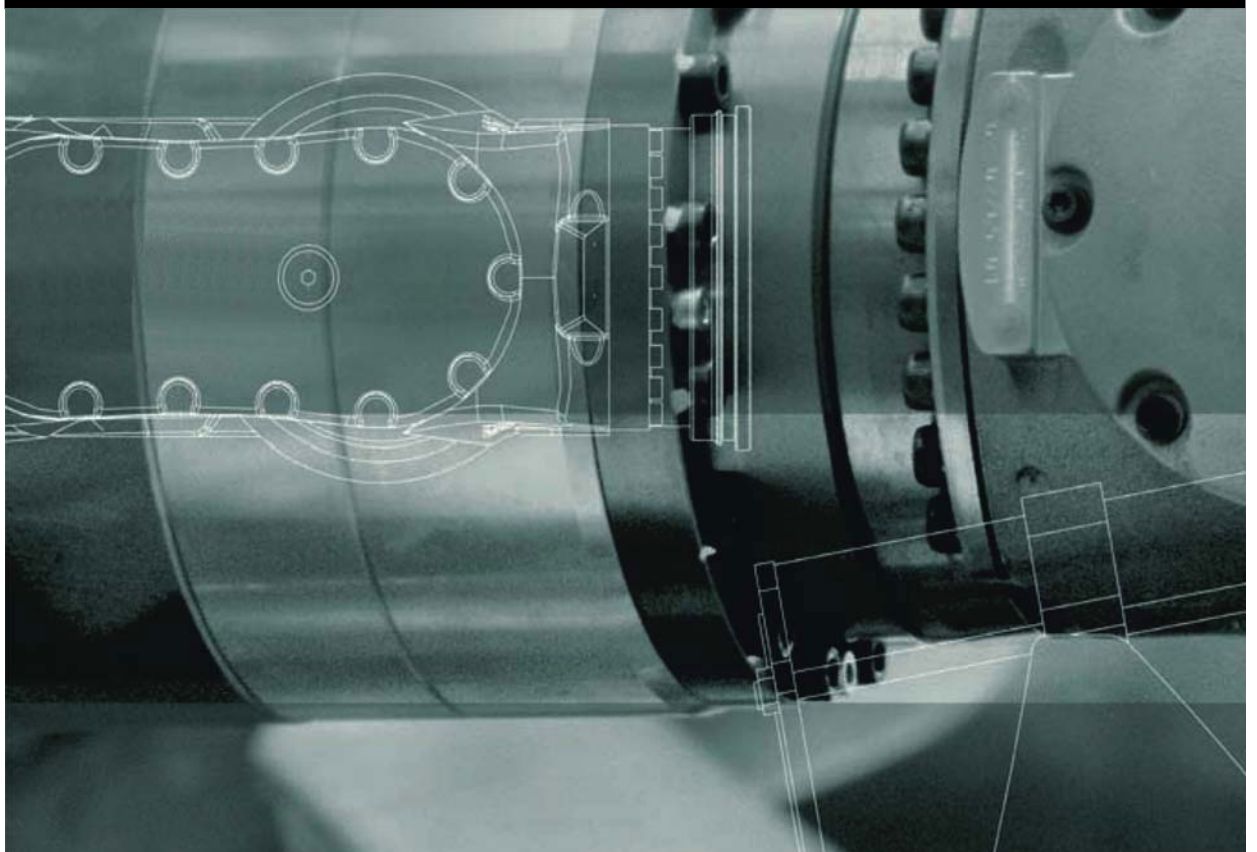


KUKA.RoboSpin SDA 1.0

For KUKA System Software 8.2



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Other functions not described in this documentation may be operable in the controller. The user has no claims to these functions, however, in the case of a replacement or service work.

We have checked the content of this documentation for conformity with the hardware and software described. Nevertheless, discrepancies cannot be precluded, for which reason we are not able to guarantee total conformity. The information in this documentation is checked on a regular basis, however, and necessary corrections will be incorporated in the subsequent edition.

Subject to technical alterations without an effect on the function.

Translation of the original documentation

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1 Introduction

1.1 Target group

This documentation is aimed at users with the following knowledge and skills:

- Advanced KRL programming skills
- Advanced knowledge of the robot controller system
- Knowledge of spot welding



For optimal use of our products, we recommend that our customers take part in a course of training at KUKA College. Information about the training program can be found at www.kuka.com or can be obtained directly from our subsidiaries.

1.2 Industrial robot documentation

The industrial robot documentation consists of the following parts:

- Documentation for the manipulator
- Documentation for the robot controller
- Operating and programming instructions for the KUKA System Software
- Documentation relating to options and accessories
- Parts catalog on storage medium

Each of these sets of instructions is a separate document.

1.3 Representation of warnings and notes

Safety

These warnings are relevant to safety and **must** be observed.



These warnings mean that it is certain or highly probable that death or severe injuries **will** occur, if no precautions are taken.



These warnings mean that death or severe injuries **may** occur, if no precautions are taken.



These warnings mean that minor injuries **may** occur, if no precautions are taken.



These warnings mean that damage to property **may** occur, if no precautions are taken.



These warnings contain references to safety-relevant information or general safety measures. These warnings do not refer to individual hazards or individual precautionary measures.

Notes

These hints serve to make your work easier or contain references to further information.



Tip to make your work easier or reference to further information.

2 Product description

KUKA.RoboSpin SDA is an expansion for KUKA.ServoGun FC SDA and KUKA.EqualizingTech SDA.

RoboSpin SDA makes it possible to execute a rotational motion about the TCP during the welding process. The rotational motion increases the weld quality and reduces the tip wear.

The user communicates the following parameters to the robot controller:

- Spin angle
- Spin time

The robot controller calculates the spin velocity from these parameters.

