

Application

"Opening of the protective door regarding PA-CONTROL with servoTEC S2 axes"

Short Version: The process

- Stopping the machine process
- Opening the protective doors
- Manual manipulation by operating staff
- Closing the protective door again
- Restarting the machine process

refers to the deactivation and activation of the axes. This process is not a task with a high degree of difficulty.

However, it is more difficult to make a decision on how the axes can or may be moved on after being switched off.

To solve this task, there are axis parameters, system-R-register, system markers and commands in the PA-CONTROL for which sensible application is discussed in this application document.

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1 Modifications

Document modifications and life cycle

Document Code	Date	Generation and modification
APP5016_EN_1117813_PAC_OpeningProtectiveDoor_servoTEC_S2_R1a.doc	October 2013	Release of the English document. Translation of the original German document: "APP5016_DE_1076280_PAC_OeffnenDerSchutztuer_servoTEC_S2_R1c.doc"

2 Preface

During the process "Stop machine process - open protective door - manual action by operating staff - close protective door again - restart machine process", deactivating and activating the axes is the task with the lower difficulty. However, it is much more difficult to make a decision on how the axes are to be moved on again once they were moved in the deactivated condition. To solve this task, the PA-CONTROL axis parameter, system-R-register, system markers and commands.

Axis parameters	System-R-Register (SR)	System-Marker (SM)	Commands
<ul style="list-style-type: none"> ▪ Release mode ▪ Activation method ▪ Maximum position deviation ▪ Group assignment when the axis is moved 	<ul style="list-style-type: none"> ▪ SR51 – SR66 : Position at axis IDLE/SAFE switching ▪ SR71 – SR86 : Target position of the axis 	<ul style="list-style-type: none"> ▪ SM191 – SM206 : Axis was moved too much in the IDLE/SAFE condition 	<ul style="list-style-type: none"> ▪ ABORT.An ▪ OFF.An / ON.An ▪ STOP.An / START.An

When deactivating and activating the axis, two general possibilities are differentiated:

Condition	Action
Axis standing Condition OPERATIONAL	<ul style="list-style-type: none"> - The axis is deactivated (IDLE/SAFE). - After activation, the axis is returned to its old position (if moved).
Axis running Condition ACTIVE	<ul style="list-style-type: none"> - The axis is stopped (HALT) and then switched off (IDLE/SAFE). - After deactivation, the interrupted running command is continued.

Use the axis parameters "Activation movement mode" to set the described manner of work (on this, see chapter *Axis parameters activation movement mode, page 7*).

2.1 Axis parameters activation movement mode

Value	Description of the mode	Comment
0	The axis stops and is not moved, even if it was moved or a running command was interrupted.	In this mode, you have to run the application programme, correct the position and/or continue the running command (see example: <i>Deactivation of axes by the operating system, page 9</i> by a command).
1	(DEFAULT) A running command that was interrupted by the function "STOP" is continued. Otherwise, the axis stops where it just is and the current position is assumed.	If opening of the protective door is permitted only at the pre-defined positions in the sequence (release of the door lock) where the axis positions are uncritical (waiting position), this mode is a version that can be handled simply.
2	The operating system runs the axis to the position in which the axis was located before it was switched to the condition "IDLE / SAFE". A running command that was interrupted by the function "OFF AXIS" is continued.	If opening of the protective door is permitted only at the pre-defined positions in the sequence (release of the door lock) where the axis positions are uncritical (waiting position), this mode is a version that can be handled simply.
3	The operating system checks if the axis was moved in the status "IDLE / SAFE". If the difference exceeds the specification of the axis parameter "Maximum position deviation", the system error (E582) is generated. Otherwise, the axis is moved to the position before switching to status "IDLE / SAFE" or the interrupted running operation is continued.	The protective door may be opened at any time of the machine process. The axis parameter "Maximum position deviation" can or may determine a threshold by how much the axis may be moved in the condition IDLE/SAFE without this having any negative effect on the further machine sequence. If this prerequisite is present, the axes can be deactivated and activated with very little effort by the operating system (release mode) of the inputs. If an axis was moved too far in the condition IDLE/SAFE, the system error E582 is generated and AUTOMATIC mode of the PA-CONTROL must be left.

Continuation table axis parameter activation movement mode

Value	Description of the mode	Comment
4	<p>The operating system checks if the axis was moved in the status "IDLE / SAFE".</p> <p>If the difference exceeds the specification of the "maximum position deviation", the system marker (SM191, SM192,...) is set.</p> <p>Otherwise, the axis is moved to the position before switching to status "IDLE / SAFE" or the interrupted running operation is continued.</p> <p>If the system marker assigned to the axis is set, the axis cannot be moved and a system error is generated.</p> <p>If this option was selected, the system marker must be requested in the application (LD SM191, G21 SM191, ...). The system marker is reset in these queries.</p>	<p>The protective door may be opened at any time of the machine process.</p> <p>The axis parameter "Maximum position deviation" can or may determine a threshold by how much the axis may be moved in the condition IDLE/SAFE without this having any negative effect on the further machine sequence.</p> <p>If this prerequisite is present, the axes can be deactivated and activated with very little effort by the operating system (release mode) of the inputs.</p> <p>If an axis was moved too far in the condition IDLE/SAFE, the corresponding system marker (SM191, ...) is set and the axis is not moved.</p> <p>Now corrective measures can be activated in the application programme and then the machine sequence can be continued.</p>

3 Deactivation of axes by the operating system

3.1 Setup

See *Figure 1, page 10*.

- PA-CONTROL with 2 servoTEC-axes (axis 1 and axis 2)
- Protective enclosure of the entire plant with a protective door
- Operating elements:
 - Main switch (supply)
 - ON, OFF, EMERGENCY OFF for power supply to the drives (servoTEC)
 - PA-CONTROL "START" "STOP" via the front panel of the PA-CONTROL or (optional) via the button "external start" and "external stop".

3.2 Functions

3.2.1 Open protective door (protective door is to be opened)

AUTOMATIC operation of the PA-CONTROL is stopped (STOP button / button external STOP). This means that the current positionings are stopped and lead to a HALT condition. Then the axes are deactivated and the condition switches to IDLE. Use the axis parameter "PUT-SAFE" to activate the personally safe restart lock (KSI+/-) in the servoTEC-amplifier via the outputs 4 and 5. It then bridges the door switches with the contacts "KSO". From the point of view of the axes, the work space is safe and the door can be opened.

Before continuing via the function "Start-after stop" in AUTOMATIC mode, the protective door must be closed again first.

3.2.2 EMERGENCY OFF

In the EMERGENCY STOP case, the axes are switched off via the input I4 (HALT → IDLE → SAFE) and the mains supply (400VAC) of the drives must be deactivated with a time delay of 0.5 seconds via K2.

If the axes are to be activated again after EMERGENCY STOP, this should be done via input I1.

