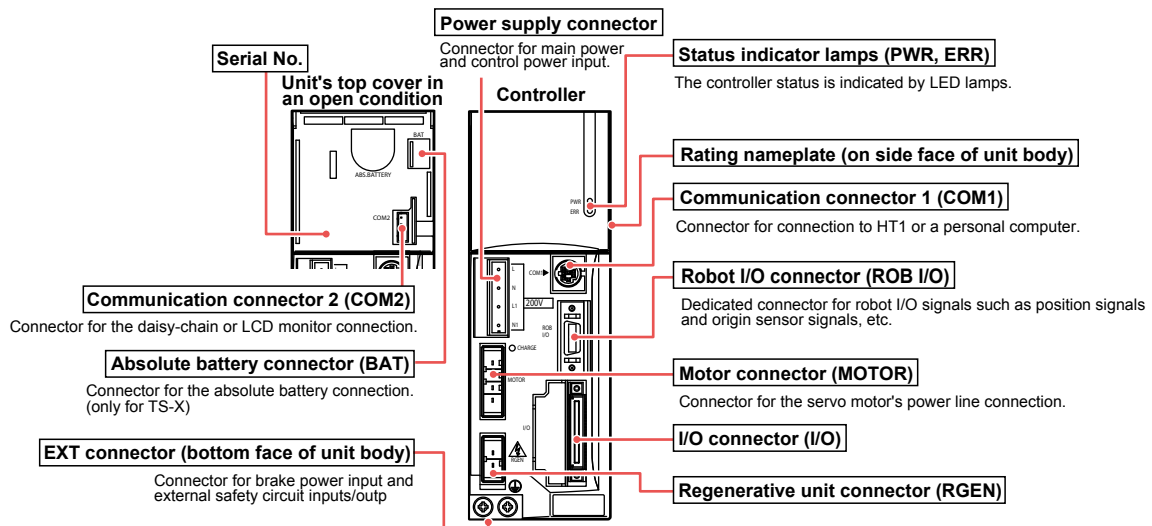
		MR12/12D	MF7/7D	MF15/15D	MF20/20D	MF30/30D	MF75/75D
Power supply voltage / Current sensor	TS-P	105	●				
		110		●		●	
		205	●				
		210		●		●	
	220					●	
Regenerative unit	No entry (None)	●	●	●			
	R (RGT)				●	●	
	R (RGU-2)						●

