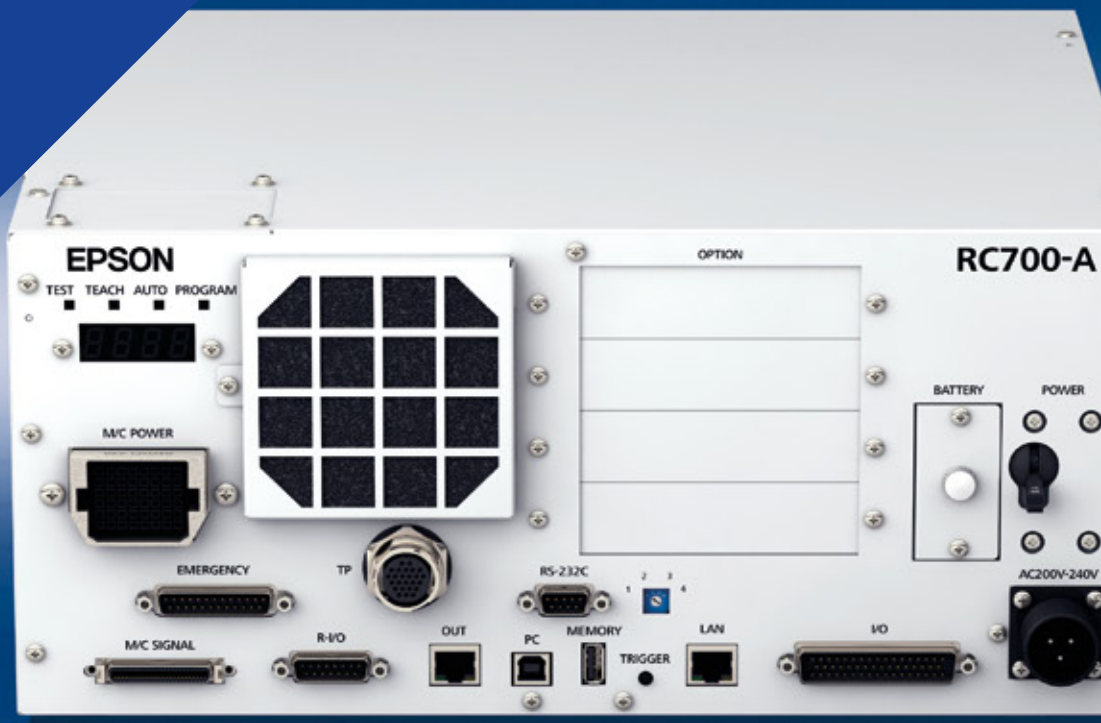
RC700-A robot controller

One controller for all



EPSON®
EXCEED YOUR VISION

Adaptable intelligence

Compact, powerful and flexible enough to meet your demands, the new Epson RC700-A controller is a true all-rounder. It works either as a stand-alone or integrated system. If it's extended to create a multi-manipulator controller, the Epson RC700-A can control several robots and peripheral devices in a complex system. **Tomorrow's automation begins with Epson.**

Featuring Epson QMEMS® technology, the Epson RC700-A is designed for the next generation of robots. Thanks to QMEMS, vibrations are considerably reduced, even when decelerating, or at high starting speeds. This improves production throughput and ensures a consistently high quality of assembly work, even at high speeds.

Table of contents

Features and benefits

Powerful universal controller can be expanded into a multi-manipulator controller

Multitasking

Compact design

Low power consumption

Low power loss

Graded safety systems (safety door circuits/emergency stop circuits)

