Application "servoTEC S2 - Drive via digital inputs and outputs"

Brief Description	Description and information on: ■ Setting of the parameters for the digital inputs and outputs ■ Positioning, Jogging mode, referencing mode ■ Settings in the error management ■ Functional example with up to four destination positions ■ Functional example with up to 16 destination positions

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1 Changes

Change history

Document Code	Date	Modifications
APP5021_EN_1117817_servoTEC_S2_ Drive_via_digital_inputs_and_outpus_R1a.doc	November 2014	Release of this English application: Reference: German document ("APP5021_DE_1086624_servoTEC_S2_FahrenUeberDigitaleIOs_R1c.doc").

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2 Foreword

The servo positioning controller LV-servoTEC S2 normally comes with ten digital inputs (DIN 0 to DIN 9). Additional inputs can be switched by using the analog inputs DIN AN 1 and DIN AN 2 as digital inputs.

The inputs DIN 4 to DIN 7 are assigned to fix functions:

- DIN 4: power stage enabling
- DIN 5: controller enabling
- DIN 6: standard setting: limit switch E0, left (negative)
- DIN 7: standard setting: limit switch E1, right (positive)

The inputs DIN 8 to DIN 9 are reserved for:

- DIN 8 for start function and sample function, referencing
- DIN 8 for start function and sample function, referencing

These freely available digital inputs (DIN0 ... DIN3, DIN8, DIN9, DIN AN 1, DIN AN 2) can be assigned with functions. With the help of this functions the drive can be controlled and different positions, that are stored in positioning sets, can be approached to.

Function examples:

■ Referencing ■ Jogging mode left / right ■ Setup speed ■ Four destination positions with option "HALT"	■ Referencing ■ Setup speed ■ 16 destination positions with option "HALT"

The therefore necessary configuration is described in the following chapters.

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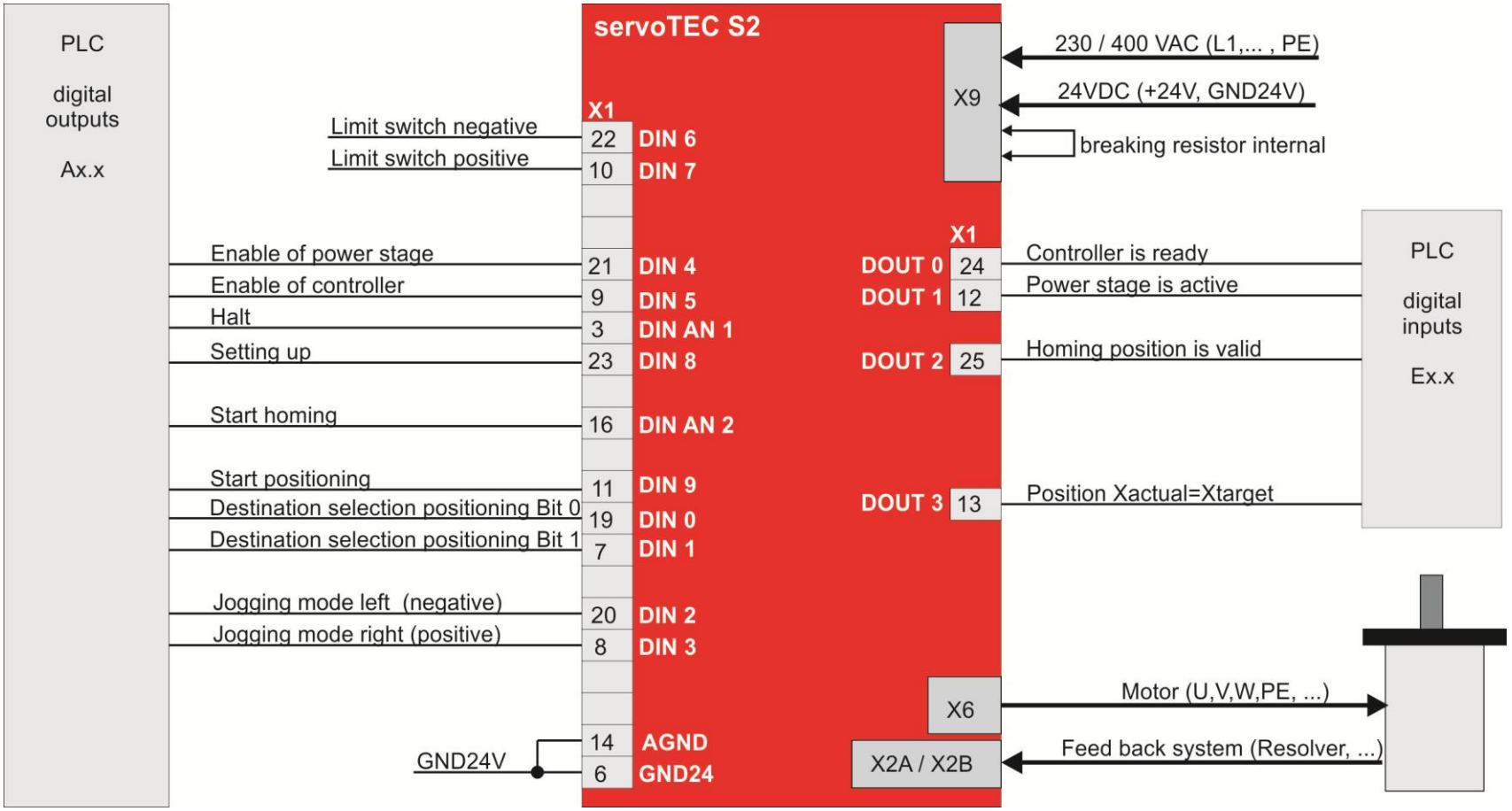
3 Connection diagram