The user has several options for defining the spin angle:

- Enter the value manually
- Or: Teach the spin angle

The user has several options for defining the spin time:

- Use the weld time from the weld timer as a basis for the spin time
- Or: Enter the value manually
- Or: Update the spin time automatically


Diagnostic messages support the user in making fine adjustments to adapt the spin motion to the weld operation. The messages can also be deactivated.


3 Installation

3.1 System requirements

- Software**
- KUKA System Software 8.2
 - KUKA.ServoGun FC SDA 1.0
 - KUKA.EqualizingTech SDA 1.0
- Compatibility**
- KUKA.ServoGun FC SDA, KUKA.EqualizingTech SDA and KUKA.RoboSpin SDA must not be installed together with one or more of the following technology packages on the same robot controller:
- KUKA.ServoGun FC
 - KUKA.EqualizingTech
 - KUKA.ServoGun TC

3.2 Installing or updating RoboSpin SDA

 It is advisable to archive all relevant data before updating a software package.

 When installing the SDA technology packages, the following sequence must be observed:

1. KUKA.ServoGun FC SDA
2. KUKA.EqualizingTech SDA
3. KUKA.RoboSpin SDA

- Preparation**
- Copy software from CD to KUKA USB stick.
The software must be copied onto the stick with the file Setup.exe at the highest level (i.e. not in a folder).

NOTICE Recommendation: Use a KUKA stick. Data may be lost if any other stick is used.

- Precondition**
- "Expert" user group
 - KUKA.ServoGun FC SDA is installed.
 - KUKA.EqualizingTech SDA is installed.


- Procedure**
1. Connect the USB stick to the robot controller or smartPAD.
 2. In the main menu, select **Start-up > Install additional software**.
 3. Press **New software**. The entry **KUKA.RoboSpin_SDA** must be displayed in the **Name** column and drive **E:** or **K:** in the **Path** column.
If not, press **Refresh**.
 4. If the specified entries are now displayed, continue with step 5.
If not, the drive from which the software is being installed must be configured first:
 - Press the **Configuration** button. A new window opens.
 - Select a line in the **Installation paths for options** area.
Note: If the line already contains a path, this path will be overwritten.
 - Press **Path selection**. The available drives are displayed.
 - Select **E:**. (If stick connected to the robot controller.)
Or select **K:**. (If stick connected to the smartPAD.)
 - Press **Save**. The window closes again.


The drive only needs to be configured once and then remains saved for further installations.

5. Mark the entry **KUKA.RoboSpin_SDA** and click on **Install**. Answer the request for confirmation with **Yes**.
6. Confirm the reboot prompt with **OK**.
7. Remove the stick.
8. Reboot the robot controller.

LOG file A LOG file is created under C:\KRC\ROBOTER\LOG.

3.3 Uninstalling RoboSpin SDA

 It is advisable to archive all relevant data before uninstalling a software package.

 When uninstalling the SDA technology packages, the following sequence must be observed:

1. KUKA.RoboSpin SDA
2. KUKA.EqualizingTech SDA
3. KUKA.ServoGun FC SDA

Precondition

- “Expert” user group
- KUKA.EqualizingTech SDA has been uninstalled.
- KUKA.ServoGun FC SDA has been uninstalled.

Procedure

1. In the main menu, select **Start-up > Install additional software**.
2. Mark the entry **KUKA.RoboSpin_SDA** and click on **Uninstall**. Reply to the request for confirmation with **Yes**. Uninstallation is prepared.
3. Reboot the robot controller. Uninstallation is resumed and completed.

LOG file A LOG file is created under C:\KRC\ROBOTER\LOG.

4 Operation

4.1 Menus

The following command is specific to this technology package:

Select the menu sequence **Commands > RoboSpin > PTP, LIN, CIRC**





4.2 Status keys

Procedure

Displaying the status keys:

- In the main menu, select **Configuration > Status keys > ServoTech**.

Description

Status key	Name / description
	<p>Toggle status keys</p> <p>Displays additional status keys.</p>
	<p>Do not update spin time</p> <ul style="list-style-type: none"> ■ Deactivates the automatic update function for the spin time. (RS_Update_SpinTime = FALSE) ■ Deactivates the diagnostic messages. (RS_ShowInfoMessages = FALSE)
	<p>Update spin time and show messages</p> <ul style="list-style-type: none"> ■ Activates the automatic update function for the spin time. (RS_Update_SpinTime = TRUE) ■ Activates the diagnostic messages. (RS_ShowInfoMessages = TRUE)
	<p>Update spin time</p> <ul style="list-style-type: none"> ■ Activates the automatic update function for the spin time. (RS_Update_SpinTime = TRUE) ■ Deactivates the diagnostic messages. (RS_ShowInfoMessages = FALSE)

5 Start-up and configuration

5.1 Configuring RoboSpin.DAT

Precondition ■ “Expert” user group

- Procedure**
1. In the Navigator, open the file eg_extern.DAT in the directory R1\TP\RoboSpin.
 2. Open the fold **RoboSpin GLOBALS**.
 3. Configure the following variables contained in the fold:
 - RS_Timer
 - RS_Cycflag
 - RS_Interrupt
 4. Close the file. Respond to the query asking whether the changes should be saved by pressing **Yes**.

Description **Variables in the section "Variables for Settings":**

Type/Variable	Description
INT RS_Timer	RoboSpin uses 1 timer. The number of the timer must be defined here.
INT RS_Cycflag	RoboSpin uses 1 cyclical flag. The number of the flag must be defined here.
INT RS_Interrupt	RoboSpin uses 1 interrupt. The number of the interrupt must be defined here.
BOOL RS_Update_SpinTime	These variables can be displayed and modified in the variable overview.
INT RS_SpinTime_Offset	(>>> 7.1 "Displaying and modifying diagnostic variables" Page 27)
REAL RS_ACC_ORI	Note: These variables may only be modified after consultation with KUKA Roboter GmbH.
REAL RS_APO_CDIS	

Variables in the section "Variables for Diagnosis":

These variables can be displayed and, in some cases, modified in the variable overview.