Remote control and maintenance possible with additional PC

Industry standard inputs/outputs

One/two-phase connectivity

TCP-IP connection

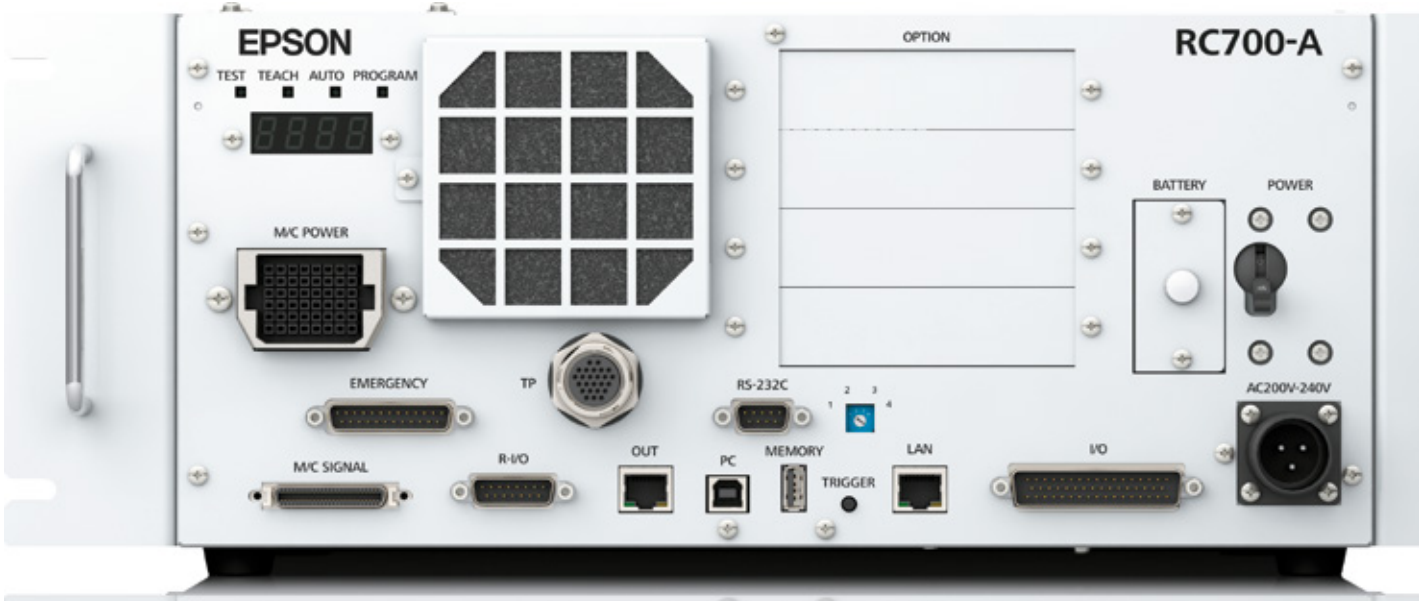
RS-232 connection

Real-time inputs/outputs

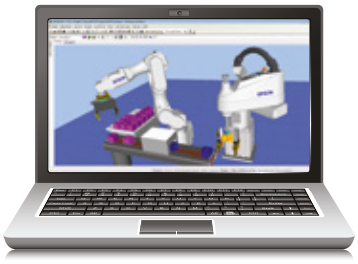
Integrated motor circuit breaker

Status indicator

The Epson RC700-A can be used with SCARA robots from the G and RS series, and the six-axis robots from the C4, C8 and N2 series, as well as with future generations of robots.



Integrated concept, Simple networking



User configuration programs for personal computer

Epson RC+ 7.0 software program

Simulator function

High-speed conveyor tracking

Expansion I/O cards

Serial RS-232C port

Fieldbus cards

Profibus master

EPSON RC700-A Controller

Image processing systems CV and PV

Teach Pendant TP1

Epson six-axis robot (C4, C8 and N2 series)

Epson SCARA G series

Epson SCARA RS series

Teach Pendant TP2

Teach Pendant TP3

Open system architecture

The Epson RC700-A can communicate with all conventional fieldbus systems. It can be connected to lower and higher level controllers, sensors, actors, conveyor belts and other peripheral devices. This means that the RC700-A can take over all robot, motion and process control functions – without the need for a PLC.

Multitasking specialist

If several robots and peripheral devices are connected to the controller, the RC700-A's multitasking ability enables you to use your system more effectively and with fewer problems. Synchronisation takes place using markers and without additional wiring being required.

The RC700-A can process 48 multi-tasks. Of these, 16 tasks can be used as background tasks – even if the robot program is interrupted. This multitasking ability means that even complex processes can be controlled easily within the work cell.

Networking at no extra cost

Using the integral ethernet port, it's possible to connect the RC700-A to other Epson robot systems or company networks at no extra cost, so you can access the controller right from your desk.

RC700-A Drive units - benefits for manipulators

Control a higher number of manipulators with one controller. The RC700-A drive units can control up to 4 manipulators with ease. This enables you to use tasks and markers to easily synchronise robots which work together in a single workspace.

The RC700-A drive units are available in two versions:

RC700-A DU4 for additional four-axis robots

RC700-A DU6 for additional six-axis robots

Various assembly scenarios

Thanks to its compact size, the Epson RC700-A fits inside a control cabinet. It can also be installed in various positions – horizontal, vertical, on the floor, on the ceiling or on the wall.

Quick setup

All the ports are located on one side, making it easier to connect the controller quickly and giving easy access for maintenance and repair work. The number of assemblies has been minimised to increase reliability. All components can be replaced without special tools.

Trigger key for backup

Use of the trigger key enables you to save a complete backup – including system status – to a USB stick. You can do this at any time whilst the system is running to make it possible to do simple offline error analysis.