3.3 Wiring principle of the application "Deactivation of axes by the operating system"

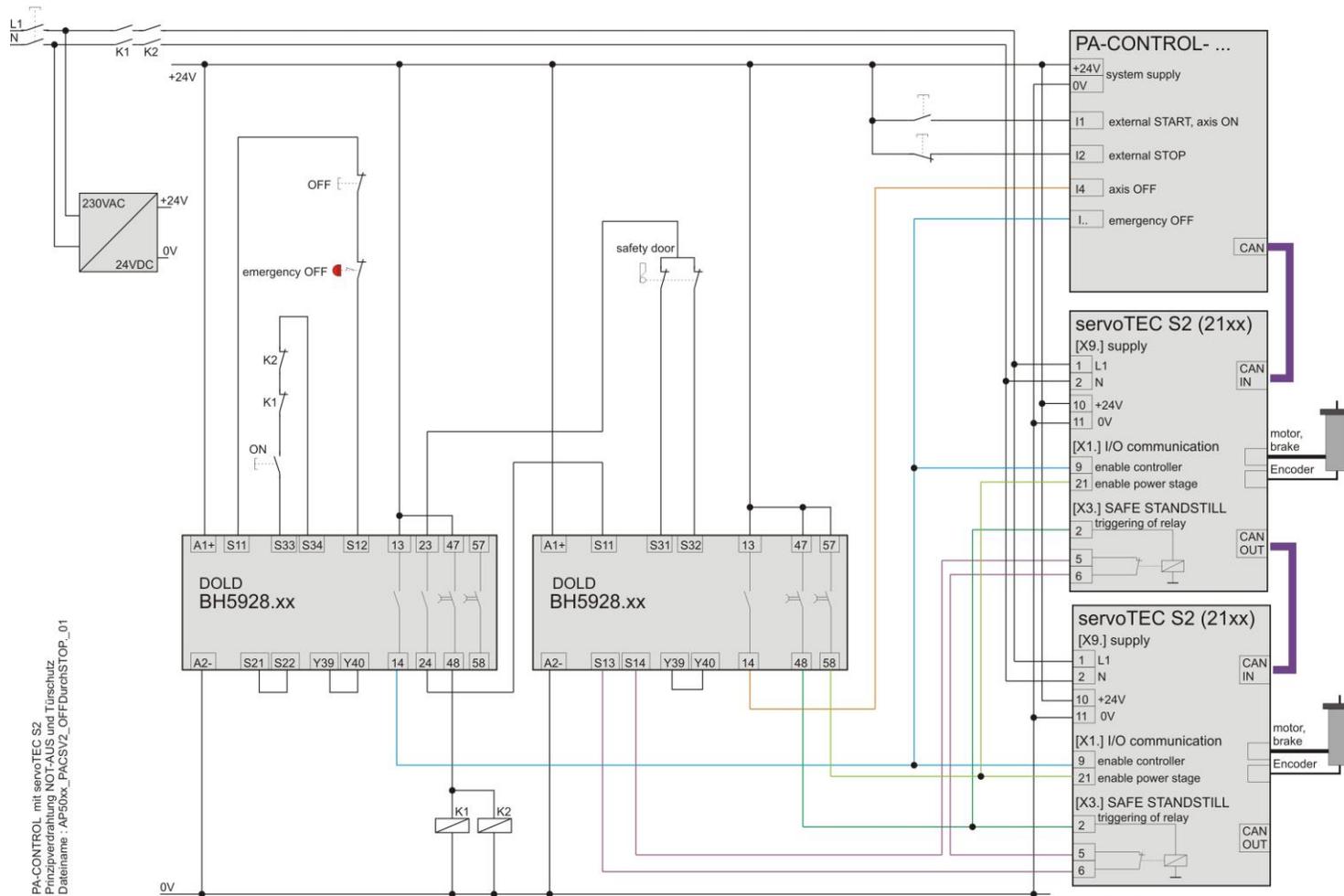
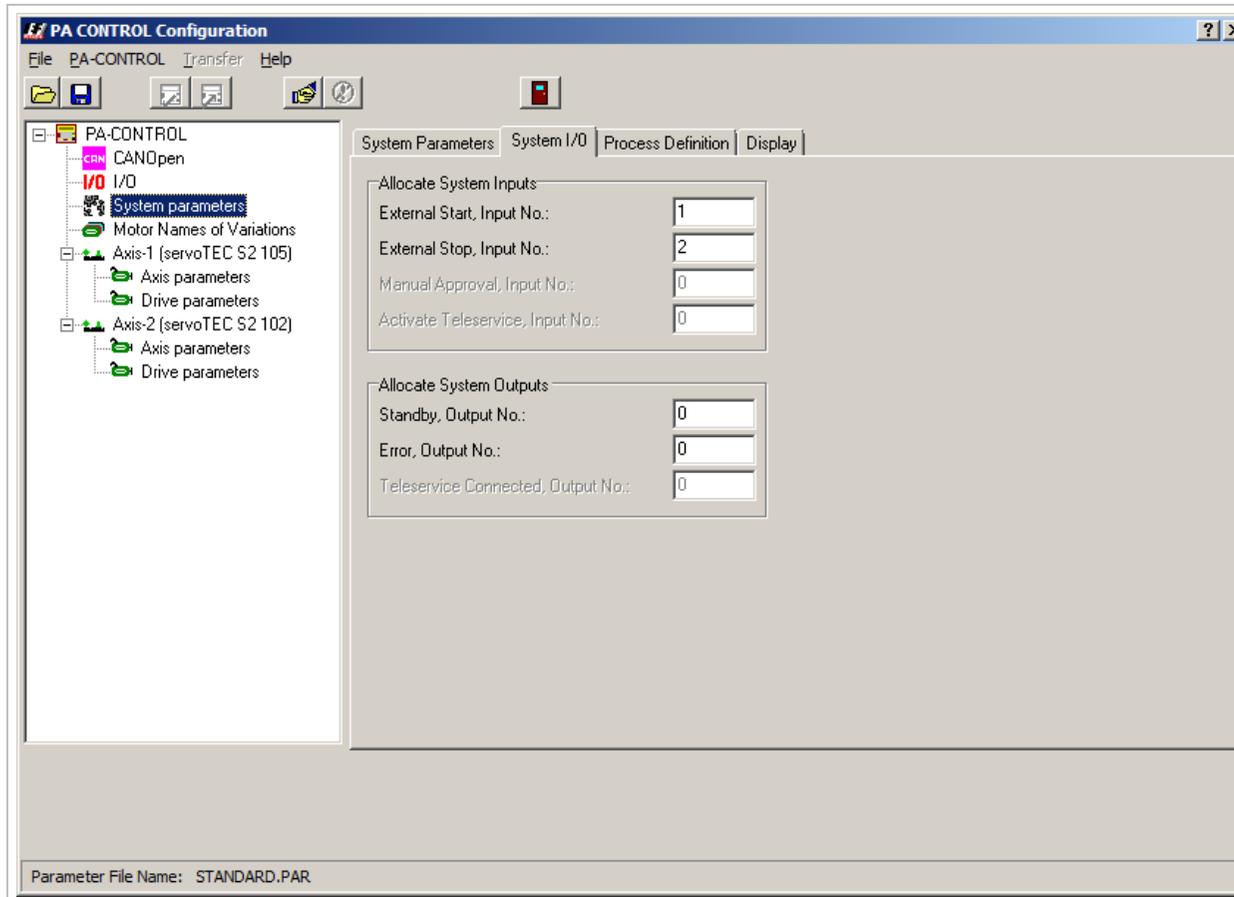


Figure 1: PA-CONTROL with 2 servoTEC-axes, setting of the parameters for "Deactivating the axes by the operating system"