(>>> 7.1 "Displaying and modifying diagnostic variables" Page 27)

5.2 Adapting the variable overview to RoboSpin

Description Diagnostic variables can be displayed in the variable overview.

To make this possible, the file ConfigMon.INI upon which the variable overview is based must be adapted to RoboSpin. The required content is already prepared and need only be inserted into ConfigMon.INI.

The content is prepared in English and German.

- German: file ConfigMon_ServoTech_SDA_DE.INI
- English: file ConfigMon_ServoTech_SDA_EN.INI


The variables are then displayed in the selected language in the variable overview.

Precondition

- “Expert” user group

Procedure

1. Depending on the language desired, open one of the following files in the Navigator in the directory C:\KRC\USER:
 - ConfigMon_ServoTech_SDA_DE.INI
 - Or ConfigMon_ServoTech_SDA_EN.INI
2. Copy the contents from line [Group1] until the end of the file.
3. Close the file.
4. Open the file ConfigMon.INI.
5. Determine the highest group number in the file.
(e.g. by searching the file for the string "[Group]")
6. Scroll to the end of the file and insert the copied contents into the last line.
7. Scroll through the inserted contents and change the group numbers, i.e. continue counting up from the original highest number.
8. Close the file ConfigMon.INI.
Respond to the request for confirmation asking whether the changes should be saved by pressing **Yes**.

 Further information about configuring the variable overview is contained in the Operating and Programming Instructions for System Integrators.

5.3 Defining the spin time

The spin time can be determined in the following ways:


- Use the weld time from the weld timer as the basis for the spin time.
(>>> 5.3.1 "Using the weld time from the weld timer as the basis for the spin time" Page 14)
- Manually define the spin time.
(>>> 5.3.2 "Defining the spin time manually" Page 15)
- Update the spin time automatically.
(>>> 5.3.3 "Automatically updating the spin time" Page 15)


5.3.1 Using the weld time from the weld timer as the basis for the spin time

Description

In this variant, the robot controller takes the weld time from the weld timer and calculates the spin time based on this.

Spin time = weld time + EG_WELDTIME_OFFSET[Gun no.].

 If EG_WELDTIME_OFFSET is equal to zero, this results in a spin time that is actually longer than the weld operation, due to technical reasons inherent in the system.
Consequently, EG_WELDTIME_OFFSET is usually assigned a negative value. This makes it possible to achieve a spin motion which ends at the same time as the weld operation.

 The suitable value for the offset must be determined through practical tests. RoboSpin provides messages to support the user.
(>>> 7.2 "Diagnostic messages for determining offsets" Page 28)

Parameter The following parameters must be configured in order to use the weld time from the timer as the basis for the spin time:

Parameter	Setting options
ServoGunFC[].WeldTimeTimer == TRUE	<ul style="list-style-type: none"> ■ In eg_extern.DAT ■ Via the variable correction function
EG_WELDTIME_OFFSET[]	<p>Note: Information about eg_extern.DAT is contained in the KUKA.ServoGun FC SDA documentation.</p>
RS_Update_Spintime == FALSE	<ul style="list-style-type: none"> ■ Via the status keys (>>> 4.2 "Status keys" Page 11) ■ Via the variable correction function ■ Via the variable overview (>>> 7.1 "Displaying and modifying diagnostic variables" Page 27)
Configuration parameter Timer type <> TEST	<ul style="list-style-type: none"> ■ Via the main menu Configuration > ServoGun Force Control > Configuration <p>Note: Information about this configuration page is contained in the KUKA.ServoGun FC SDA documentation.</p>

5.3.2 Defining the spin time manually

Description In this variant, the value for the spin time is defined manually.

Parameter The following parameters must be configured in order to define the spin time manually:

Parameter	Setting options
Spin time	<ul style="list-style-type: none"> ■ Via the inline form RoboSpin, in the option window Spin parameters (>>> 6.7 "Option window "Spin parameters"" Page 25)
ServoGunFC[].WeldTimeTimer == FALSE	<ul style="list-style-type: none"> ■ In eg_extern.DAT ■ Via the variable correction function <p>Note: Information about eg_extern.DAT is contained in the KUKA.ServoGun FC SDA documentation.</p>
RS_Update_Spintime == FALSE	<ul style="list-style-type: none"> ■ Via the status keys (>>> 4.2 "Status keys" Page 11) ■ Via the variable correction function ■ Via the variable overview (>>> 7.1 "Displaying and modifying diagnostic variables" Page 27)

5.3.3 Automatically updating the spin time

Description In this variant, the start value for the spin time is defined manually.

1. The robot controller uses the start value for the first weld.
2. The robot controller measures how long the weld operation lasts. (The duration depends on the welding program and is independent of the spin time.)
3. The robot controller adds the value of RS_SpinTime_Offset to the measured value. It uses the result as the spin time for the next weld.
4. During the next weld, it again measures how long the weld operation lasts.
5. The robot controller repeats steps 3 and 4 for all further weld operations.



If the same values are used for weld time and spin time, this results in a spin time that is actually longer than the weld operation, due to technical reasons inherent in the system.

Consequently, RS_SpinTime_Offset is usually assigned a negative value. This makes it possible to achieve a spin motion which ends at the same time as the weld operation.



The suitable value for the offset must be determined through practical tests. RoboSpin provides messages to support the user.