3.1 Functional example with four destination positions and jogging mode



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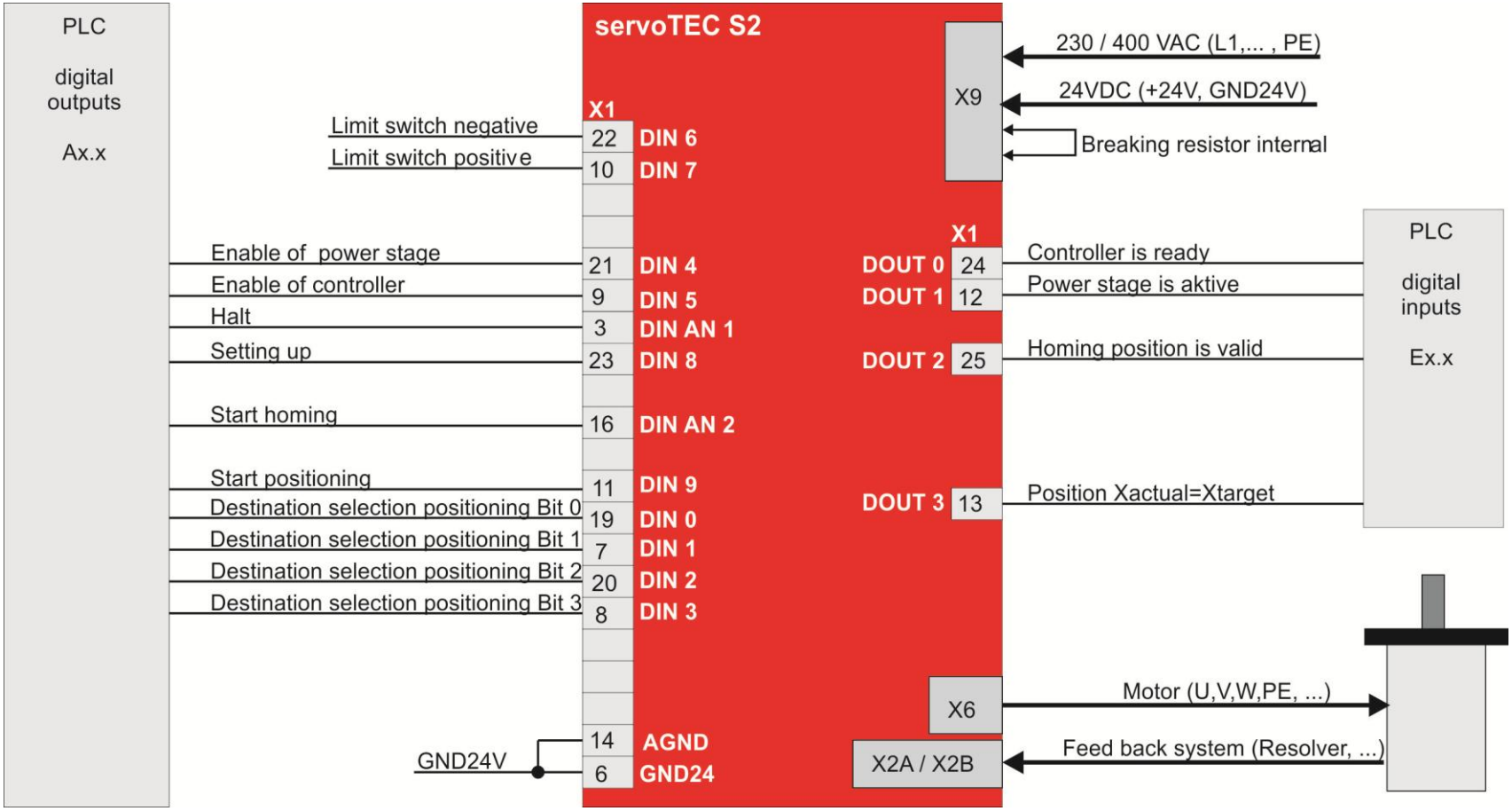
3.2 Functional example with 16 destination positions