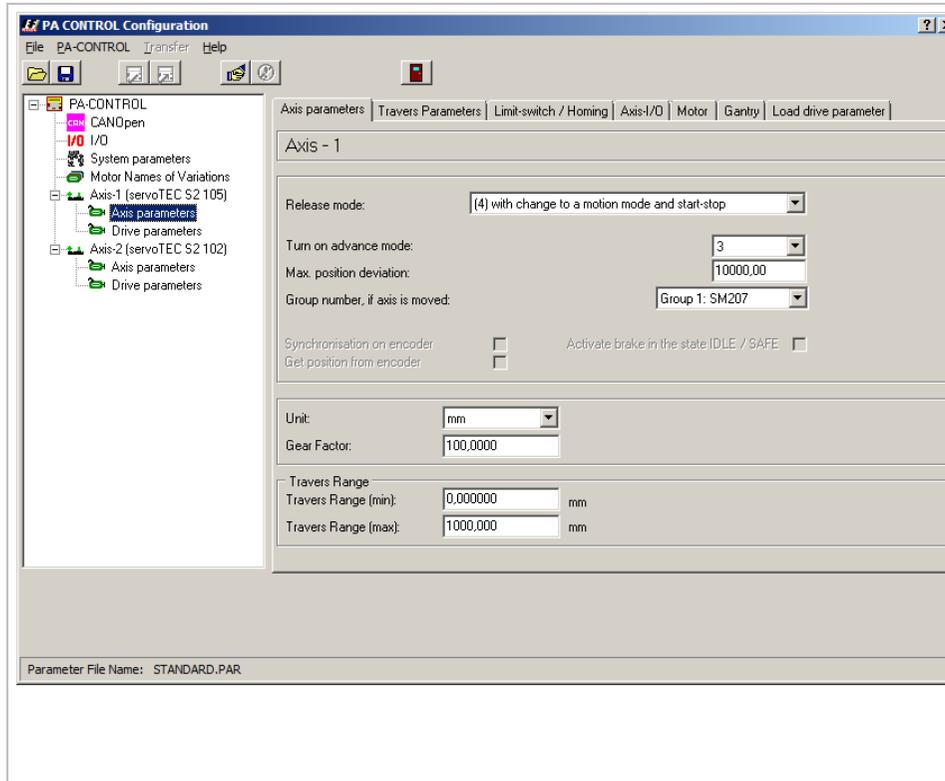
3.3.1 System parameters



External start, input no. = 1

External stop, input no. = 2

3.3.2 Axis parameters



Release mode = 4

The axis is switched into the condition OPERATIONAL when switching to the operating mode "AUTOMATIC", at STOP and when leaving the operating mode AUTOMATIC, the axis is switched back to the condition IDLE/SAFE.

If START is activated again after STOP (START-after-STOP), the axis is first switched back to the condition OPERATIONAL or ACTIVE before the programmes can be processed further.

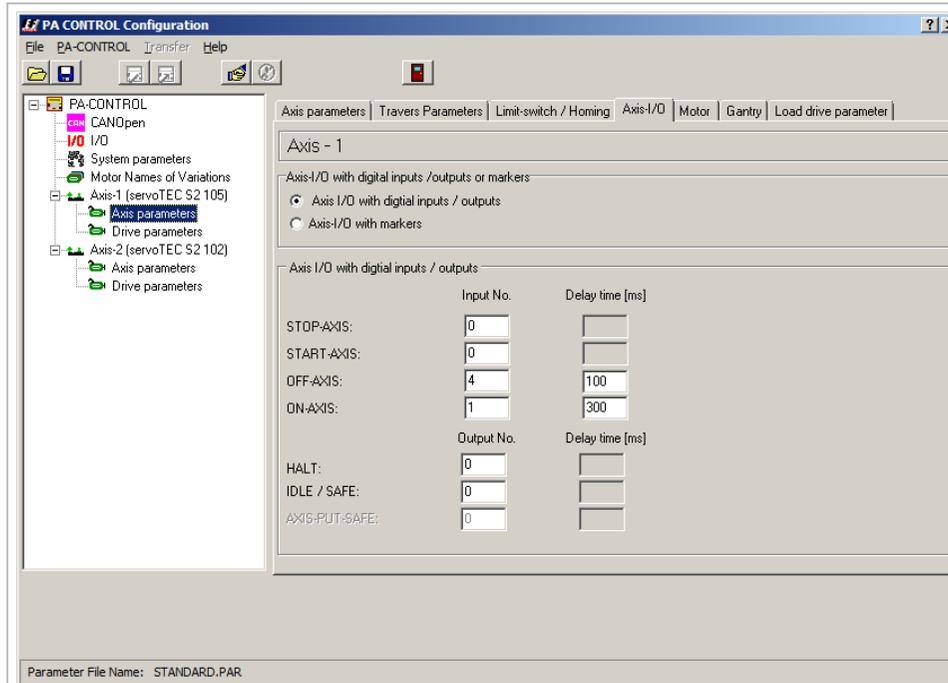
When leaving the operating mode AUTOMATIC, the axis is always switched to the condition IDLE/SAFE.

Activation mode = 3

The operating system verifies whether the axis was moved in the condition IDLE/SAFE. If the difference is larger than specified in the axis parameter "Maximum position deviation (100 mm, see below), the system error (E582) is generated.

Otherwise, the axis is moved to the position before switching to status "IDLER / SAFE" or the interrupted running operation is continued.

Maximum position deviation = 100,000



OFF axis input no. = 4

In the "EMERGENCY STOP CASE", the input I4 switches the axis into the condition IDLE/SAFE.

(Axis 2: OFF axis input no. = 4, same input)

ON axis input no. = 1

After an EMERGENCY STOP case, the axis can be switched back to OPERATIONAL or ACTIVE via input I1 (axis 2: ON axis input no. = 1, same input)

Axis PUT-SAFE = 4

In this case, the output O4 is used to activate the option AS (personally safe restart lock) at the servoTEC-amplifier.

For axis 2, a different output must be used, e.g. O5

If a drive amplifier has no AS function and instead the power supply must be deactivated, the parameter **Axis-PUT-SAFE = 0** is set

OFF axis delay time = 100

When deactivating the axis, there will be a 100 ms waiting time before the axis is actually deactivated. This waiting time is to cause the kinetic energy of the axis to be consumed when the axis is deactivated during a run.

This delay time must be considered if the power supply is deactivated.

ON axis delay time = 300

This delay time is inserted when activating the axis. This is to achieve the interim circuit voltage in full.

3.4 Notes on the function and generation of the PA-CONTROL programme (application programme)

The application programme does not require any programme parts to deactivate and activate the axis. The settings "Release mode = 4" and "Activation movement mode = 3" executes all functions of the operating system.

If the protective door is to be opened, AUTOMATIC operation of the PA-CONTROL is stopped (external STOP-input, ...).and the axes are deactivated (SAFE). If the axes have reached the condition SAFE, the protective door can be opened.

In case of EMERGENCY STOP, the setting of the axis parameter "OFF axis = 4" (input 4) is deactivated and then (K2 drop-delayed) the mains supply is deactivated with a delay. This setting leads to the axis being stopped targeted in case of EMERGENCY OFF and does not run out uncontrolled.

When the EMERGENCY STOP has been removed, the setting of the axis parameter "ON axis = 1" (input 1) can be activated again by pushing the "external START button".

4 Deactivation of axes through the input

See Figure 2, page 16.

4.1 Setup

- PA-CONTROL with 2 servoTEC-axes (axis 1 and axis 2)
- Protective enclosure of the entire plant with a protective door
- Operating elements:
 - Main switch (supply)
 - ON, OFF, EMERGENCY OFF for power supply to the drives (servoTEC)
 - PA-CONTROL "START" "STOP" via the front panel of the PA-CONTROL or (optional) via the button "external start" and "external stop"
 - Switch "Axis ON".

4.2 Functions

4.2.1 Open protective door (protective door is to be opened)

The switch "Axis ON" is opened (input I4 = 0 → axes IDLE/SAFE). First, the current positionings are stopped (HALT). Then the axes are deactivated (IDLE). Use the axis parameter "PUT-SAFE" to activate the personally safe restart lock (KSI+/-) in the servoTEC-amplifier via the outputs O4 and O5. It then bridges the door switches with the contacts "KSO". From the point of view of the axes, the work space is safe and the door can be opened (SAFE).

Before continuing via the function "Start-after stop" in AUTOMATIC mode, the protective door must be closed again first.

4.2.2 EMERGENCY OFF

In the EMERGENCY STOP case, the axes are switched off via the input I4 (IDLE/SAFE) and the mains supply (400VAC) of the drives must be deactivated with a time delay of 0.5 seconds via K2.