## Part names

### TS-S2/TS-SH

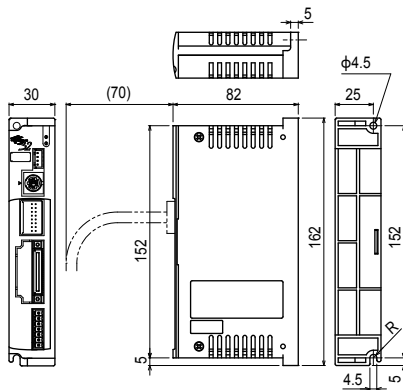


### TS-X/TS-P

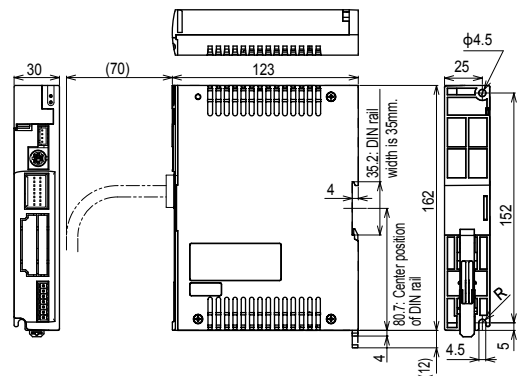


## ■ Dimensions

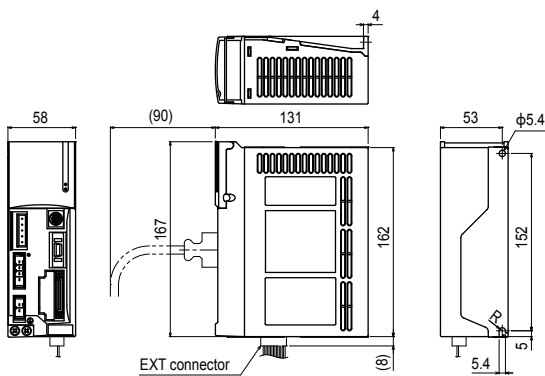
### ■ TS-S2



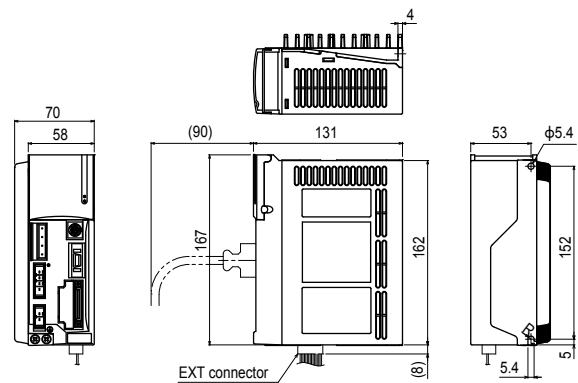
### ■ TS-SH



### ■ TS-X/TS-P (105/110/205/210)



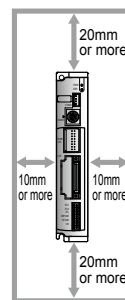
### ■ TS-X/TS-P (220)



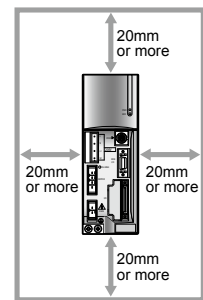
## ■ Installation conditions

- Install the TS-S2/TS-SH/TS-X/TS-P inside the control panel.
- Install the TS-S2/TS-SH/TS-X/TS-P on a vertical wall.
- Install the TS-S2/TS-SH/TS-X/TS-P in a well ventilated location, with space on all sides of the TS-S2/TS-SH/TS-X/TS-P (See fig. at right.).
- Ambient temperature : 0 to 40°C
- Ambient humidity : 35 to 85% RH (no condensation)

### ■ TS-S2/TS-SH



### ■ TS-X/TS-P



## ■ Cautions on TS-S2 / TS-SH

For the RF type sensor specifications, the controllers "TS-S2" and "TS-SH" become "TS-S2S" and "TS-SHS", respectively.

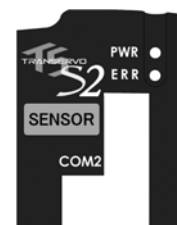
### TS-S2 / TS-SH (Standard specifications)

"BK" label is affixed to the front of the controller.



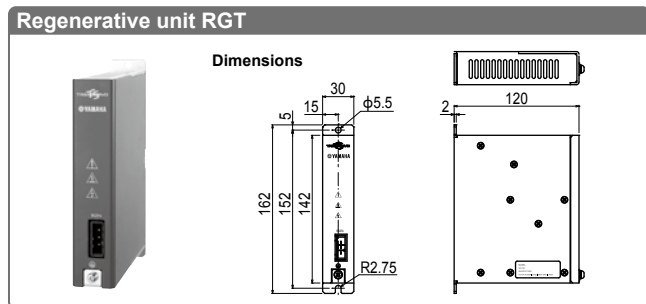
### TS-S2S / TS-SHS (Sensor specifications)

"SENSOR" label is affixed to the front of the controller.  
 (Be aware that "TS-S2S" is affixed to the front of the controller.)



Articulated robots  
 YA  
 Linear conveyor modules  
 LCM100  
 Compact single-axis robots  
 TRANSEVO  
 Single-axis robots  
 FLIP-X  
 Linear motor single-axis robots  
 PHASER  
 Cartesian robots  
 XY-X  
 SCARA robots  
 YK-X  
 Pick & place robots  
 YP-X  
 CLEAN  
 CONTROLLER  
 INFORMATION  
 Robot positioner  
 Pulse string driver  
 Robot controller  
 I/V/A/VZ Electric gripper  
 Option