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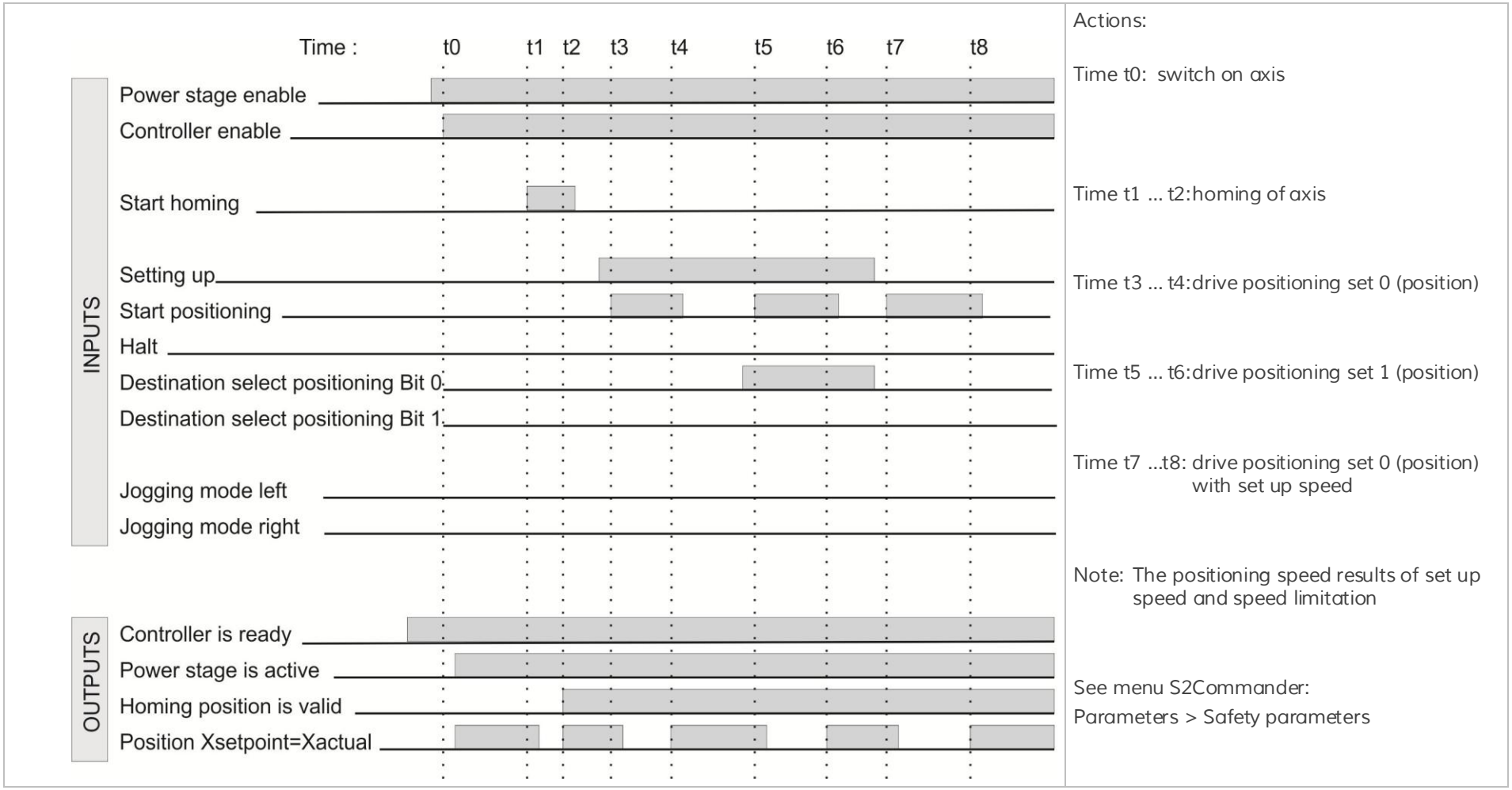