(>>> 7.2 "Diagnostic messages for determining offsets" Page 28)


Parameter

The following parameters must be configured in order to update the spin time automatically:

Parameter	Setting options
Spin time	<ul style="list-style-type: none"> Via the inline form RoboSpin, in the option window Spin parameters (>>> 6.7 "Option window "Spin parameters"" Page 25) <p>The start value is defined here. The display is then automatically refreshed according to the updated values.</p>
ServoGunFC[Gun no.].WeldTime-Timer == FALSE	<ul style="list-style-type: none"> In eg_extern.DAT Via the variable correction function <p>Note: Information about eg_extern.DAT is contained in the KUKA.ServoGun FC SDA documentation.</p>
Spin time offset	<ul style="list-style-type: none"> Via the variable correction function Via the variable overview (>>> 7.1 "Displaying and modifying diagnostic variables" Page 27)
RS_Update_Spintime == TRUE	<ul style="list-style-type: none"> Via the status keys (>>> 4.2 "Status keys" Page 11) Via the variable correction function Via the variable overview (>>> 7.1 "Displaying and modifying diagnostic variables" Page 27)
Configuration parameter Timer type <> TEST	<ul style="list-style-type: none"> Via the main menu Configuration > ServoGun Force Control > Configuration <p>Note: Further information is contained in the KUKA.ServoGun FC SDA documentation.</p>
RS_Last_MeasuredSpinTime: Greater than 110 ms and less than 7000 ms	<p>Display option:</p> <ul style="list-style-type: none"> Via the variable overview (>>> 7.1 "Displaying and modifying diagnostic variables" Page 27)
Spin angle: < -0.0001 ° or > 0.0001	<ul style="list-style-type: none"> Via the inline form RoboSpin in the option window Spin parameters. (>>> 6.7 "Option window "Spin parameters"" Page 25)

6 Programming

6.1 Programming a weld spot

 This description applies if **Compensation #AIR** is configured. A different description applies in the case of **Compensation #EQUALIZING**. (>>> 6.2 "Programming a weld spot with Equalizing" Page 19)

Distances

The following distances are required for the position of the gun during teaching:

Distance ...	Value
Moving electrode	Min. 15 mm distance from the workpiece
Fixed electrode	Max. 5 mm distance from the workpiece
Gun opening	Must be at least 4 mm less than the negative software limit switch.

Procedure

If the spin angle is to be entered manually:

1. Position the gun on the desired weld spot. Observe the required distances.
2. Select the menu sequence **Commands > ServoTech > SPOT** and then select the desired motion type.
3. Set the parameters in the inline form.
(>>> 6.1.1 "Inline form "RoboSpin"" Page 17)
4. Press **Cmd OK** to save the instruction.

If the spin angle is to be taught:

1. Position the gun on the desired weld spot. Observe the required distances.
2. Select the menu sequence **Commands > ServoTech > SPOT** and then select the desired motion type.
3. Set the parameters in the inline form, except for the spin angle in the option window **Spin parameters**.
(>>> 6.1.1 "Inline form "RoboSpin"" Page 17)
4. Save the position by pressing **Touch Up**.
5. Rotate the gun about the working direction until the desired end position for the spin motion has been reached.
The key to be pressed (**A**, **B** oder **C**) depends on the working direction.
6. Press the **Touch angle** button.
 - The difference between the position taught in step 4 and the current position is then taken as the spin angle.
 - The robot controller displays the following message: **Current coordinates saved as the spin angle.**
 - The spin angle is automatically entered into the option window **Spin parameters**.
7. Press **Cmd OK** to save the instruction.

6.1.1 Inline form "RoboSpin"

The instruction performs a motion and executes a weld spot at the end point of the motion. The gun rotates around the point during the weld.

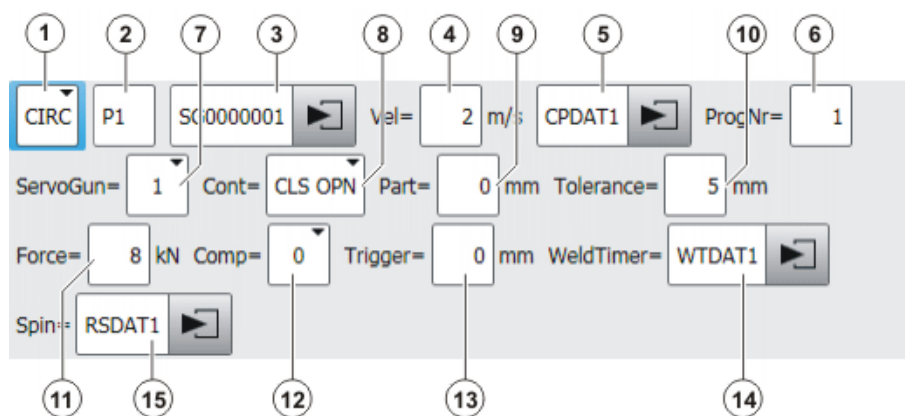


Fig. 6-1: Inline form “RoboSpin”

Item	Description
1	Type of motion <ul style="list-style-type: none"> ■ PTP, LIN or CIRC
2	Only for CIRC motions: Auxiliary point
3	Name of the end point <p>Touch the arrow to edit the point data. The corresponding option window is opened.</p> <p>(>>> 6.3 "Option window “Frames”" Page 22)</p> <p>Only with the option ProgSelect FALSE:</p> <p>The last 7 characters (= default number) must be digits. The robot controller communicates these digits to the weld timer as the program number.</p> <ul style="list-style-type: none"> ■ [...]0 000 001... [...]9 999 999 <p>The number of relevant final characters can be configured in the parameter ProgDigits.</p>
4	Velocity <ul style="list-style-type: none"> ■ For PTP: 0 ... 100 % ■ For LIN or CIRC: 0.001 ... 2 m/s
5	Name for the motion data set <p>The system automatically generates a name. The name can be overwritten. Touch the arrow to edit the point data. The corresponding option window is opened.</p> <p>(>>> 6.4 "Option window: Motion parameters (PTP)" Page 23)</p> <p>(>>> 6.5 "Option window: Motion parameters (LIN, CIRC)" Page 24)</p>
6	Program number for the weld timer <ul style="list-style-type: none"> ■ 1 ... 100 000 <p>Note: This box is only displayed if the option ProgSelect TRUE has been configured.</p>
7	Active gun <ul style="list-style-type: none"> ■ 1 ... 6