Expands flexibly to meet your needs

The expansion cards allow you to communicate with external devices and to integrate with fieldbus networks, so you can expand your system to the exact configuration you need for your application – from simple handling tasks to complete machine and robot control.

Max. two expansion cards

Two channels per card

RS-232C serial port card

The Epson RC700-A has a serial port for communicating with external accessories as standard. The serial expansion card enables you to use two additional channels (with a maximum of two expansion cards) so that a total of five channels are available.

Galvanic isolation of the inputs and output

An additional 24 inputs and 16 outputs per expansion card

Optical decoupling of the I/O cards

Protection against external influences such as excess voltage and electrostatic discharge

Profibus protocol stacks without loading the PC

Direct access to the process data in the dual port memory

Simple function control using LED status indicators

Save the configuration files to the internal flash

Provides 256 inputs and 256 outputs

Controls up to 1,024 inputs and 1,024 outputs (freely configurable) as Profibus master

Expansion I/O card

If the standard 24 inputs and 16 output aren't enough, and you don't want to create a fieldbus network, you can expand your system with a further 24 inputs and 16 outputs per expansion card. There's space for up to four expansion cards in total.

Fieldbus cards

To use a fieldbus system in your system or reduce wiring work, you can use the following slave cards with the RC700-A: Profibus, DeviceNet, CC-Link, ProfiNet and Ethernet IP. And, as a new addition, you can also use EtherCAT: the real-time Ethernet technology with nearly unlimited network expansion.

In addition, you can fit master cards, such as a Profibus master, in your PC. They record and control all the stations of the Profibus DP network as well as performing configuration, maintenance and diagnostic work for the network.

Ergonomic, convenient and intuitive – portable control and display devices

Teach Pendant TP1

This powerful, universal device performs all of the tasks pertaining to operation, display and teaching. Equipped with a high-contrast 4.0“ TFT display.

Teach Pendant TP2

A cost-effective introductory model which is compact and easy to operate.

Teach Pendant TP3

A mobile terminal featuring an ergonomic casing with a brilliant and high-contrast 10“ TFT-LCD display. Thanks to fast processors, it’s perfectly suited for demanding visualisation and operating applications.

High-speed conveyor tracking

Enables high-precision synchronisation with moving objects.

With the help of an image processing system, objects can be detected on the conveyor belt both in a linear direction and in a circular direction on a turntable. The robot picks them up without stopping the belt. An encoder measures the conveyor belt movement constantly. Even if the speed changes between detecting and handling an object, the robot can pick it up and put it down precisely.

Multi-conveyor and multi-robot

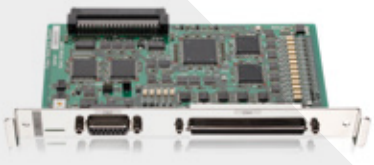
The RC700-A supports up to 16 conveyor belts. These can be combined, in the conveyor tracking system, with all the robots connected to the controller. The objects found on the conveyor belts are placed in intelligent queues and processed in parallel by several robots without the operator having to intervene.

Sensor tracking

Instead of detecting the position of an object with a camera, the conveyor tracking system is triggered by a sensor, such as a light barrier. When the object enters the robot’s pick-up range, the robot can pick it up precisely.

PG motion board

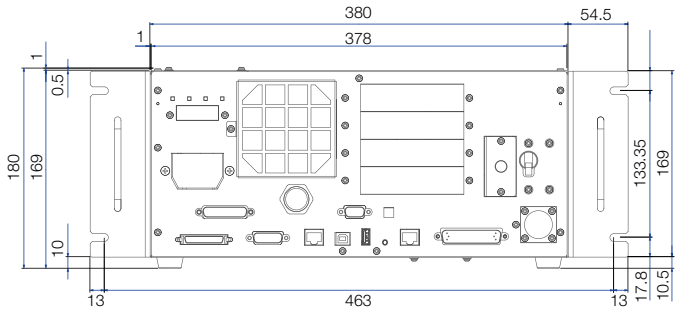
The board is primarily used to read the speed of the conveyor belt using an encoder. Software options mean that it can also be used to control kinematic systems which don’t use Epson components. Both step motors and servo motors are supported.