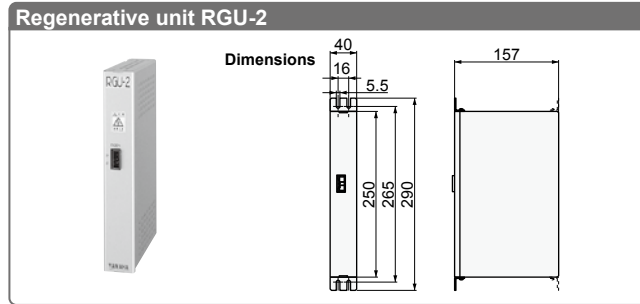
## Regenerative unit RGT/RGU-2



### Basic specifications

Item	RGT
Model	KCA-M4107-0A
Dimensions	W30 × H142 × D118mm (Not including installation stay)
Weight	470g
Regenerative voltage	Approx. 380V or more
Regenerative stop voltage	Approx. 360V or less
Accessory	Cable for connection with controller (300mm)

Note. Always leave an empty space (gap of about 20mm) between this unit and the adjacent controller.  
Also, always use the dedicated cable when connecting the controller.



### Basic specifications

Item	RGU-2 (TS-P)
Model	KCA-M4107-2A (Including accessory)
Dimensions	W40 × H250 × D157mm
Weight	0.9kg
Regenerative voltage	Approx. 380V or more
Regenerative stop voltage	Approx. 360V or less
Accessory	Cable for connection with controller (300mm)

Note. Always leave an empty space (gap of about 20mm) between this unit and the adjacent controller. Also, always use the dedicated cable when connecting the controller.

## Data overview

Point data and parameter data settings must be specified in order to operate a robot from a TS series controller.

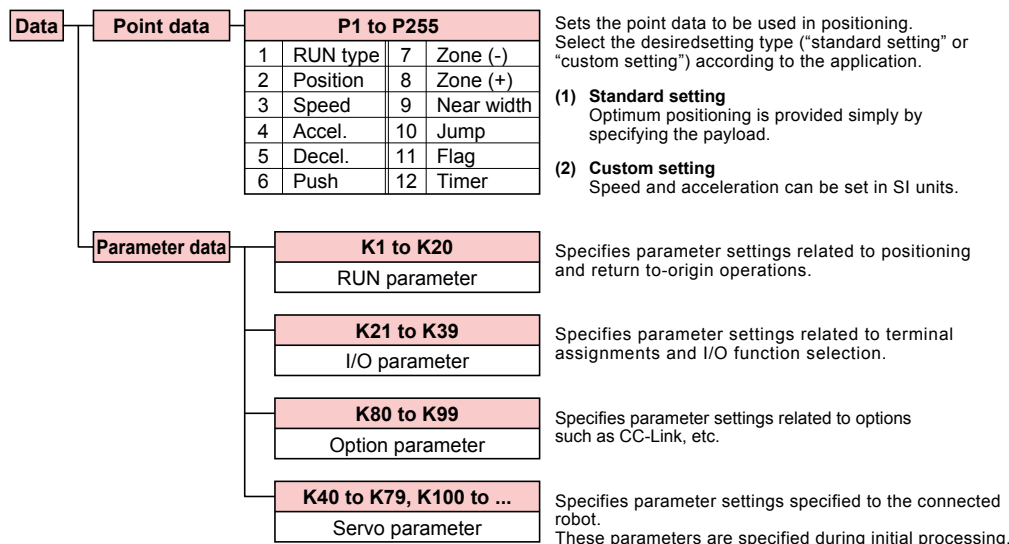
### Point data

The point data used in positioning operations includes items such as the "RUN type", "Position", and "Speed", etc. Up to 255 points (P1 to P255) can be registered. There are two point data setting types: "Standard setting" type that automatically defines optimal positioning simply by specifying the payload and "Custom setting" type that allows setting the speed (mm/s) and acceleration (m/s<sup>2</sup>) in SI units. Select the desired setting type according to the application.

### Parameter data

Parameter data is divided into the following categories: "RUN parameters", "I/O parameters", "option parameters", and "servo parameters".