Item	Description
8	<ul style="list-style-type: none"> ■ CLS OPN: Approximate positioning during closing and opening motions ■ OPN: Approximate positioning during opening motion ■ CLS: Approximate positioning during closing motion ■ (blank): Without approximate positioning
9	<p>Total thickness of the workpieces to be welded</p> <ul style="list-style-type: none"> ■ 0 ... 100 mm <p>Note: This box is only displayed if the option ThicknessTimer FALSE has been configured.</p>
10	<p>Amount by which the actual thickness may deviate (in both directions) from the value in Part</p> <p>Example: If Part is set to 20 mm and Tolerance to 3 mm, then the thickness may lie between 17 and 23 mm.</p> <ul style="list-style-type: none"> ■ 0 ... 100 mm <p>Note: This box is only displayed if the option ThicknessToTimer FALSE has been configured.</p>
11	<p>Welding force</p> <ul style="list-style-type: none"> ■ Switch-on threshold ... 10 kN <p>Note: This box is only displayed if the option ForceTimer FALSE has been selected.</p>
12	<ul style="list-style-type: none"> ■ 0: Without compensation ■ 1: Compensator 1 ■ 2: Compensator 2
13	<p>Distance after which compensation is deactivated on opening the gun. The lower the value, the earlier the deactivation of compensation.</p> <ul style="list-style-type: none"> ■ -9,999 ... 0 mm
14	<p>Weld parameters</p> <p>Touch the arrow to display the data. The corresponding option window is opened.</p> <p>(>>> 6.6 "Option window "Weld timer parameters"" Page 24)</p> <p>Note: This box is only displayed if at least one of the following options has been configured: ForceTimer TRUE, ThicknessTimer TRUE, ThicknessToTimer TRUE, WeldTimeTimer TRUE</p>
15	<p>Spin parameters</p> <p>Touch the arrow to edit the data. The corresponding option window is opened.</p> <p>(>>> 6.7 "Option window "Spin parameters"" Page 25)</p>

6.2 Programming a weld spot with Equalizing



This description applies if **Compensation #EQUALIZING** is configured.

A different description applies in the case of **Compensation #AIR**.

(>>> 6.1 "Programming a weld spot" Page 17)

Distances

The following distances are required for the position of the gun during teaching:

Distance ...	Value
Fixed electrode	No distance from the workpiece; must be in contact with the workpiece.
Gun opening	Must be at least 4 mm away from the negative software limit switch.

Procedure**If the spin angle is to be entered manually:**

1. Position the gun on the desired weld spot. Observe the required distances.
2. Select the menu sequence **Commands > ServoTech > SPOT** and then select the desired motion type.
3. Set the parameters in the inline form.
(>>> 6.2.1 "Inline form "RoboSpin" (EqualizingTech)" Page 20)
4. Press **Cmd OK** to save the instruction.

If the spin angle is to be taught:

1. Position the gun on the desired weld spot. Observe the required distances.
2. Select the menu sequence **Commands > ServoTech > SPOT** and then select the desired motion type.
3. Set the parameters in the inline form, except for the spin angle in the option window **Spin parameters**.
(>>> 6.2.1 "Inline form "RoboSpin" (EqualizingTech)" Page 20)
4. Save the position by pressing **Touch Up**.
5. Rotate the gun about the working direction until the desired end position for the spin motion has been reached.
The key to be pressed (**A**, **B** oder **C**) depends on the working direction.
6. Press the **Touch angle** button.
 - The difference between the position taught in step 4 and the current position is then taken as the spin angle.
 - The robot controller displays the following message: **Current coordinates saved as the spin angle**.
 - The spin angle is automatically entered into the option window **Spin parameters**.
7. Press **Cmd OK** to save the instruction.

Sequence**Program sequence for welding:**

When approaching points, the robot maintains a certain distance from the workpiece so that the fixed electrode does not scrape against the workpiece. The user can configure this distance (for all weld spots for the gun) via the REAL variable EG_TOUCH_DIFF[] in the file EG_EXTERN.DAT. Default setting: 3 mm.

The actual opening width of the gun at the point is the sum of the taught opening width and this distance.

6.2.1 Inline form "RoboSpin" (EqualizingTech)

The instruction performs a motion and executes a weld spot at the end point of the motion. The gun rotates around the point during the weld.

Fig. 6-2: Inline form “RoboSpin” (Equalizing)

Item	Description
1	Type of motion <ul style="list-style-type: none"> ■ PTP, LIN or CIRC
2	Only for CIRC motions: Auxiliary point
3	Name of the end point <p>Touch the arrow to edit the point data. The corresponding option window is opened.</p> <p>(>>> 6.3 "Option window “Frames”" Page 22)</p> <p>Only with the option ProgSelect FALSE:</p> <p>The last 7 characters (= default number) must be digits. The robot controller communicates these digits to the weld timer as the program number.</p> <ul style="list-style-type: none"> ■ [...]0 000 001... [...]9 999 999 <p>The number of relevant final characters can be configured in the parameter ProgDigits.</p>
4	Velocity <ul style="list-style-type: none"> ■ For PTP: 0 ... 100 % ■ For LIN or CIRC: 0.001 ... 2 m/s
5	Name for the motion data set <p>The system automatically generates a name. The name can be overwritten. Touch the arrow to edit the point data. The corresponding option window is opened.</p> <p>(>>> 6.4 "Option window: Motion parameters (PTP)" Page 23)</p> <p>(>>> 6.5 "Option window: Motion parameters (LIN, CIRC)" Page 24)</p>
6	Program number for the weld timer <ul style="list-style-type: none"> ■ 1 ... 100 000 <p>Note: This box is only displayed if the option ProgSelect TRUE has been configured.</p>
7	Active gun <ul style="list-style-type: none"> ■ 1 ... 6
8	<ul style="list-style-type: none"> ■ CLS OPN: Approximate positioning during closing and opening motions ■ OPN: Approximate positioning during opening motion ■ CLS: Approximate positioning during closing motion ■ (blank): Without approximate positioning