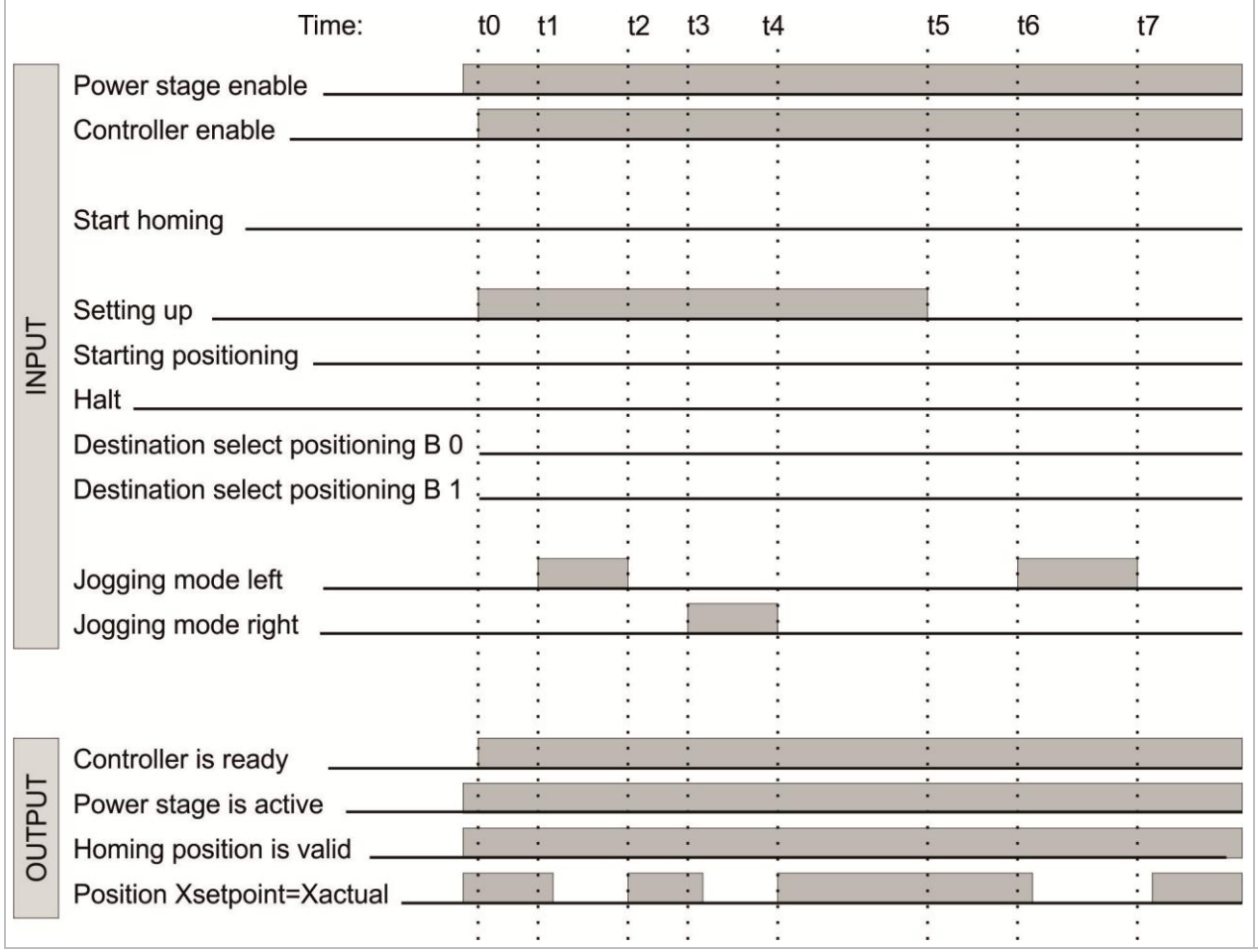
4 Operation for functional example ‘four destination positions with jogging mode’