### Data structure



## Point data

### Point data item list

P1 to P255		
Item	Description	
1	RUN type	Specifies the positioning operation pattern.
2	Position	Specifies the positioning target position or movement amount.
3	Speed	Specifies the positioning speed.
4	Accel.	Specifies the positioning acceleration.
5	Decel.	Specifies the positioning deceleration (as a percentage of the acceleration).
6	Push	Specifies the electrical current limit value for "Push" operations.
7	Zone (-)	Specifies the "personal zone" output range.
8	Zone (+)	
9	Near width	Specifies the "near width" zone (distance tolerance relative to target position).
10	Jump	Specifies the next movement destination, or the next merge operation merge destination point No. following positioning completion.
11	Flag	Specifies other information related to the positioning operation.
12	Timer	Specifies the waiting time (delay) after positioning completion.

### "Standard setting" and "custom setting"

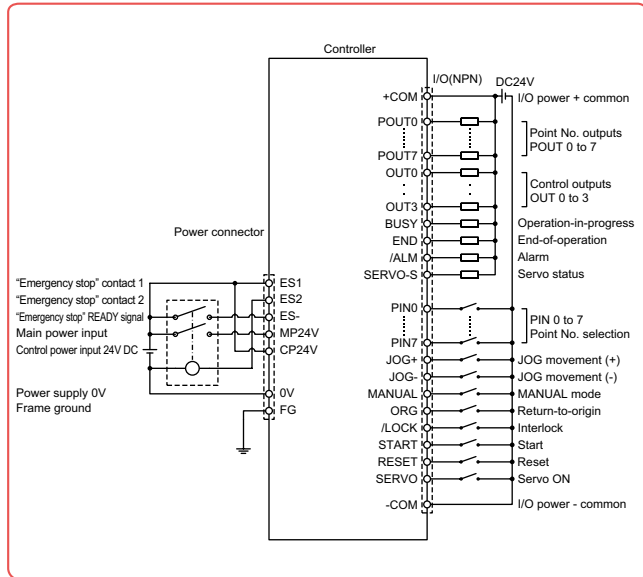
There are 2 setting types for point data ("standard setting" or "custom setting"). Select the desired setting type according to the application.

The maximum number of setting points for both setting types is 255 points (P1 to P255).

Setting Type	Description
Standard setting	Optimum positioning is provided simply by specifying the payload. This setting type is well-suited to assembly and transport applications.
Custom setting	Allows changing the speed and acceleration in SI units so the desired positioning operation can be set. This setting type is suited for machining and inspection systems.

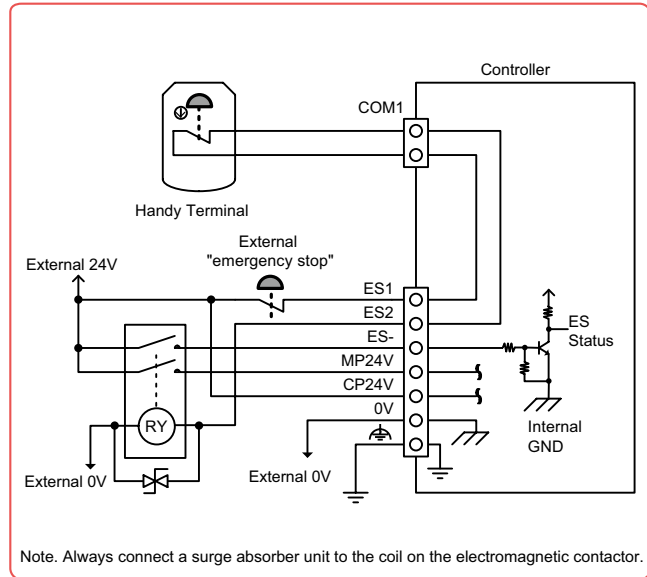
## NPN type input / output wiring diagram