4 channels per card

Max. 4 cards possible

Front view



Package

1 Epson RC700-A controller

1 Epson RC+ program CD including simulator

1 set of mounting brackets for the robot controller

1 set of 3m motor and signal cables

1 plug for Emergency Stop

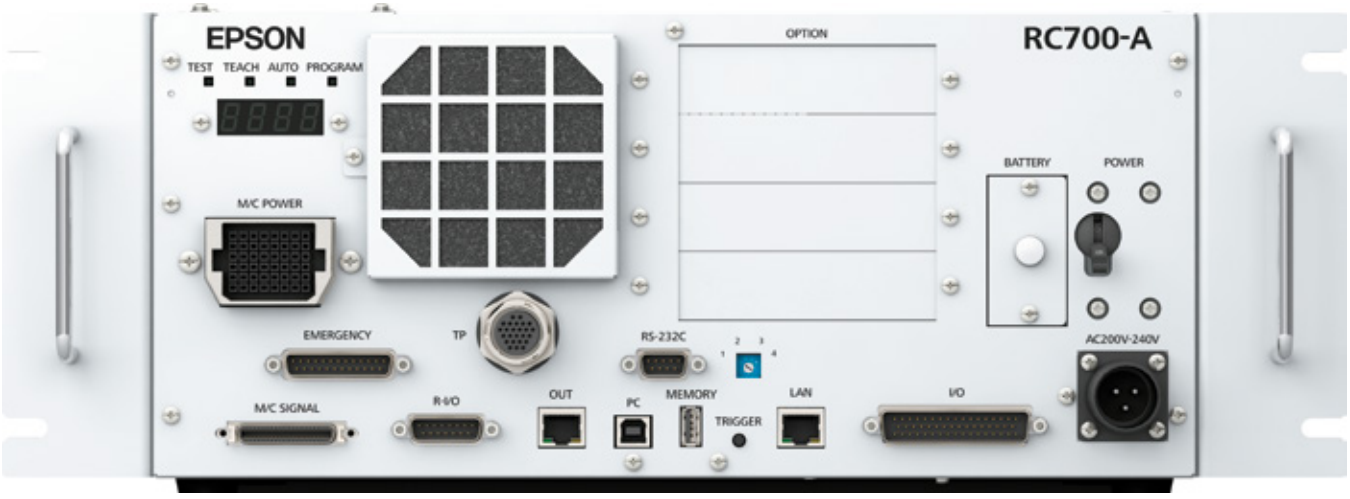
1 plug for standard I/O

1 USB programming cable

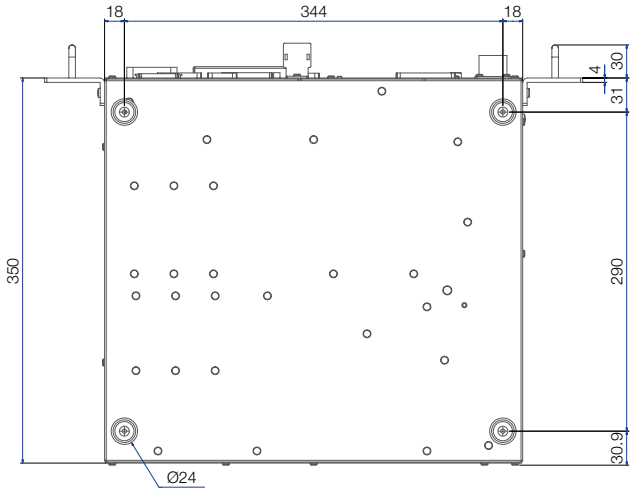
Manuals on CD

1 installation / safety manual

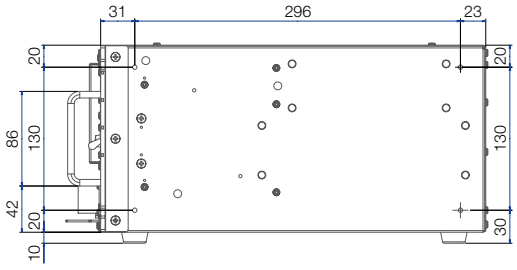
A gap of 200mm at the front and 100mm in all other directions should be left clear for the air flow and the outgoing cables.