4.1 Homing axis and move to position



4.2 Jogging mode of axis



Actions:

Time t0: switch on axis

Time t1 ... t2: Jogging mode left axis with adjusted speed

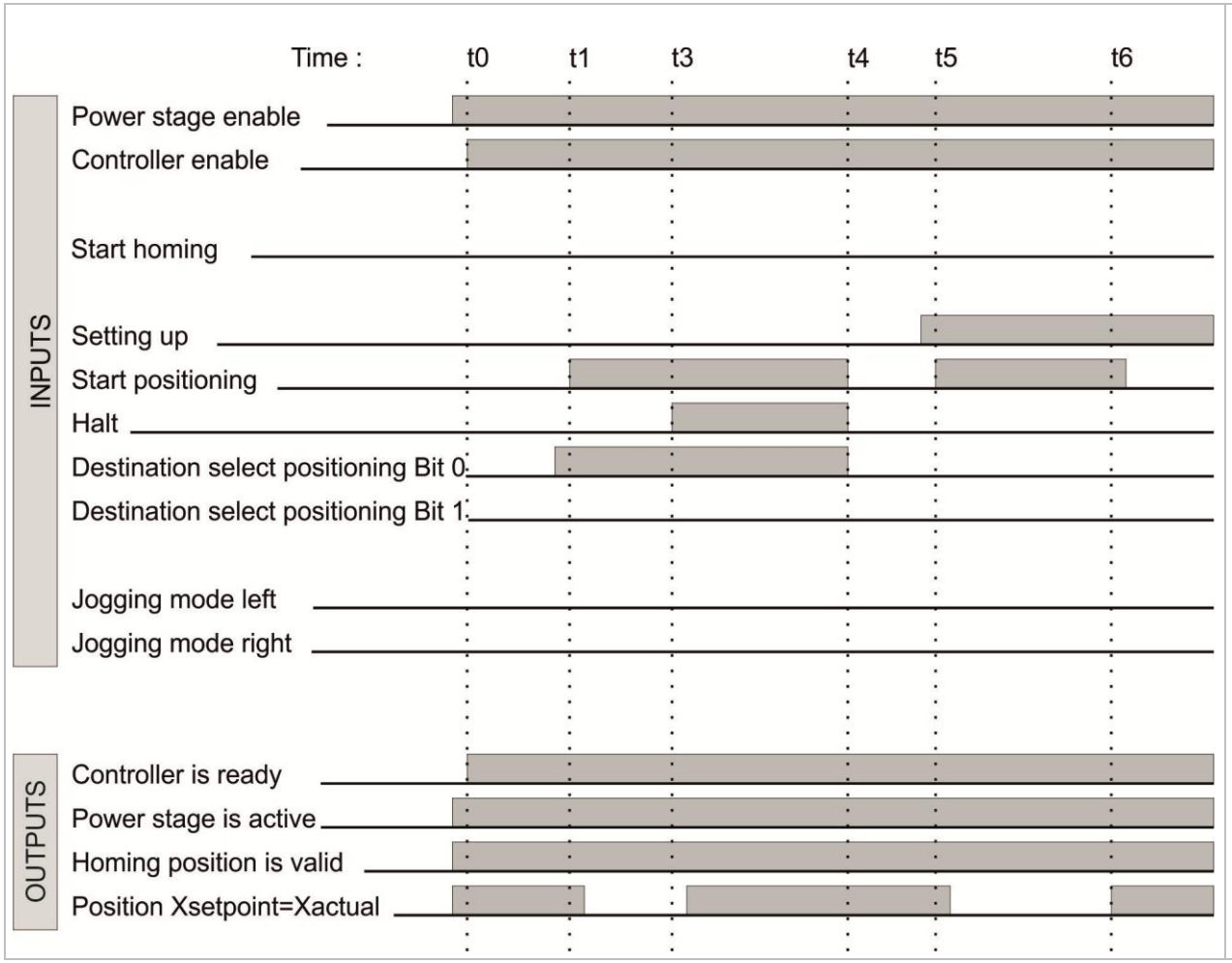
Time t3 ... t4: Jogging mode right axis with adjusted speed

Time t5: switch over setup speed

Time t6 ... t7: Jogging mode left axis with setup-speed

Note:
in the S2Commander menu "Parameters > Positioning > Destination parameters", the setup-speeds can be parameterized and set in jogging mode TIPP0 (pos) and TIPP1 (neg).