Item	Description
9	Total thickness of the workpieces to be welded <ul style="list-style-type: none"> 0 ... 100 mm Note: This box is only displayed if the option ThicknessTimer FALSE has been configured.
10	Amount by which the actual thickness may deviate (in both directions) from the value in Part Example: If Part is set to 20 mm and Tolerance to 3 mm, then the thickness may lie between 17 and 23 mm. <ul style="list-style-type: none"> 0 ... 100 mm Note: This box is only displayed if the option ThicknessTolTimer FALSE has been configured.
11	Welding force <ul style="list-style-type: none"> Switch-on threshold ... 10 kN Note: This box is only displayed if the option ForceTimer FALSE has been selected.
12	Weld parameters Touch the arrow to display the data. The corresponding option window is opened. (>>> 6.6 "Option window "Weld timer parameters"" Page 24) Note: This box is only displayed if at least one of the following options has been configured: ForceTimer TRUE , ThicknessTimer TRUE , ThicknessTolTimer TRUE , WeldTimeTimer TRUE
13	Spin parameters Touch the arrow to edit the data. The corresponding option window is opened. (>>> 6.7 "Option window "Spin parameters"" Page 25)

6.3 Option window "Frames"

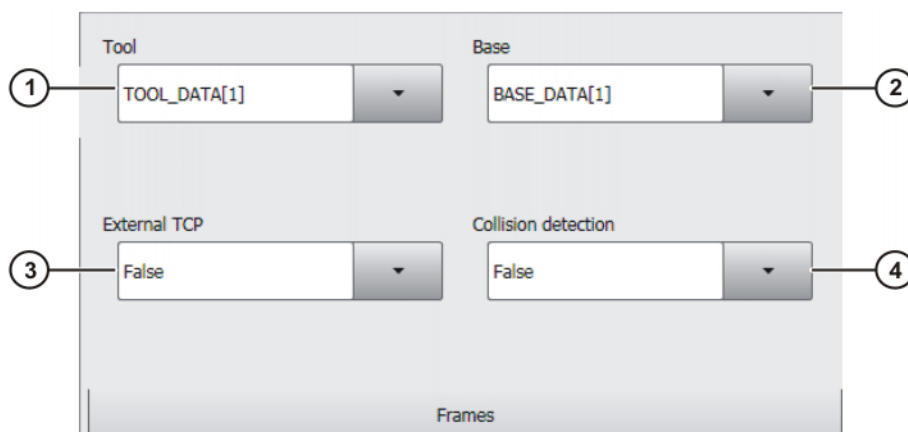


Fig. 6-3: Option window: Frames

Item	Description
1	Tool selection. If True in the box External TCP : workpiece selection. Range of values: [1] ... [16]
2	Base selection. If True in the box External TCP : fixed tool selection. Range of values: [1] ... [32]
3	Interpolation mode <ul style="list-style-type: none"> ■ False: The tool is mounted on the mounting flange. ■ True: The tool is a fixed tool.
4	<ul style="list-style-type: none"> ■ True: For this motion, the robot controller calculates the axis torques. These are required for collision detection. ■ False: For this motion, the robot controller does not calculate the axis torques. Collision detection is thus not possible for this motion.

6.4 Option window: Motion parameters (PTP)

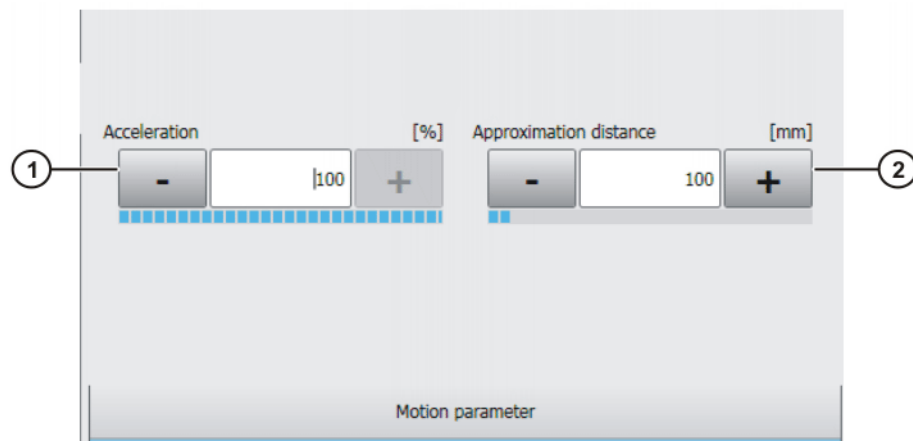


Fig. 6-4: Option window: Motion parameters (PTP)

Item	Description
1	Acceleration Refers to the maximum value specified in the machine data. The maximum value depends on the robot type and the selected operating mode. <ul style="list-style-type: none"> ■ 1 ... 100 %
2	This box is only displayed if it is specified in the inline form that the point is to be approximated. Furthest distance before the end point at which approximate positioning can begin. Maximum distance 100%: half the distance between the start point and the end point relative to the contour of the PTP motion without approximate positioning <ul style="list-style-type: none"> ■ 1 ... 100 %