View from below



Side view



Dimensions excluding cable connection

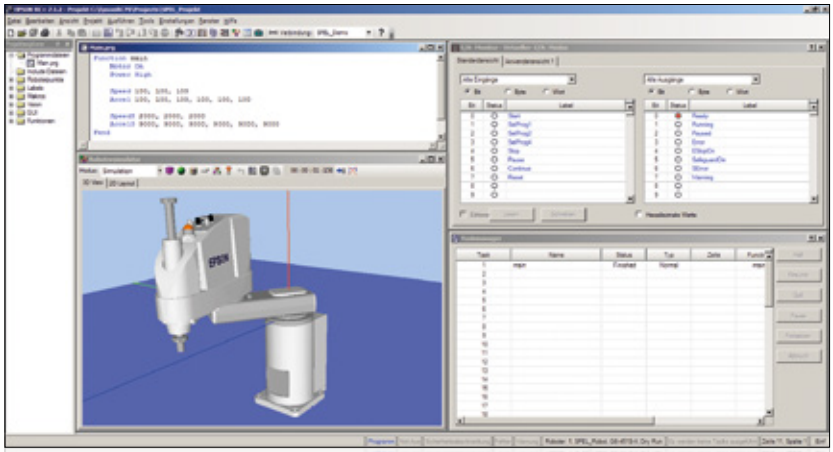
Technical data for Epson RC700-A

Ports	1x USB memory, 1x USB device 1x 10/100 base T-Ethernet 24/16 Standard I/O channels – 8/8 as Remote RS-232C Standard 1x channel
CPU	32-bit Microprocessor
Hardware options	**Control and display devices** Teach Pendant 1 (TP1) Teach Pendant 2 (TP2) Teach Pendant 3 (TP3) **Drive Unit** 1 Robot Manipulator per drive unit, 2 additional drive units possible
Expansion card options	**I/O expansion** 24/16, 4 additional cards possible **I/O fieldbus master cards** Profibus, DeviceNet, Ethernet/IP, 1 additional card of each type possible **I/O slave fieldbus cards** Profibus, DeviceNet, ProfiNet, Ethernet/IP, CC-Link, EtherCAT, 1 additional card of each type possible **RS-232C serial port** 2 channels per card, 2 additional cards possible **Pulse Generator Motion card** 4 channels per card, 4 additional cards possible
Software options	RC+ API 7.0 previously VB Guide External Control Point Motion (ECP) GUI Builder 7.0 Force Sensing Security Option
Development environment	Epson RC+ 7.0
Programming language	Epson SPEL+ 7.0 multitasking-capable
Connection values	**One-phase** AC 200 V to 240 V **Two-phase** AC 110 V to 120V, 50/60 Hz
Power consumption	Up to 2,500 VA – depending on manipulator model
Ambient temperature	5–40°C
Relative humidity	20% to 80% – non condensing
Safety equipment	Emergency stop button, safety door entry, low power mode, generator brake **Error detection** Encoder cable break **Detectors** Motor overload, motor speed error, irregular motor torque (manipulator out of control), overheating of a motor driver module, positioning overrun – servo error, speed overrun – servo error, CPU error, memory checksum error, relay drop-out, excess voltage, mains voltage outage, temperature deviation, fan error
Certifications	CE ANSI RIA R15.06-1999 EC Maschinenrichtlinie 2006/42/EC
Dimensions	380 x 350 x 180mm
Weight	11kg

Powerful, efficient, intuitive: Epson RC+ 7.0 development environment

With its intuitive Windows interface, open structure and integrated image processing, the powerful Epson RC+ 7.0 project management and development environment makes programming your applications straightforward.

The software is capable of controlling all kinds of robots and functions. It also supports a graphic 3D environment which enables you to visualise robot motions and simulate the robot program almost completely.



We make it simple

As soon as you enter inputs, for example movement and I/O instructions, the system displays familiar designators on pull-down menus to make the programming process easier. You can access an extensive help system using the F1 help key you'll recognise from Windows. Every command is described along with its parameters. What's more, there are also links to related commands and examples which can be copied and pasted into your project.

Features and advantages

Runs in Microsoft Windows XP, Windows Vista and Windows 7

Integrated project management system for fast project development

Communicates with the controller via USB or Ethernet

Enables you to connect one computer to multiple controllers

Parallel operation of multiple RC+ 7.0 applications possible (one computer accesses multiple control units in parallel)

SPEL+ programming language: powerful, easy to learn and use

Intuitive operation

Image processing integrated in the interface

Wide-ranging port connection: Ethernet I/O, Profibus, DeviceNet, ProfiNet, serial port, TCP/IP, I/O Handshake direct or available as an option

Programming environment available in German, English, French, Japanese and Chinese

Background tasks for complete system control

Extensive multi-manipulator commands

Integration of DLL functions

Simulator

File management

New functions

The Epson RC+ 7.0 follows on from the Epson RC 5.0 and RC 6.0, and features lots of new functions, including:

Lifetime prediction: Industry 4.0. Predictive planning of maintenance intervals for core components

Vision simulation to simulate and test image processing sequences

Catch-on-fly for image capture and analysis without stopping the robot

Defect inspection: image processing function to identify defective parts

Support for colour and high-resolution cameras

CAD-to-Point to convert CAD data to robot points

Test mode e.g. running the program with the safety door open using the enable key

Support for Epson QMEMS© sensor technology

Software options

Conveyor tracking

Position synchronisation whilst the conveyor is running

External Control Point (ECP)

You decide the coordinates: with ECP you can guide the workpiece contour easily and precisely along an external point

Force sensing

Allows the force of the robot to be measured in real-time

GUI Builder

Quickly and easily create your own user interface based on Epson programming language SPEL+