### TS-S2/TS-SH



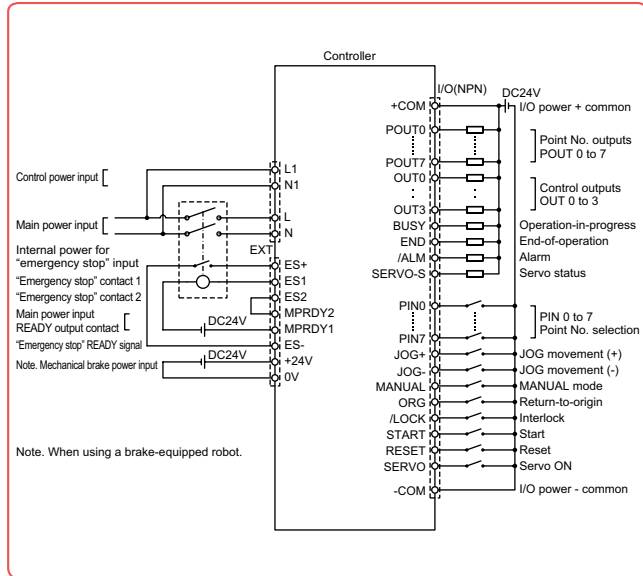
## Emergency stop circuit example

### TS-S2/TS-SH (power connector and host unit connection example)



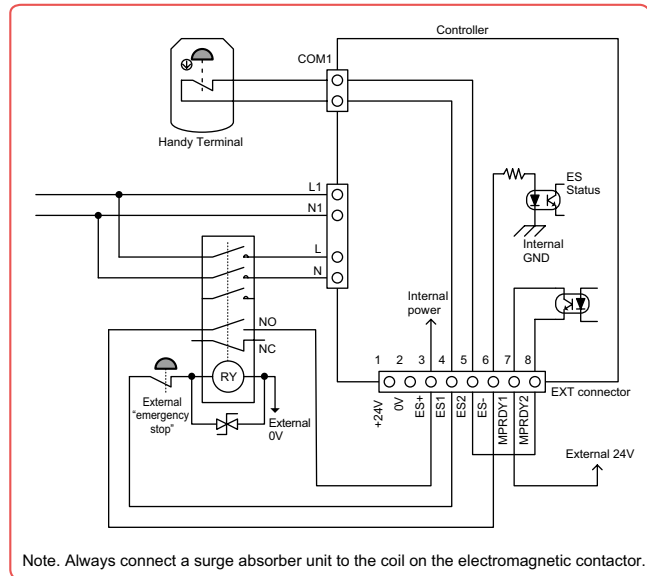
Note. Always connect a surge absorber unit to the coil on the electromagnetic contactor.

### TS-X



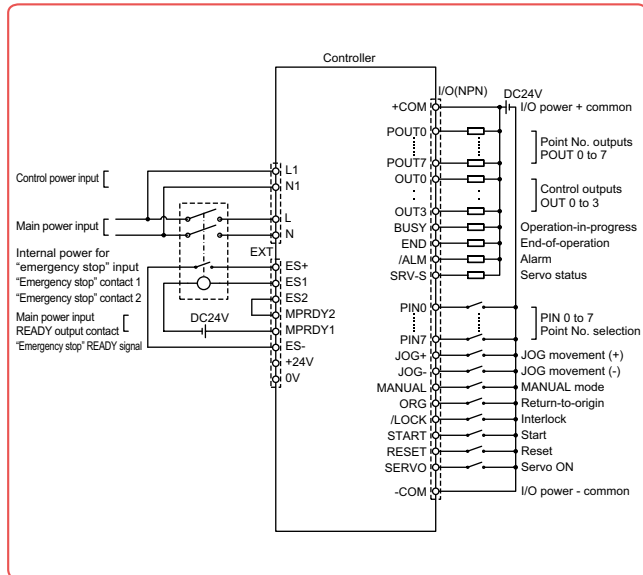
Note. When using a brake-equipped robot.

### TS-X/TS-P (EXT connector and host unit connection example)



Note. Always connect a surge absorber unit to the coil on the electromagnetic contactor.

### TS-P



Installing an external safety circuit will satisfy safety category class 4 standards. See P.613 for more information.