6.5 Option window: Motion parameters (LIN, CIRC)

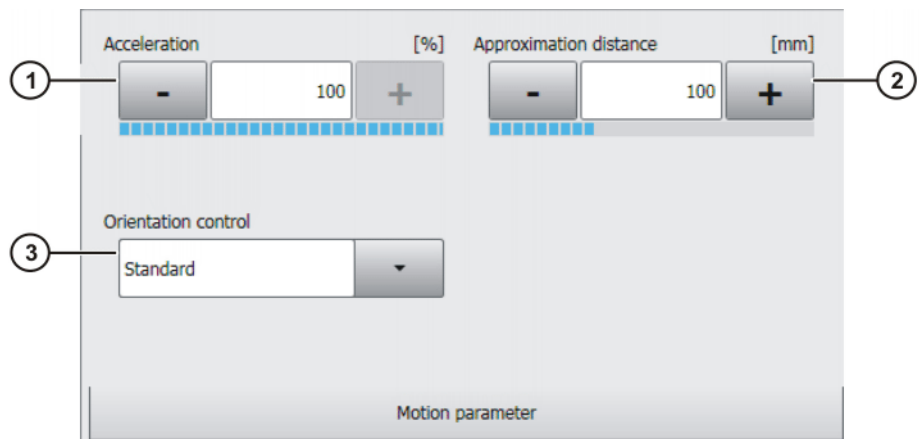


Fig. 6-5: Option window: Motion parameters (LIN, CIRC)

Item	Description
1	Acceleration Refers to the maximum value specified in the machine data. The maximum value depends on the robot type and the selected operating mode.
2	This box is only displayed if it is specified in the inline form that the point is to be approximated. Furthest distance before the end point at which approximate positioning can begin The maximum permissible value is half the distance between the start point and the end point. If a higher value is entered, this is ignored and the maximum value is used.
3	Orientation control selection. <ul style="list-style-type: none"> ■ Standard ■ Wrist PTP ■ Constant orientation control

6.6 Option window “Weld timer parameters”

The values in this window come from the weld timer. They are only displayed and cannot be modified.

Exception: If the configuration parameter **Timer type** is set to **TEST**, the values can be edited. The values displayed are those which the robot controller last received from a weld timer.

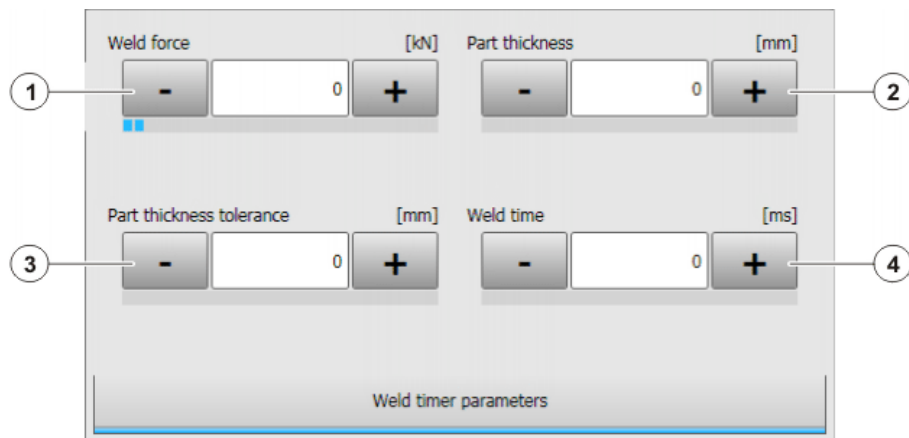


Fig. 6-6: Option window “Weld timer parameters”

Item	Description
1	Welding force Note: This box is only displayed if the option ForceTimer TRUE has been selected.
2	Total thickness of the workpieces to be welded Note: This box is only displayed if the option ThicknessTimer TRUE has been selected.
3	Amount by which the actual total thickness may deviate (in both directions) from the value in Part thickness Example: If Part thickness is set to 20 mm and Part thickness tolerance to 3 mm, then the total thickness may lie between 17 and 23 mm. Note: This box is only displayed if the option ThicknessToTimer TRUE has been selected.
4	Duration of weld operation This value plus the value of EG_WELDTIME_OFFSET[axis no.] results in the spin time. Note: This box is only displayed if the option WeldTimeTimer TRUE has been selected.

6.7 Option window “Spin parameters”

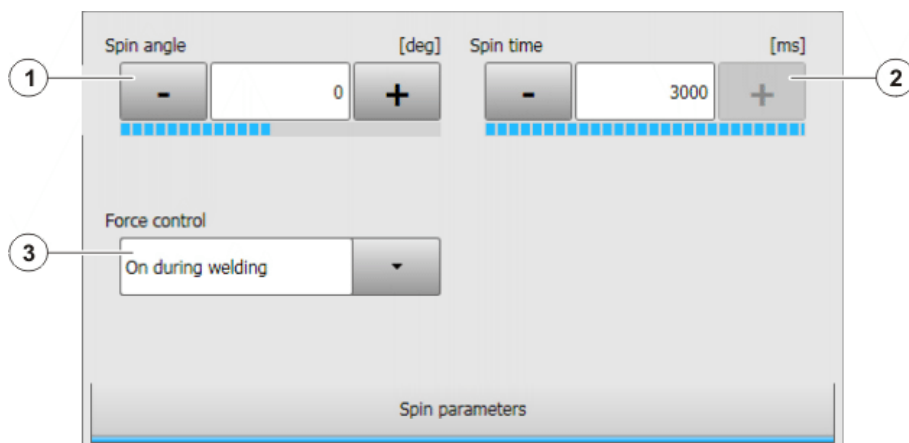


Fig. 6-7: Option window “Spin parameters”

Item	Description
1	<p>Spin angle</p> <p>Number of degrees the robot rotates about the TCP during welding</p> <ul style="list-style-type: none">■ -20 ° ... +20 °■ 0 °: No rotation
2	<p>Spin time</p> <ul style="list-style-type: none">■ If RS_Update_SpinTime == FALSE: The spin time is defined here.■ If RS_Update_SpinTime == TRUE: The start value for the spin time is defined here. The display is then automatically refreshed according to the updated values.■ 0 ° ... +3 000 ° <p>Note: This box is only displayed if the option WeldTimeTimer FALSE has been configured.</p>
3	<ul style="list-style-type: none">■ ON: Force control is active during the spin motion.■ OFF: Force control is not active during the spin motion. Position control is active.