Optical Character Recognition (OCR)

OCR identifies fonts and symbols reliably and controls the print – even under difficult conditions

PG Motion System

Read conveyor speeds via encoders

RC+ API

RC+ API enables you to integrate your application in external software to develop user interfaces and databases

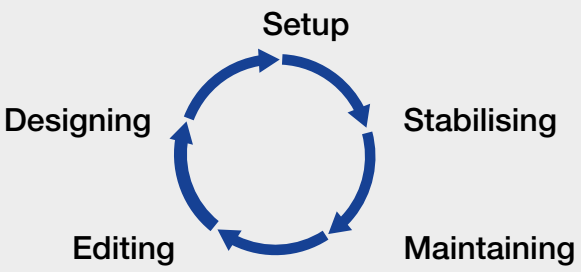
Security option

Greater security by user management and usage control

Vision Guide 7.0

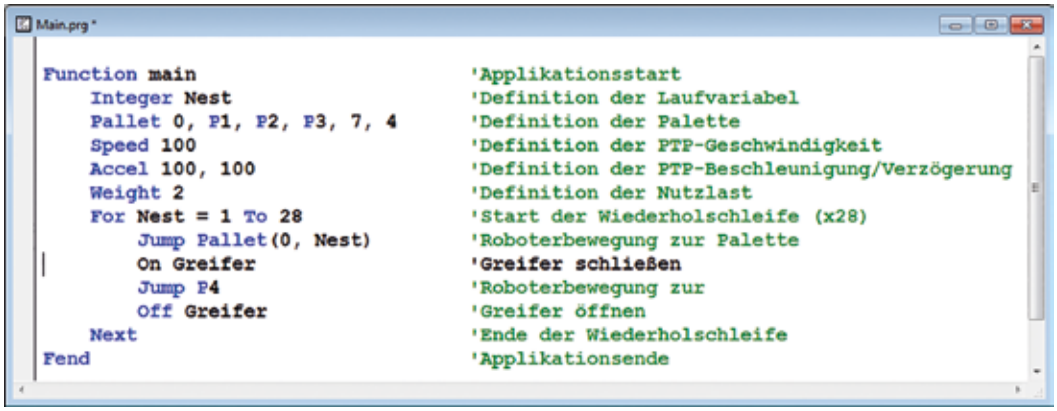
Efficient Epson image processing system

Suitable for the whole automation lifecycle



We’re fluent in SPEL

Specially developed by Epson, this line-based SPEL+ script language is not only powerful, but also easy to learn. Its range of commands enables you to program a very wide variety of robot motions – from a simple pick and place application to complex multi-manipulator line control.



Complete high-language SPEL+

Fast and secure

SPEL+ is translated into a robot code by a compiler. This is carried out faster than using an interpreter and the syntax can also be checked before the program is run.

More flexibility

The extensive range of comments for various applications means short programming time with many fewer errors. You can add your own commands using the SPEL+ syntax.

Clearly structured

In addition to program structure commands you can also use sub-program techniques, multi-tasking and interrupt commands to write programs which are easy to read and easy to enhance and expand.

Communicative

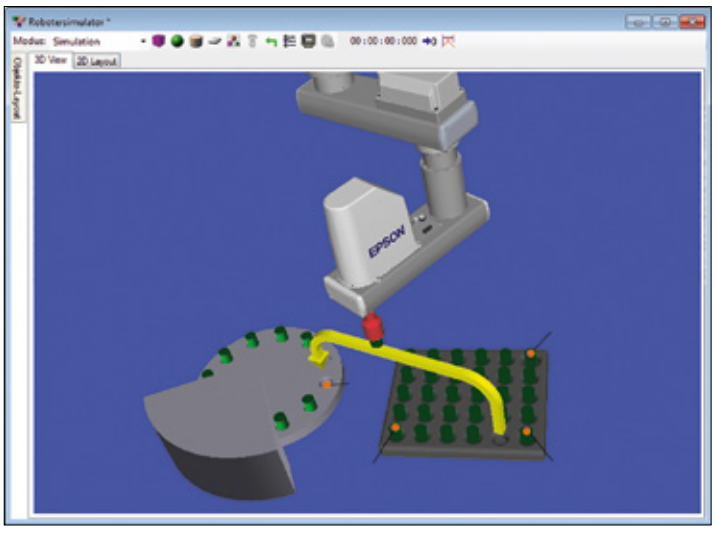
Whether it is for easy handling of inputs and outputs, communication via the serial TCP/IP port or exchange data in a fieldbus system – SPEL+ minimises the programming work.

Intuitive to learn

SPEL+ has no cryptic codes and uses real values.