4.3 Wiring principle of the application "Deactivation of axes by an input"

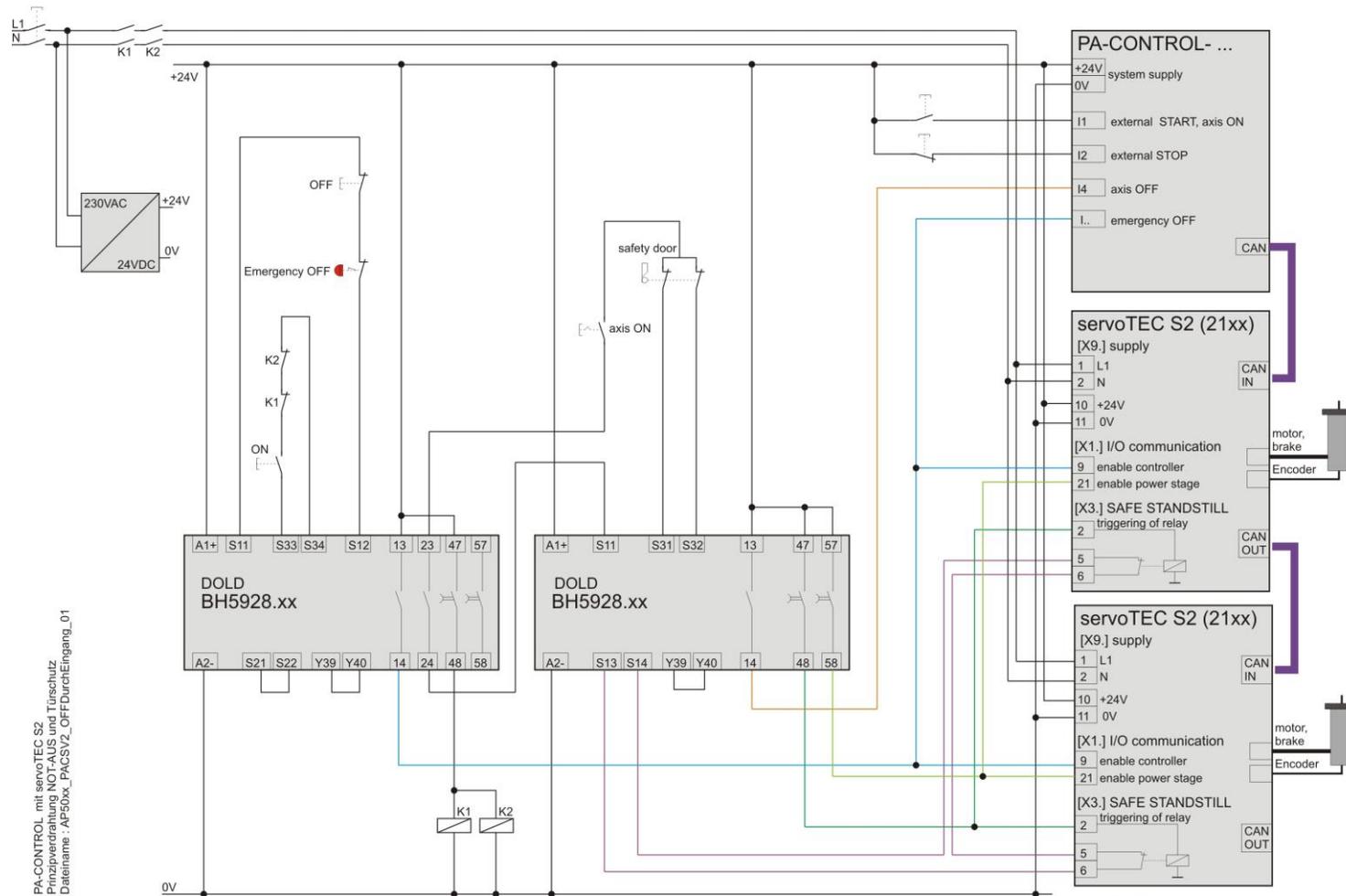
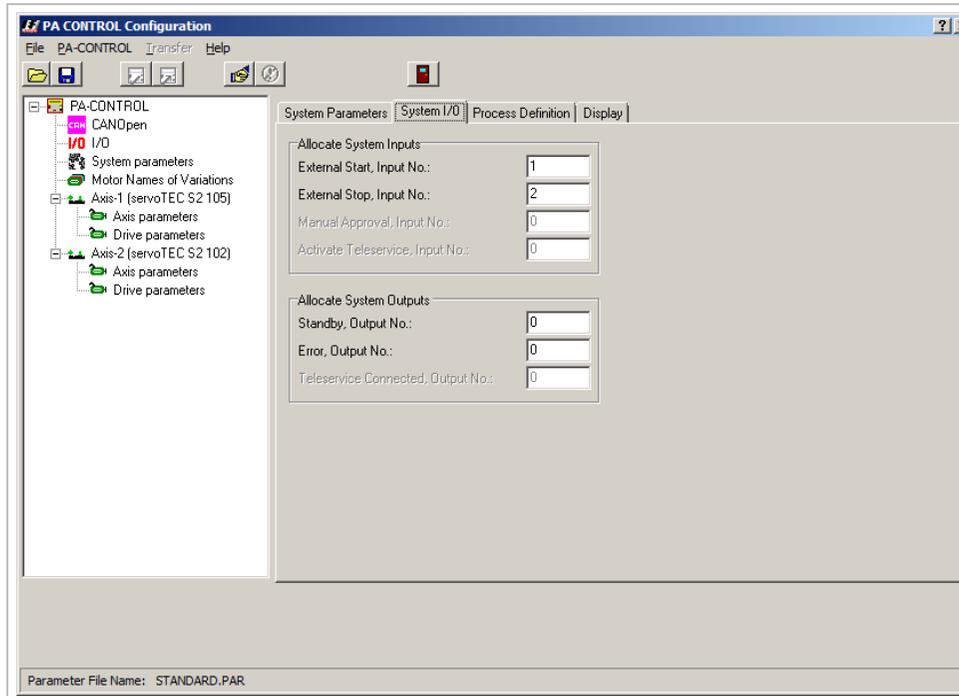


Figure 2: PA-CONTROL with 2 servoTEC-axes, setting of the parameters for "Deactivating the axes by an input"

4.4 Setting the parameters for "Deactivation of axes by an input"

4.4.1 System parameters



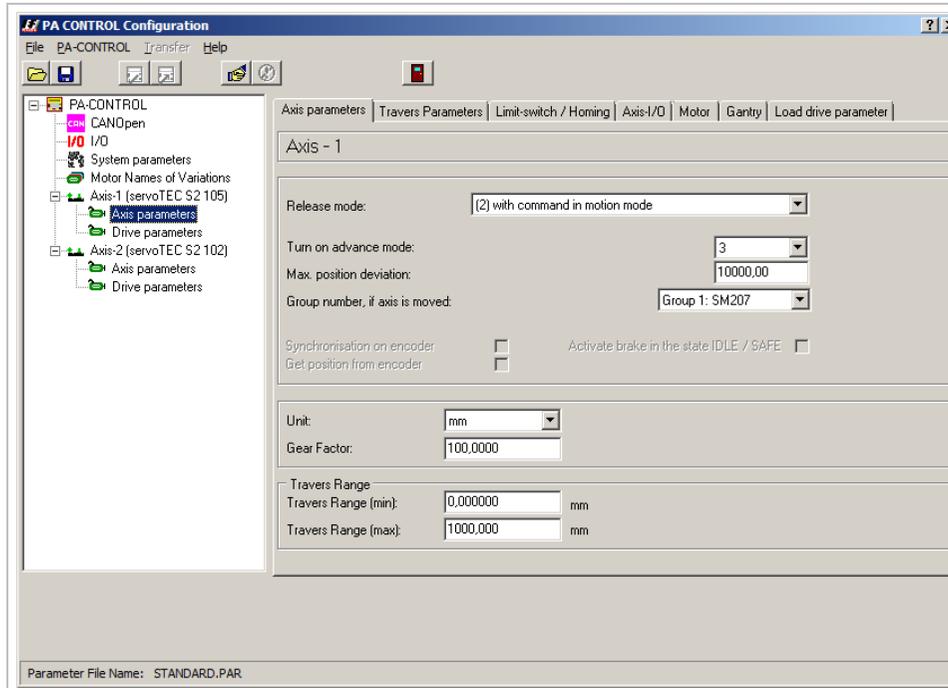
External start, input no. = 1

This setting is optional and not required for the function activate/deactivate axes.