## I/O Specifications

Item	Description
NPN	Input 16 points, 24VDC +/-10%, 5.1mA/point, positive common Output 16 points, 24VDC +/-10%, 50mA/point, sink type
PNP	Input 16 points, 24VDC +/-10%, 5.5mA/point, minus common Output 16 points, 24VDC +/-10%, 50mA/point, source type
CC-Link	CC-Link Ver.1.10 compatible, Remote station device (1 node)
DeviceNet™	DeviceNet™ Slave 1 node
EtherNet/IP™	EtherNet/IP™ adapter (2 ports)
PROFINET	PROFINET Slave 1 node

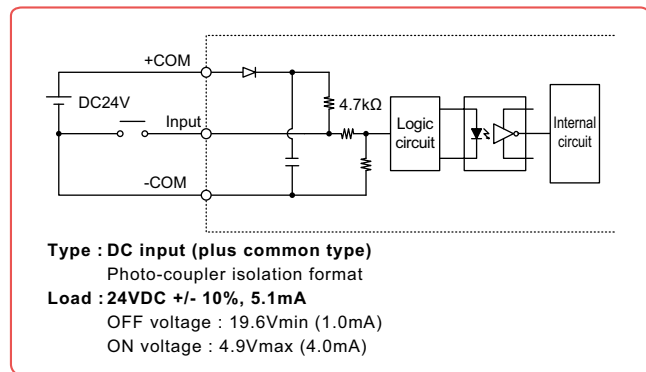
Articulated robots  
YA  
Linear CONVEYOR modules  
LCM100  
Compact single-axis robots  
TRANSERVO  
Single-axis robots  
FLIP-X  
Linear motor single-axis robots  
PHASER  
Cartesian robots  
XX-X  
SCARA robots  
YK-X  
Pick & place robots  
YP-X  
CLEAN CONTROLLER  
INFORMATION  
Robot positioner  
Pulse string driver  
Robot controller  
N/V/N/V2 Electric gripper  
Option

## I/O signals (NPN / PNP)

No.	Signal Name	Description	No.	Signal Name	Description
A1	+COM	I/O power input, positive common (24VDC +/-10%)	B1	POUT0	Point No. outputs
A2			B2	POUT1	
A3	NC	No connection	B3	POUT2	
A4			B4	POUT3	
A5	PIN0	Point No. select	B5	POUT4	
A6			B6	POUT5	
A7			B7	POUT6	
A8			B8	POUT7	
A9			B9	OUT0	
A10			B10	OUT1	
A11			B11	OUT2	
A12			B12	OUT3	
A13	JOG+	JOG movement (+ direction)	B13	BUSY	Operation-in-progress
A14	JOG-	JOG movement (- direction)	B14	END	Operation-end
A15	MANUAL	MANUAL mode	B15	/ALM	Alarm
A16	ORG	Return-to-origin	B16	SRV-S	Servo status
A17	/LOCK	Interlock	B17	NC	No connection
A18	START	Start	B18	NC	
A19	RESET	Reset	B19	-COM	I/O power input, negative common (0V)
A20	SERVO	Servo ON	B20		