Simple to transfer

SPEL+ syntax can be transferred to various .Net products. It also has an interface to Labview.



Even complex pallet layers can be easily set up and processed with the pallet command. There’s no need to teach every single network, so you’ll save time and get more reliable results.

In addition to PTP (point-to-point), LINEAR MOTIONS, CP (continuous path), SPEL+ also covers a series of other commands such as JUMP or PALLET.

Software tools for the Epson RC+ 7.0 development environment

It's great when even complex projects are made simple. The tools for the Epson RC+ 7.0 development environment give you everything you need to program your application efficiently.

Command
One-line command editor

Compiler
Check the programs
(syntax, definition, value range, etc.)

Debugger
Program with stop points / step mode

DLL functions
Access to external DLL functions

Editor
Create SPEL+ programs:
online help, syntax check, label lists, detection and colour display of keywords, parameters and comments, parameter list, definition jump

Error text editor
Creation of your own error messages for specific application

File management
Create and access files and databases (Excel, Access, SQL)

IO label editor
Edit names for I/O / markers / fieldbus I/O for the data sizes bits, byte and word

IO monitor
Display the status of I/O / markers / fieldbus I/O for the data sizes bits, byte and word. Special application displays can be created.

Macro editor
Create SPEL+ program as a programming aid

Robot manager
Contains all information and control elements relevant to robots - inserted in clear windows:
Set-up, edit points, loop parameters, tool and robot coordinate systems, load capacity and moment of inertia. The robot trip points can be used to switch motors on and off, complete a reset or complete a home run.

Stackeditor
Display the program branches

System history
Recording of errors, events and warnings (diagnostics)

Task manager
Display the open multi-tasks, traps and their status, display the current program line

Variable editor
Display / edit the current variable values

Maintenance manager
Create / load / display backups, controller reset

Simulator
Planning and visualisation of processes, program validation

Simulation of robot cells

Good preparation is everything. Plan and visualise all procedures in your production, validate your program offline initially and carry out troubleshooting and editing work easily from your desk. With the Epson RC+ Simulator – included in the software package – you save time and money through all phases of your project.

Phase 1
Design

Plan your robot cell at full size in advance and work out the expected cycle time for your application to check feasibility before a single part for the system has been made. Plan future system expansions in the simulation system to keep downtime to a minimum.

Phase 2
Integration

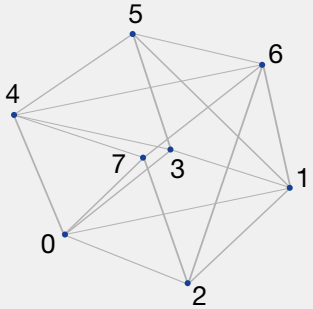
Completing the program validation process before the robots are delivered enables you to create programs at the same time, with the system capable of displaying and evaluating even complex motions. Collision risks are identified and equipment damage is prevented.