External stop, input no. = 2

This setting is optional and not required for the function activate/deactivate axes.

4.4.2 Axis parameters



Release mode = 2

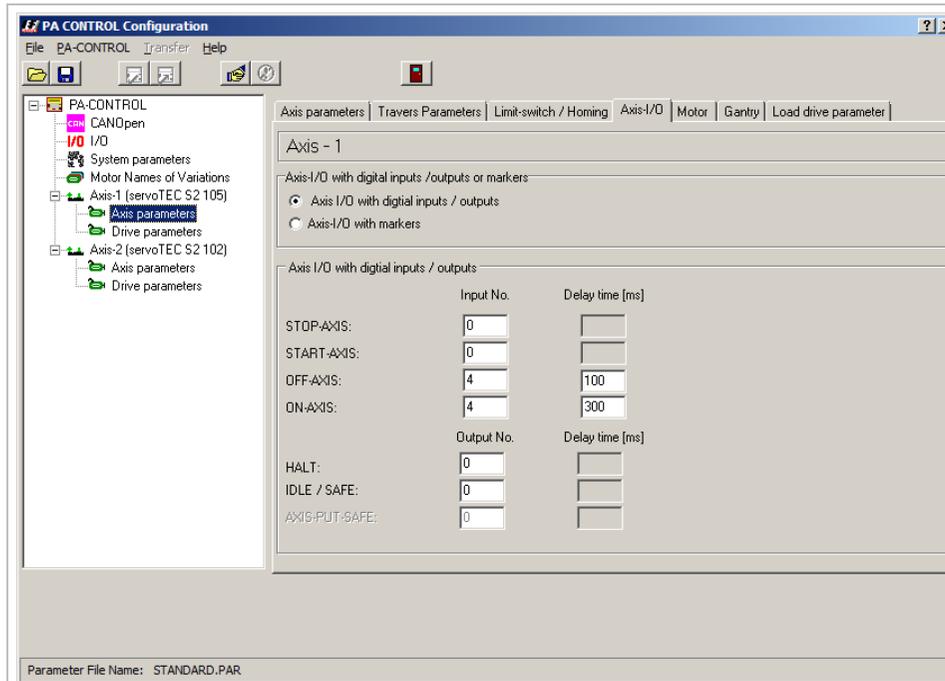
The axis is activated and deactivated in AUTOMATIC operation depending on the inputs OFF axis and ON axis (axis 1 = input I4, axis 5 = inputs I5) (OPERATIONAL/ACTIVE, IDLE/SAFE). When leaving the AUTOMATIC operation, the axis is deactivated at all times (IDLE/SAFE).

Activation mode = 3

The operating system verifies whether the axis was moved in the condition IDLE/SAFE. If the difference is larger than specified in the axis parameter "Maximum position deviation (100 mm, see below), the system error (E582) is generated.

Otherwise, the axis is moved to the position before switching to status "IDLE / SAFE" or the interrupted running operation is continued.

Maximum position deviation = 100



OFF axis input no. = 4

When the input I4 is not live, the axis is deactivated (IDLE/SAFE) in AUTOMATIC mode.

ON axis input no. = 4

When the input I4 is not live, the axis is activated (OPERATIONAL/ACTIVE) in AUTOMATIC mode.

OFF axis delay time = 100

When deactivating the axis, there will be a 100 msec waiting time before the axis is actually deactivated. This waiting time is to cause the kinetic energy of the axis to be consumed when the axis is deactivated during a run.

This delay time must be considered if the power supply is deactivated.

ON-axis delay time = 300

This delay time is inserted when activating the axis. This is to achieve the interim circuit voltage in full.

Axis PUT-SAFE = 4

In this case, the output 4 (O4) activates the option AS (personally secure restart lock) at the servoTEC-amplifier.

For axis 2, a different output, e.g. O5, must be used.

If a drive amplifier has no AS function and instead the power supply must be deactivated, the parameter **axis PUT-SAFE = 0** is set.

4.5 Notes on generation of the PA-CONTROL programmes for "Axis deactivation through an input"

The application programme does not require any programme parts to deactivate and activate the axis. The settings axis parameter "Release mode = 2", "Activation movement mode = 3", "OFF axis = 4", "ON axis = 4" and "PUT-SAFE = 4 (5)" executes all functions of the operating system.

When switching the PA-CONTROL to the operating mode "AUTOMATIC operation", the axes are not activated yet. Only when the PA-CONTROL is in the operating mode AUTOMATIC, the axis is activated according to the input I4.

In case of EMERGENCY STOP, the setting of the axis parameter "OFF axis = 4" (input I4) is deactivated and then (K2 drop-delayed) the mains supply is deactivated with a delay. This setting leads to the axis being stopped targeted in case of EMERGENCY OFF and does not run out slowly.

When the EMERGENCY STOP has been removed, the setting of the axis parameter "ON axis = 4" (input 4) can be activated again by pushing the switch Axis On.

5 Deactivation of axes through a command

See *Figure 3, page 23*.

5.1 Setup

- PA-CONTROL with 2 servoTEC-axes (axis 1 and axis 2)
- Protective enclosure of the entire plant with a protective door
- Operating elements:
 - Main switch (supply)
 - ON, OFF, EMERGENCY OFF for power supply to the drives (servoTEC)
 - PA-CONTROL "START" "STOP" via the front panel of the PA-CONTROL or (optional) via the button "external start" and "external stop".

5.2 Functions

5.2.1 Open protective door (protective door is to be opened)

Programme	Description
<pre> \$WAIT_UNTIL_ON I3.1 G21 I4.0 WAIT_UNTIL_ON ON.A1 ON.A2 ; \$WAIT_UNTIL_OFF G21 I3.0 SWITCH_OFF G21 I4.0 SWITCH_OFF JMP WAIT_UNTIL_OFF ; \$SWITCH_OFF OFF.A1 OFF.A2 JMP WAIT_UNTIL_ON </pre>	<p>In AUTOMATIC operation, a parallel programme that monitors input 3 is running. If the input is not live, the commands "OFF.A1" and "OFF.A2" switch off the axes (IDLE/SAFE). These commands lead to the current positioning being stopped first and the axes then being deactivated (IDLE).</p> <p>Use the axis parameter "PUT-SAFE" to activate the personally safe restart lock (KSI+/-) in the servoTEC-amplifier via the outputs 4 and 5. It then bridges the door switches with the contacts "KSO".</p> <p>From the point of view of the axes, the work space is safe and the door can be opened (SAFE).</p>

5.2.2 EMERGENCY OFF

In the EMERGENCY STOP case, the axes are switched off via the input I4 and the mains supply (400VAC) of the drives must be deactivated with a time delay of 0.5 seconds via K2. If the axes are to be activated again after EMERGENCY STOP, this should be done through a programme part via O1/I5.