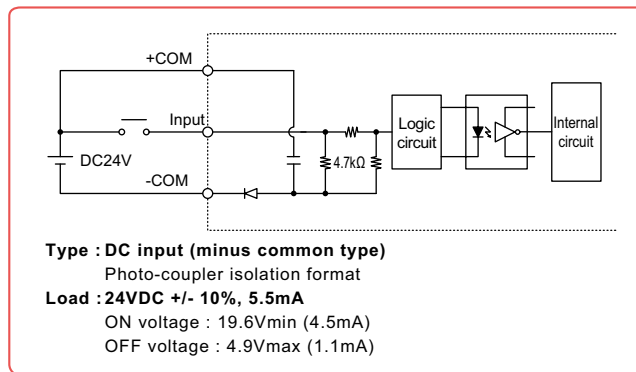
### NPN type I/O circuit details

#### ● Input circuit

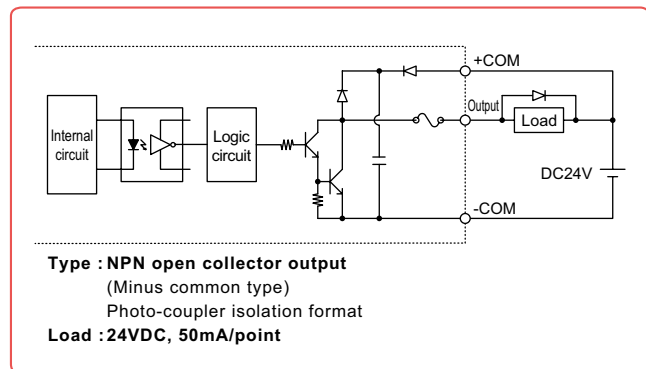


### PNP type I/O circuit details

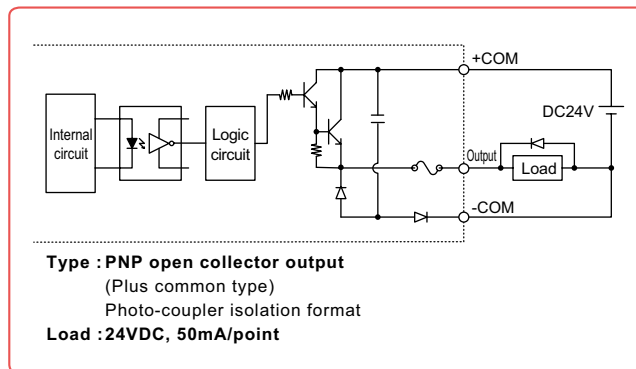
#### ● Input circuit



#### ● Output circuit



#### ● Output circuit



# Accessories and part options

## TS-S2/TS-SH/TS-X/TS-P



### Standard accessories

#### ● Power connector

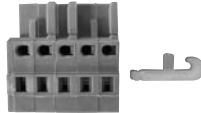


Model KCC-M4421-00

TS-S2  
TS-SH  
TS-SD

#### ● Power connector (AC100V specifications)

Included when 100V model is purchased

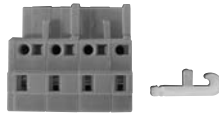


Model KCA-M5382-00

TS-X  
TS-P

#### ● Power connector (AC200V specifications)

Included when 200V model is purchased



Model KAS-M5382-00

LCC140  
TS-X  
TS-P  
SR1-X  
SR1-P  
RCX221  
RCX222  
RCX240/S  
RCX340

#### ● EXT connector

For braking power and safety circuit connections.



Model KCA-M5370-00

TS-X  
TS-P

#### ● Dummy connector



Model KCA-M5163-00

TS-S2  
TS-SH  
TS-X  
TS-P

#### ● I/O cables (2m/20-core×2)



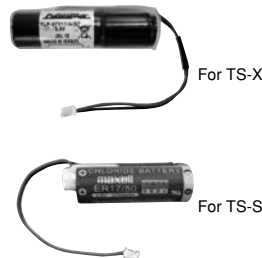
Model KCA-M4421-20

TS-S2  
TS-SH  
TS-X  
TS-P

#### ● Absolute battery

##### ● Absolute battery basic specifications

Item	For TS-X	For TS-SH
Battery type	Lithium metallic battery	
Battery capacity	3.6V / 1,650mAh	3.6V / 2,750mAh
Data holding time	About 1 year (in state with no power applied)	
Dimensions	φ18 × L50mm	φ17 × L53mm
Weight	24g	22g



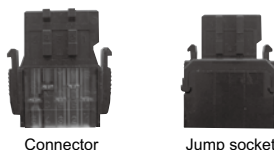
Model KCA-M53G0-10 (For TS-X)  
KCA-M53G0-01 (For TS-SH)

TS-X  
TS-SH

Note. The absolute battery is subject to wear and requires replacement. If trouble occurs with the memory then remaining battery life is low so replace the absolute battery. The battery replacement period depends on usage conditions. But generally you should replace the battery after about 1 year counting the total time after connecting to the controller and left without turning on the power.

#### ● CC-Link connector (CC-Link specifications)

Included when CC-Link model is purchased



Model Connector<sup>Note.</sup> KCA-M4872-00  
Jump socket KCA-M4873-00

TS-S2  
TS-SH  
TS-X  
TS-P

Note. This is a single connector type. (Insert two connectors into a branching socket.)