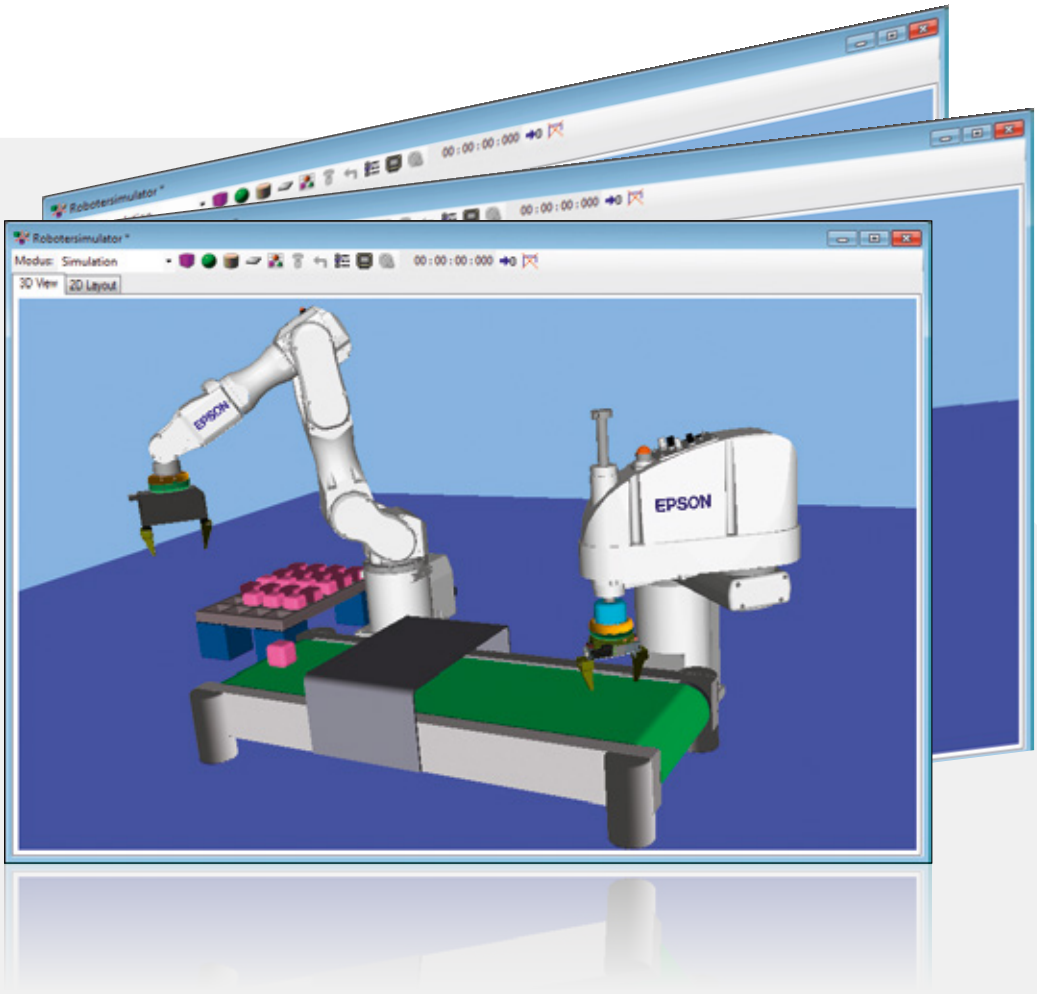
Phase 3
Operation and maintenance

Troubleshoot and modify programs from your desk. Use the 3D layout to visualise collision detection, reachability checks and robot motions.

Even simpler designs using the CAD-to-Point function

The CAD-to-Point function allows CAD data to be converted into robot points.





About Epson

Epson Robotic Solutions is one of the leading suppliers of high tech robot systems that are renowned worldwide for their reliability. The product range includes six-axis robots, SCARA robots, the SCARA entry-level LS and T models, the special Epson-developed Spider and N2 robots types, as well as the pioneering Dual Arm robot. Added to this are image processing controls and the Epson Force Sensor for force-controlled applications.

This gives Epson Robotic Solutions one of the most comprehensive ranges of high-precision industrial robots in the world, making them a technological pioneer for intelligently controlled automation processes.

Technological pioneer

1982
Epson SCARA robots freely available in Japan for the first time

1986
First class 1 cleanroom robot

1997
First PC-based controller

2008
Inventor of the right or left arm-optimised G3 SCARA robot

2009
Inventor of the spider – a unique SCARA robot with no dead zones

2013
First application of Epson QMEMS® sensors in robotics, reducing six-axis kinematics vibrations

2014
Epson Compact Vision CV2: Epson's own ultra-fast image processing computer

2016
Epson N2 series: World's first six-axis robot with folding arm - extremely compact and space-saving

2017
Epson Dual Arm robot with an arm geometry inspired by human physiology, as well as integrated sensors such as cameras, force sensors, and accelerometers

Pre- and after-sales support

Feasibility studies for maximum planning and project security

Support for planning and implementation

Introductory seminars, programming/maintenance courses, operator training

Inspection and individual maintenance concepts

Hotline service, on-site repair service

Central spare part stocking

Epson Industrial Solutions Center – find your solution

Epson Industrial Solutions Center

Experience all our Epson robots in action. Build, simulate and improve your automation application in a workshop cell, with help from our experts. The cell can be controlled and networked using all conventional fieldbus systems. In addition, we can supply you with modern peripherals such as a vision and conveyor tracking system.

Make an appointment

Call us on
+49 2159 538 1800

or send an email to
info.rs@epson.de

Epson Deutschland GmbH
Robotic Solutions Division
Otto-Hahn-Straße 4
40670 Meerbusch

Phone: **+49 2159 5381800**
Fax: **+49 2159 5383170**
E-Mail: **info.rs@epson.de**
www.epson.de/robots

Epson America Inc.
www.epsonrobots.com

Seiko Epson Corp
http://global.epson.com/products/robots/

Epson China Co, Ltd.
www.epson.com.cn/robots/

A6757_RC700A_EN-GB_01/18

For more information please contact:

Home users: 0343 90 37766
Business users*: 0871 42 37766
Republic of Ireland: 01 436 7742

Or visit us at https://www.epson.co.uk/contactus

* 10p per minute plus network extras.

Trademarks and registered trademarks are the property of Seiko Epson Corporation or their respective owners.
Product information is subject to change without prior notice.

EPSON®