5.3 Wiring principle of the application "Deactivation of axes by a command"

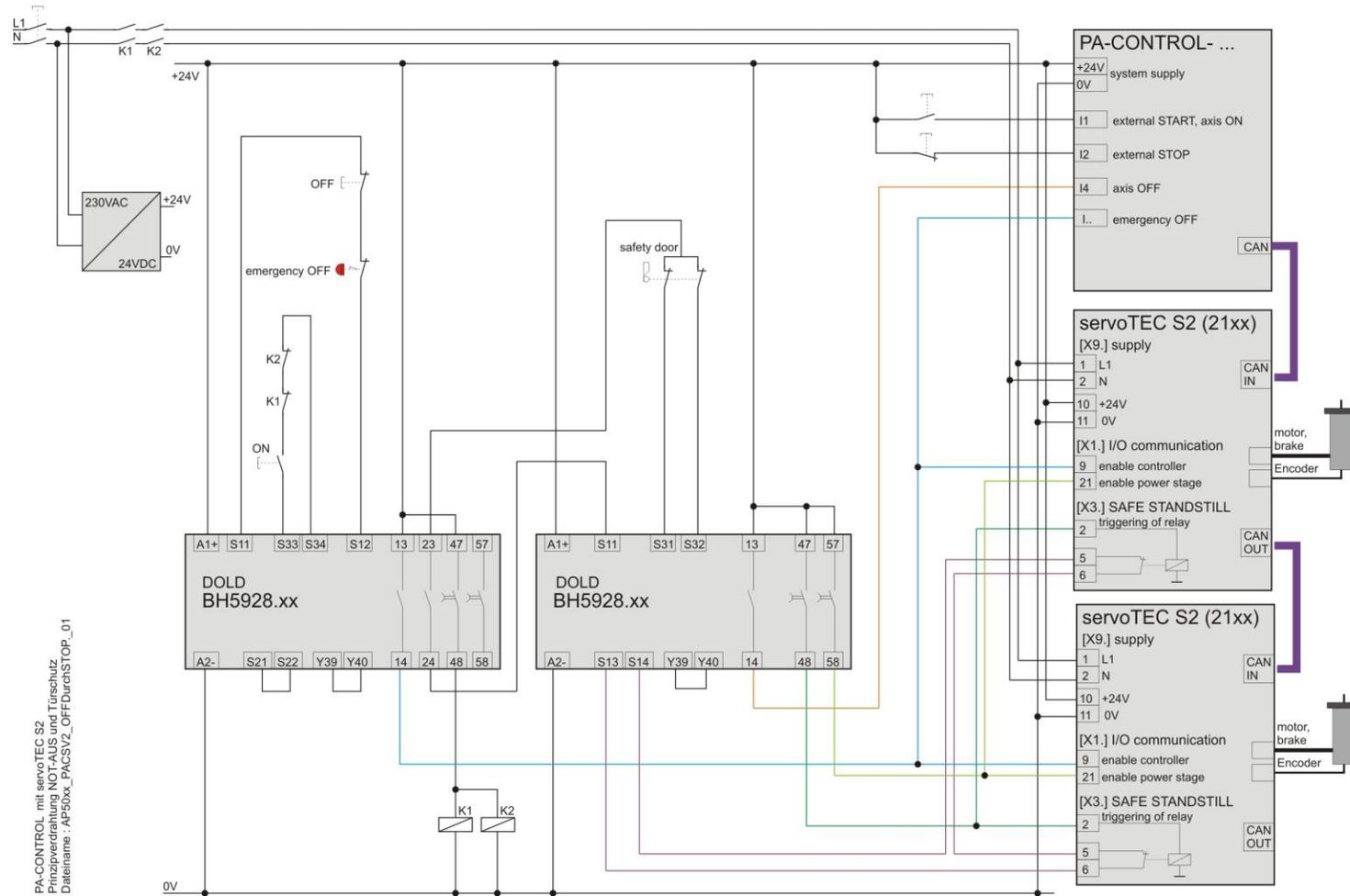
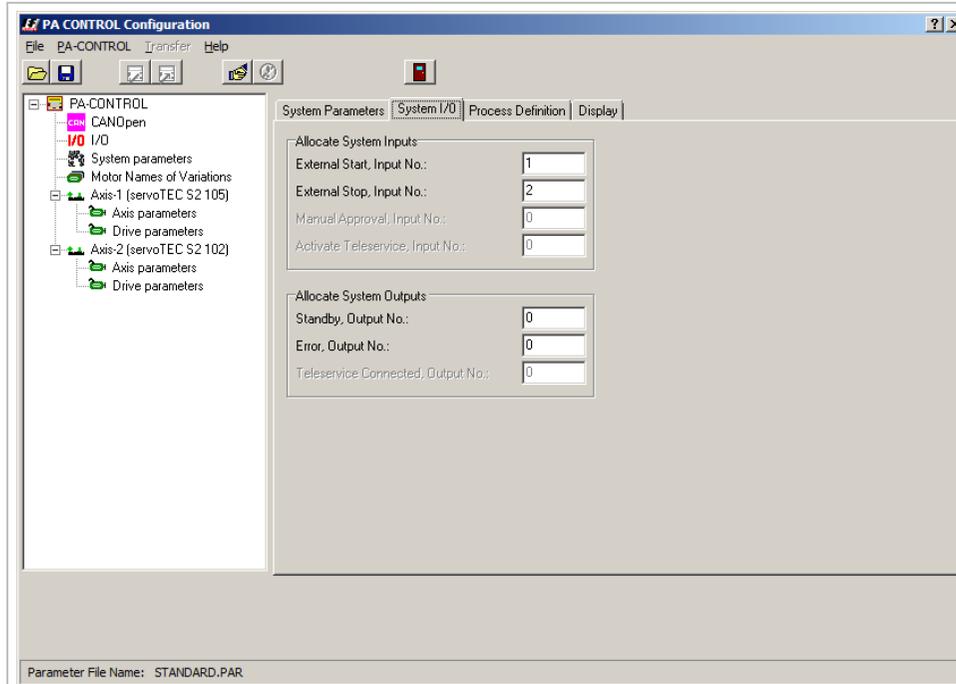


Figure 3: PA-CONTROL with 2 servoTEC-axes, setting of the parameters for "Deactivating the axes by a command"

5.4 Setting the parameters for system parameter "Deactivation of axes by a command"



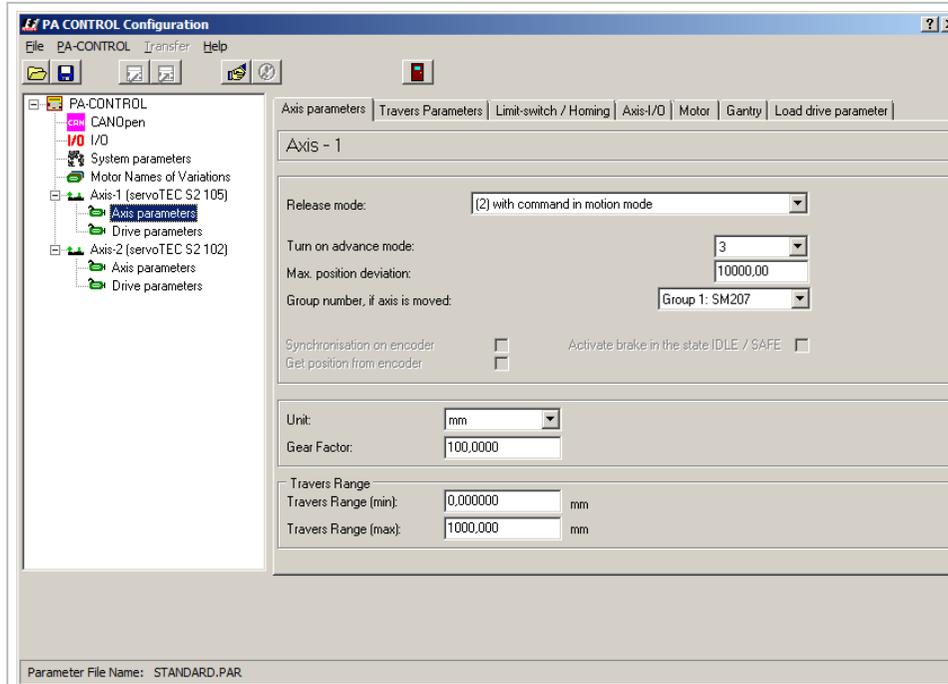
External start, input no. = 1

This setting is optional and not required for the function activate/deactivate axes.

External stop, input no. = 2

This setting is optional and not required for the function activate/deactivate axes.