7 Diagnosis

7.1 Displaying and modifying diagnostic variables

- Precondition**
- The variable overview has been adapted.
(>>> 5.2 "Adapting the variable overview to RoboSpin" Page 13)
 - "Expert" user group

- Procedure**
1. In the main menu, select **Display > Variable > Overview > Display**.
The **Variable overview – Display** window is opened.
 2. Select the group **RoboSpin**. The variables are displayed.
 3. If required:
 - Modify variables.
 - Press **OK** to save the change and close the window.



Information about using the variable overview can be found in the operating and programming instructions for the KUKA System Software.

Description Some of the values are only displayed and cannot be modified.

Variable	Description
RoboSpin info msg	<ul style="list-style-type: none"> ■ Red/TRUE: The robot controller displays diagnostic messages for RoboSpin in the message window. ■ Gray/FALSE: No diagnostic messages Variable: RS_ShowInfoMessages
Spin time offset	Only relevant in the following case: <ul style="list-style-type: none"> ■ The option WeldTimeTimer FALSE is configured. ■ And: RS_Update_SpinTime == TRUE Variable: RS_SpinTime_Offset
Update spin time	<ul style="list-style-type: none"> ■ Red/TRUE: The automatic update function is activated. ■ Gray/FALSE: The automatic update function is deactivated. Variable: RS_Update_SpinTime Note: This display is only up-to-date during the weld operation. Outside of the weld operation, the current status can be displayed via the variable correction function.
Point name	Name of the last point where a spin motion has been executed with an angle not equal to zero Display only Variable: RS_Last_Point_Name
Spin angle	Spin angle for the most recent spin motion carried out [deg] Display only. Variable: RS_Last_Spin_Angle
Spin vel	Velocity for the most recent spin motion carried out [deg/s]. The actual velocity executed is equivalent to this value * \$OV_PRO. Display only. Variable: RS_Last_Spin_Vel
Used spin time	The most recent spin time used as the basis for calculating the velocity of the spin motion Display only. Variable: RS_Last_OldSpinTime Note: Only relevant if RS_Update_SpinTime == TRUE

Variable	Description
Measured weld time	<p>Most recently measured weld time</p> <p>The value usually corresponds to: $RS_Last_OldSpinTime + RS_SpinTime_Offset$</p> <p>Display only. Variable: <code>RS_Last_MeasuredSpinTime</code></p> <p>Note: Only relevant if <code>RS_Update_SpinTime == TRUE</code></p>
Updated spin time	<p>The spin time to be used for the next spin motion</p> <p>The value usually corresponds to: $RS_Last_MeasuredSpinTime + RS_SpinTime_Offset$</p> <p>Display only. Variable: <code>RS_Last_NewSpinTime</code></p> <p>Note: Only relevant if <code>RS_Update_SpinTime == TRUE</code></p>

7.2 Diagnostic messages for determining offsets

Precondition ■ `RS_ShowInfoMessages == TRUE`

Description

Message	Cause/remedy
<i>Spin velocity at point {0} is too low!</i>	<p>Cause: The robot controller cannot execute the spin motion as quickly as specified by the spin time.</p> <p>Effect: The spin motion lasts longer than the specified spin time.</p> <p>Remedy:</p> <ul style="list-style-type: none"> ■ Increase the override. ■ And/or reduce the spin angle. ■ And/or increase the spin time.
<i>Spin velocity at point {0} is too high!</i>	<p>Cause: The robot controller cannot execute the spin motion as slowly as specified by the spin time.</p> <p>Effect: The spin motion lasts less than the specified spin time.</p> <p>Remedy:</p> <ul style="list-style-type: none"> ■ Increase the spin angle. ■ And/or reduce the spin time.
<i>Spin motion at point {0} ended too early!</i>	<p>Cause: The spin motion ended before the Weld end input came in.</p> <p>Remedy:</p> <ul style="list-style-type: none"> ■ Increase the spin time. ■ And/or: Increase the offset for the spin time (if used).

Message	Cause/remedy
<i>Measured weld time in point {0} was too short (< 110ms) !</i>	<p>Cause: The Weld end input came very early.</p> <p>Effect: The robot controller assumes that the weld time was measured incorrectly and, as a result, does not automatically update the spin time.</p> <p>Remedy:</p> <ul style="list-style-type: none">■ Check I/O configuration.■ Check the connection between the weld timer and the robot controller.
<i>Measured weld time in point {0} was too long (> 7000ms) !</i>	<p>Cause: The Weld end input came very late.</p> <p>Effect: The robot controller assumes that the weld time was measured incorrectly and, as a result, does not automatically update the spin time.</p> <p>Remedy:</p> <ul style="list-style-type: none">■ Check I/O configuration.■ Check the connection between the weld timer and the robot controller.

8 KUKA Service

8.1 Requesting support

Introduction The KUKA Roboter GmbH documentation offers information on operation and provides assistance with troubleshooting. For further assistance, please contact your local KUKA subsidiary.

Information The following information is required for processing a support request:

- Model and serial number of the robot
- Model and serial number of the controller
- Model and serial number of the linear unit (if applicable)
- Model and serial number of the linear unit (if applicable)
- Version of the KUKA System Software
- Optional software or modifications
- Archive of the software

For KUKA System Software V8: instead of a conventional archive, generate the special data package for fault analysis (via **KrcDiag**).
- Application used
- Any external axes used
- Description of the problem, duration and frequency of the fault

8.2 KUKA Customer Support

Availability KUKA Customer Support is available in many countries. Please do not hesitate to contact us if you have any questions.

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