See next page for optional parts

Articulated robots  
YA  
Linear conveyer modules  
LCM100  
Compact single-axis robots  
TRANSEVO  
Single-axis robots  
FLIP-X  
Linear motor single-axis robots  
PHASER  
Cartesian robots  
XX-X  
SCARA robots  
YK-X  
Pick & place robots  
YP-X  
CLEAN  
CONTROLLER  
INFORMATION  
Robot positioner  
Pulse string driver  
Robot controller  
I/V/I/V2 Electric gripper  
Option



## Options

### ● Handy terminal HT1/HT1-D

P.560



		HT1	HT1-D
Model	3.5m	KCA-M5110-0J	KCA-M5110-1J
	10m	KCA-M5110-6J	KCA-M5110-7J
Enable switch		–	3-position
CE marking		Not supported	Applicable

TS-S2  
TS-SH  
TS-X  
TS-P

### ● Support software TS-Manager

P.552



Model	
	KCA-M4966-0J (Japanese)
	KCA-M4966-0E (English)

TS-S2  
TS-SH  
TS-X  
TS-P  
TS-SD

### ● TS-Manager environment

OS	Microsoft Windows 2000 / XP / Vista (32bit/64bit) / 7 (32bit/64bit)
CPU	Exceeding the environment recommended by the OS being used
Memory	Exceeding the environment recommended by the OS being used
Hard disk	Vacant capacity of more than 20MB in the installation destination drive
Communication port	Serial (RS-232C), USB
Applicable controllers	TS-S2 / TS-SH / TS-X / TS-P / TS-SD

Note. Windows is the registered trademark of US Microsoft Corporation in U.S.A. and other countries.

### ● Data cables

Communication cable for TS-Manager. Select from USB cable or D-sub cable.



Model		
	USB type (5m)	KCA-M538F-A0
	D-Sub type (5m)	KCA-M538F-01

Note. USB driver for communication cable can also be downloaded from our website.

TS-S2  
TS-SH  
TS-X  
TS-P  
TS-SD

### ● Daisy chain and gateway connection cable



Model	
	KCA-M532L-00 (300mm)

TS-S2  
TS-SH  
TS-X  
TS-P  
TS-SD

### ● CC-Link termination connector (CC-Link specifications)



Model	
	KCA-M4874-00

TS-S2  
TS-SH  
TS-X  
TS-P

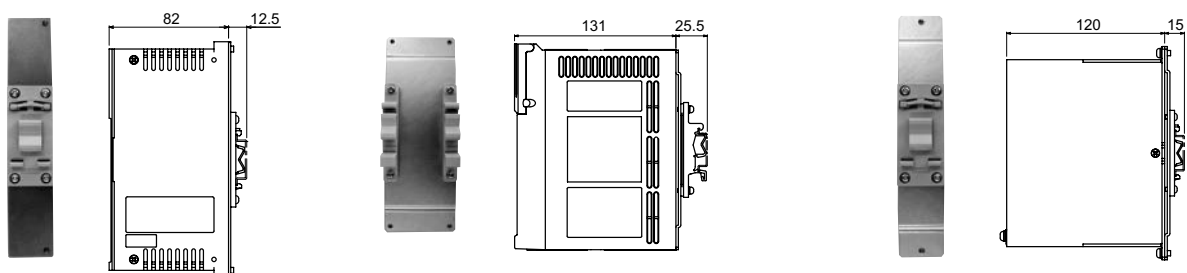
### ● TS-Monitor (LCD monitor) P.564



Model		
	For TS-X	KCA-M5119-00
	For TS-P	KCA-M5119-10

TS-X  
TS-P

### ● DIN rail mounting bracket (This bracket is provided in TS-SH as standard equipment.)



Model	
	For TS-S2 KCC-M499A-00

TS-S2

Model	
	For TS-X / TS-P KCA-M499A-00

TS-X  
TS-P

Model	
	For TS-X / TS-P with RGT KCA-M499A-10

TS-X  
TS-P