5.5 Axis parameters



Release mode = 2

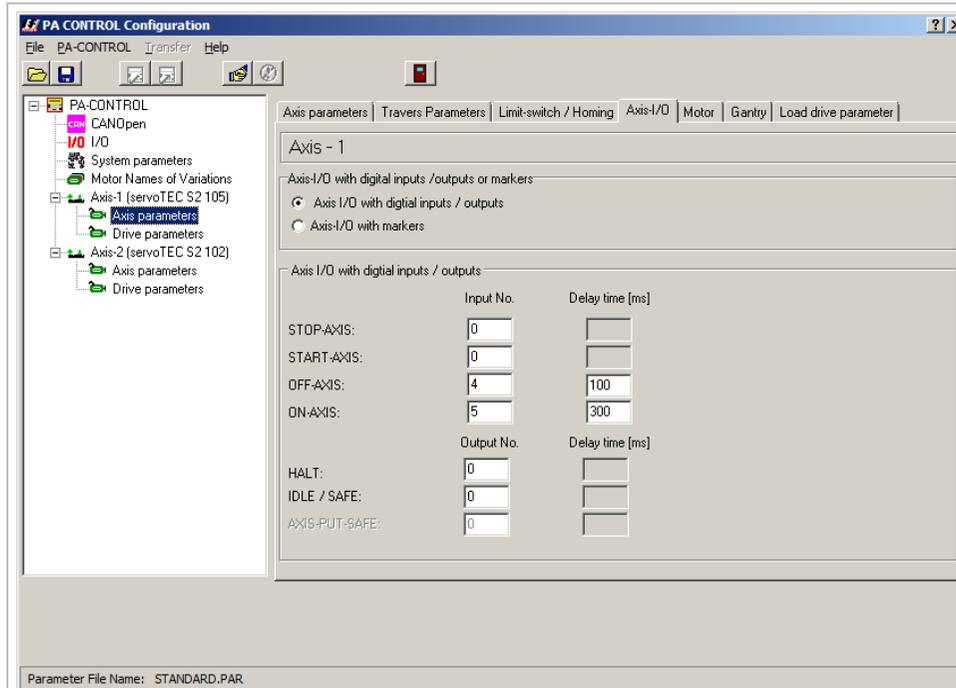
The axis is switched on and off in AUTOMATIC mode by the commands ON.A1 and OFF.A1.

The axis is always deactivated when leaving AUTOMATIC mode.

Activation mode = 3

The operating system verifies whether the axis was moved in the condition IDLE/SAFE. If the difference is larger than specified in the axis parameter "Maximum position deviation (100 mm, see below), the system error (E582) is generated. Otherwise, the axis is moved to the position before switching to status "IDLE / SAFE" or the interrupted running operation is continued.

Maximum position deviation = 100



OFF axis input no. = 4

In the "EMERGENCY STOP CASE", the input I4 switches the axis into the condition (IDLE/SAFE).

(Axis 2: OFF axis input no. = 4, same input)

ON axis input no. = 5

After EMERGENCY STOP, the axis can be switched on again (OPERATIONAL/ACTIVE) via input I5

(Axis 2: ON axis input no. = 5, same input)

OFF axis delay time = 100

When deactivating the axis, there will be a 100 msec waiting time before the axis is actually deactivated. This waiting time is to cause the kinetic energy of the axis to be consumed when the axis is deactivated during a run.

This delay time must be considered if the power supply is deactivated.

ON axis delay time = 300

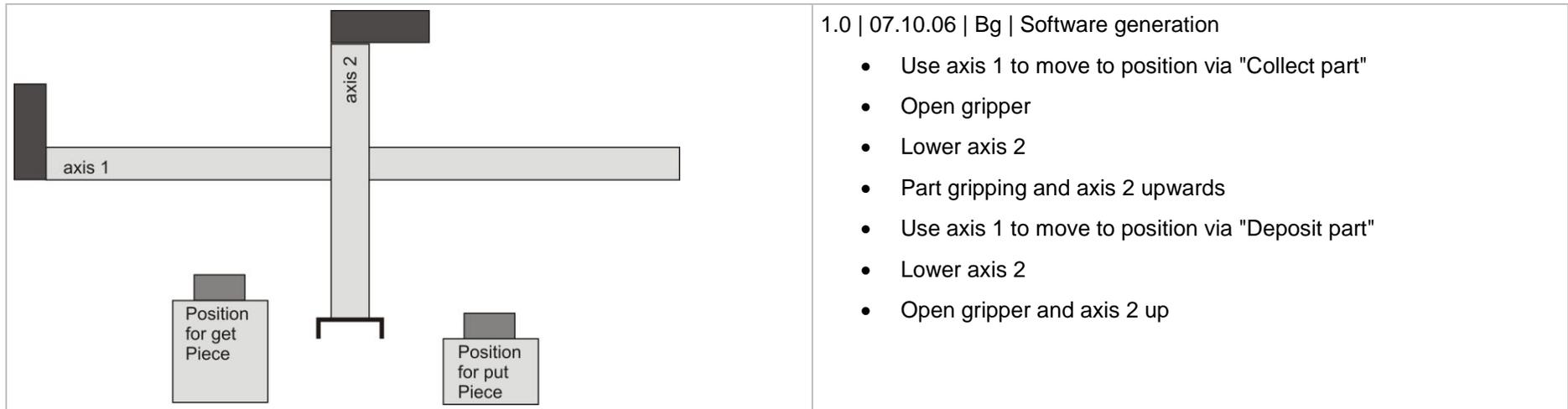
This delay time is inserted when activating the axis. This is to achieve the interim circuit voltage in full.

Axis-PUT-SAFE = 4

In this case, the output 4 (O4) is used to activate the option AS (personally safe restart lock) at the servoTEC amplifier. For axis 2, another output must be used, e.g. O5.

If a drive amplifier has no AS function and instead the power supply must be deactivated, the parameter **axis PUT-SAFE = 0** is set

6 Example 2-axis loading system (horizontal and vertical axis)



The electro-mechanical setup corresponding to the chapter 3.3 "Deactivation of axes by the operating system", page 10.

The protective door can be opened at any part of the process if the operating mode AUTOMATIC was stopped first.

If the protective door is now opened during lowering of axis 2, axis 1 is to be returned to the "old position" when the protective door is closed again. Continuation is only permitted when axis 2 is lowered.

Implementation of this requirement is explained below.

6.1 Axis parameters for "2-axis loading system (horizontal and vertical axis)"

Axis parameters	Travers Parameters	Limit-switch / Homing	Axis-I/O	Motor	Gantry	Load dr
Axis - 1						
Release mode:	<input type="text" value="(4) with change to a motion mode and start-stop"/>					
Turn on advance mode:	<input type="text" value="4"/>					
Max. position deviation:	<input type="text" value="0,500000"/>					
Group number, if axis is moved:	<input type="text" value="Group 1: SM207"/>					
Synchronisation on encoder	<input type="checkbox"/>					Activate brake in the state IDLE / SAFE
Get position from encoder	<input type="checkbox"/>					
Unit:	<input type="text" value="mm"/>					
Gear Factor:	<input type="text" value="100,0000"/>					
Travers Range						
Travers Range (min):	<input type="text" value="0,000000"/>					mm
Travers Range (max):	<input type="text" value="1000,000"/>					mm

Release mode = (4) When changing to a movement mode and start/stop
 Activation mode = 4
 Maximum position deviation= 0,5
 Group assignment when the axis is moved = group 1 SM207

Axis parameters	Travers Parameters	Limit-switch / Homing	Axis-I/O	Motor	Gantry	Load dr
Axis - 2						
Release mode:	<input type="text" value="(4) with change to a motion mode and start-stop"/>					
Turn on advance mode:	<input type="text" value="4"/>					
Max. position deviation:	<input type="text" value="100,0000"/>					
Group number, if axis is moved:	<input type="text" value="Group 1: SM207"/>					
Synchronisation on encoder	<input type="checkbox"/>					Activate brake in the state IDLE / SAFE
Get position from encoder	<input type="checkbox"/>					
Unit:	<input type="text" value="mm"/>					
Gear Factor:	<input type="text" value="100,0000"/>					
Travers Range						
Travers Range (min):	<input type="text" value="0,000000"/>					mm
Travers Range (max):	<input type="text" value="1000,000"/>					mm

Release mode = (4) When changing to a movement mode and start/stop
 Activation mode = 4
 Maximum position deviation = 100
 Group assignment when the axis is moved = group 1 SM207

Axis parameters | Travers Parameters | Limit-switch / Homing | **Axis-I/O** | Motor

Axis - 1

Axis-I/O with digital inputs /outputs or markers

Axis I/O with digital inputs / outputs
 Axis-I/O with markers

Axis I/O with digital inputs / outputs

	Input No.	Delay time [ms]
STOP-AXIS:	<input type="text" value="0"/>	<input type="text"/>
START-AXIS:	<input type="text" value="0"/>	<input type="text"/>
OFF-AXIS:	<input type="text" value="4"/>	<input type="text" value="100"/>
ON-AXIS:	<input type="text" value="1"/>	<input type="text" value="300"/>

	Output No.	Delay time [ms]
HALT:	<input type="text" value="0"/>	<input type="text"/>
IDLE / SAFE:	<input type="text" value="0"/>	<input type="text"/>
AXIS-PUT-SAFE:	<input type="text" value="0"/>	<input type="text"/>

Axis parameters | Travers Parameters | Limit-switch / Homing | **Axis-I/O** | Motor

Axis - 2

Axis-I/O with digital inputs /outputs or markers

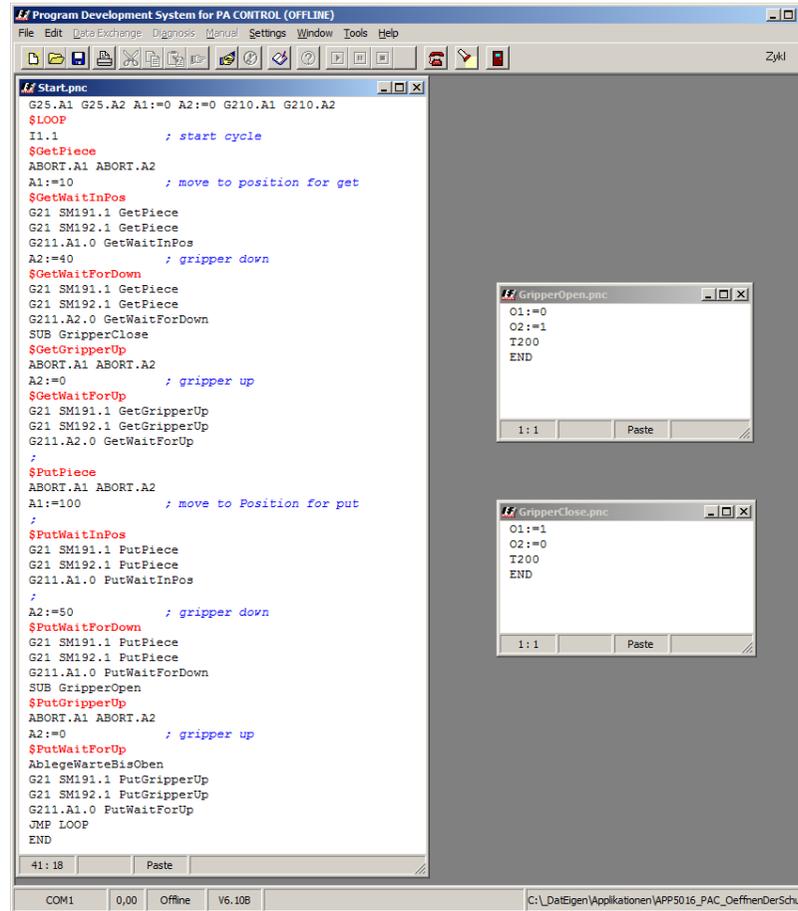
Axis I/O with digital inputs / outputs
 Axis-I/O with markers

Axis I/O with digital inputs / outputs

	Input No.	Delay time [ms]
STOP-AXIS:	<input type="text" value="0"/>	<input type="text"/>
START-AXIS:	<input type="text" value="0"/>	<input type="text"/>
OFF-AXIS:	<input type="text" value="4"/>	<input type="text" value="100"/>
ON-AXIS:	<input type="text" value="1"/>	<input type="text" value="300"/>

	Output No.	Delay time [ms]
HALT:	<input type="text" value="0"/>	<input type="text"/>
IDLE / SAFE:	<input type="text" value="0"/>	<input type="text"/>
AXIS-PUT-SAFE:	<input type="text" value="0"/>	<input type="text"/>

6.2 Programme for "2-axis loading system (horizontal and vertical axis)"



```

// Start.pnc
G25.A1 G25.A2 A1:=0 A2:=0 G210.A1 G210.A2
$LOOP
I1.1          ; start cycle
$GetPiece
ABORT.A1 ABORT.A2
A1:=10       ; move to position for get
$GetWaitInPos
G21 SM191.1 GetPiece
G21 SM192.1 GetPiece
G211.A1.0 GetWaitInPos
A2:=40       ; gripper down
$GetWaitForDown
G21 SM191.1 GetPiece
G21 SM192.1 GetPiece
G211.A2.0 GetWaitForDown
SUB GripperClose
$GetGripperUp
ABORT.A1 ABORT.A2
A2:=0       ; gripper up
$GetWaitForUp
G21 SM191.1 GetGripperUp
G21 SM192.1 GetGripperUp
G211.A2.0 GetWaitForUp
;
$PutPiece
ABORT.A1 ABORT.A2
A1:=100     ; move to Position for put
;
$PutWaitInPos
G21 SM191.1 PutPiece
G21 SM192.1 PutPiece
G211.A1.0 PutWaitInPos
;
A2:=50       ; gripper down
$PutWaitForDown
G21 SM191.1 PutPiece
G21 SM192.1 PutPiece
G211.A1.0 PutWaitForDown
SUB GripperOpen
$PutGripperUp
ABORT.A1 ABORT.A2
A2:=0       ; gripper up
$PutWaitForUp
AblegeWarteBisOben
G21 SM191.1 PutGripperUp
G21 SM192.1 PutGripperUp
G211.A1.0 PutWaitForUp
JMP LOOP
END

```

```

// GripperOpen.pnc
O1:=0
O2:=1
T200
END

```

```

// GripperClose.pnc
O1:=1
O2:=0
T200
END

```

Figure 4: Programme for "2-axis loading system (horizontal and vertical axis)"

6.2.1 Explanation of the programme

Program	Description
<pre> ... \$GetPiece ABORT.A1 ABORT.A2 A1:=10 ; move to position for get \$GetWaitInPos G21 SM191.1 GetPiece G21 SM192.1 GetPiece G211.A1.0 GetWaitInPos A2:=40 ; gripper down \$GetWaitForDown G21 SM191.1 GetPiece G21 SM192.1 GetPiece G211.A2.0 GetWaitForDown SUB GripperClose \$GetGripperUp END </pre>	<p>Axis 1 moves to the position for collection of the part with the command “A1:=10”. Afterwards the gripper will be lowered with the command “A2:=40”.</p> <p>If the protective door will be opened during the gripper is lowering and if the axis 1 was displaced/moved more than the “maximum position deviation” allows, the SM191 and the associated group marker 1 SM207 are set when activating the axis (see axis parameters 1 and 2, group assignment when axis is moved = group 1 SM207).</p> <p>Because the marker “axis was moved” is set and the “activation movement mode (release mode) = 4”, both axes are not corrected by the operating system and will be moved on after activation. The both axes are locked for further operating commands.</p> <p>Because of the query “G21 SM191.1 GetPiece“ in the loop, the program recognizes this condition and jumps to marker “\$GetPiece”.</p> <p>Because of the command “ABORT.A1“ the current position will be taken as actual position and the axis 1 switches to the condition “OPERATIONAL”.</p> <p>Because of the command “ABORT.A2“ the stopped operating command “A2:=40” will be aborted, the current position will be assumed as actual position and the axis 2 switches to the condition “OPERATIONAL”.</p> <p>Afterwards the position for collecting the piece will be driven to with the command “A1:=10” first.</p>