4.3 Drive axis and then stop and discontinue the motion task



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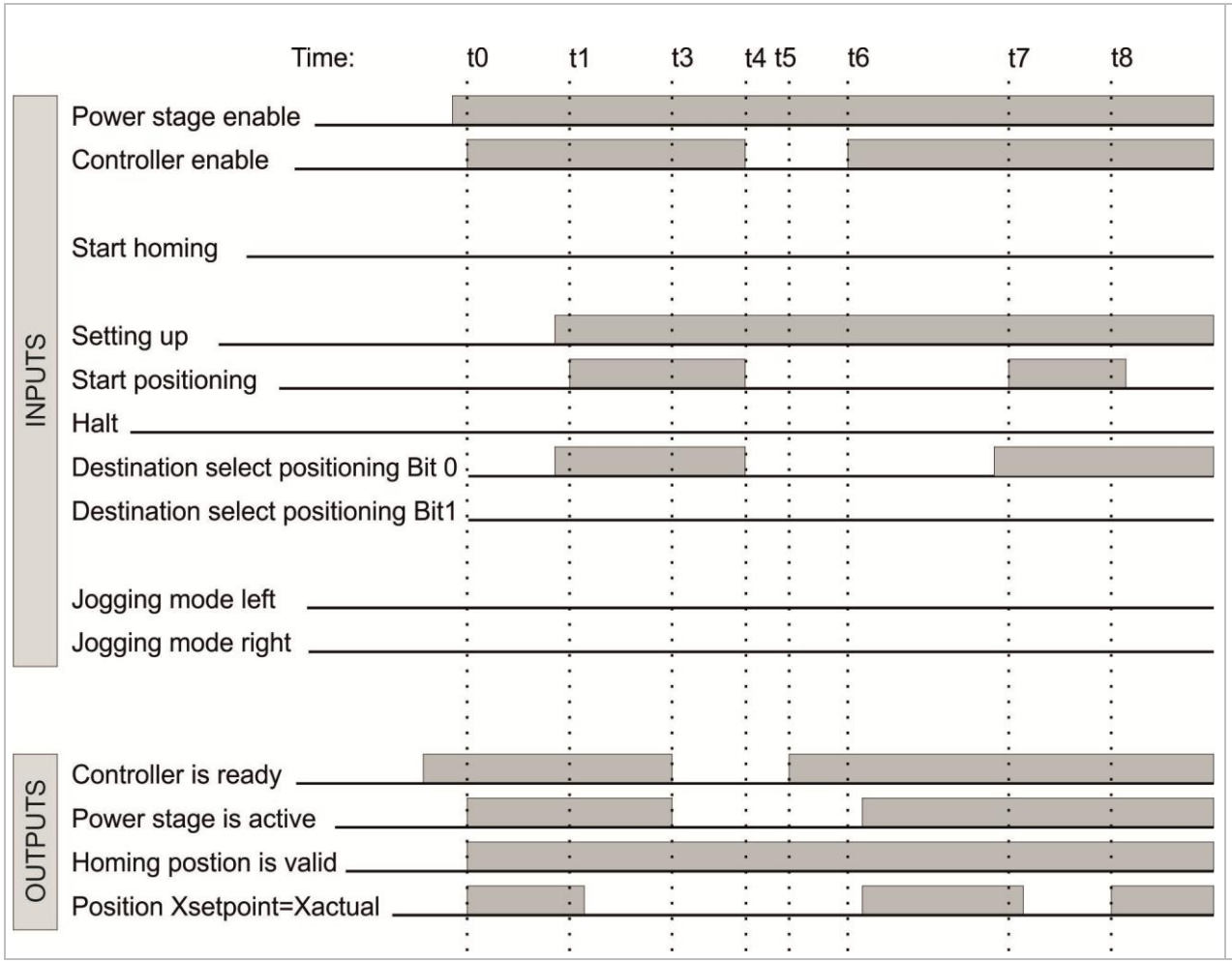
4.4 Drive axis and then stop and interrupt motion task



Actions:

Time t0: switch on axis

Time t1: starting positioning set 0

Time t3: failure positioning error, power stage is switched off, "readiness controller" will be omitted.

Time t4: PLC removes "controller enable" and "readiness controller" (t5) is prepared again.

Time t6: PLC sets "controller enable" and power stage is active again.

The signal of the controller is position Xsetpoint=Xactual, but it's impossible because of the failure message.

Drive to the same or another position or remedy the error causes and restart the machine.

Time t7 ...t8: starting/reaching positioning error 0

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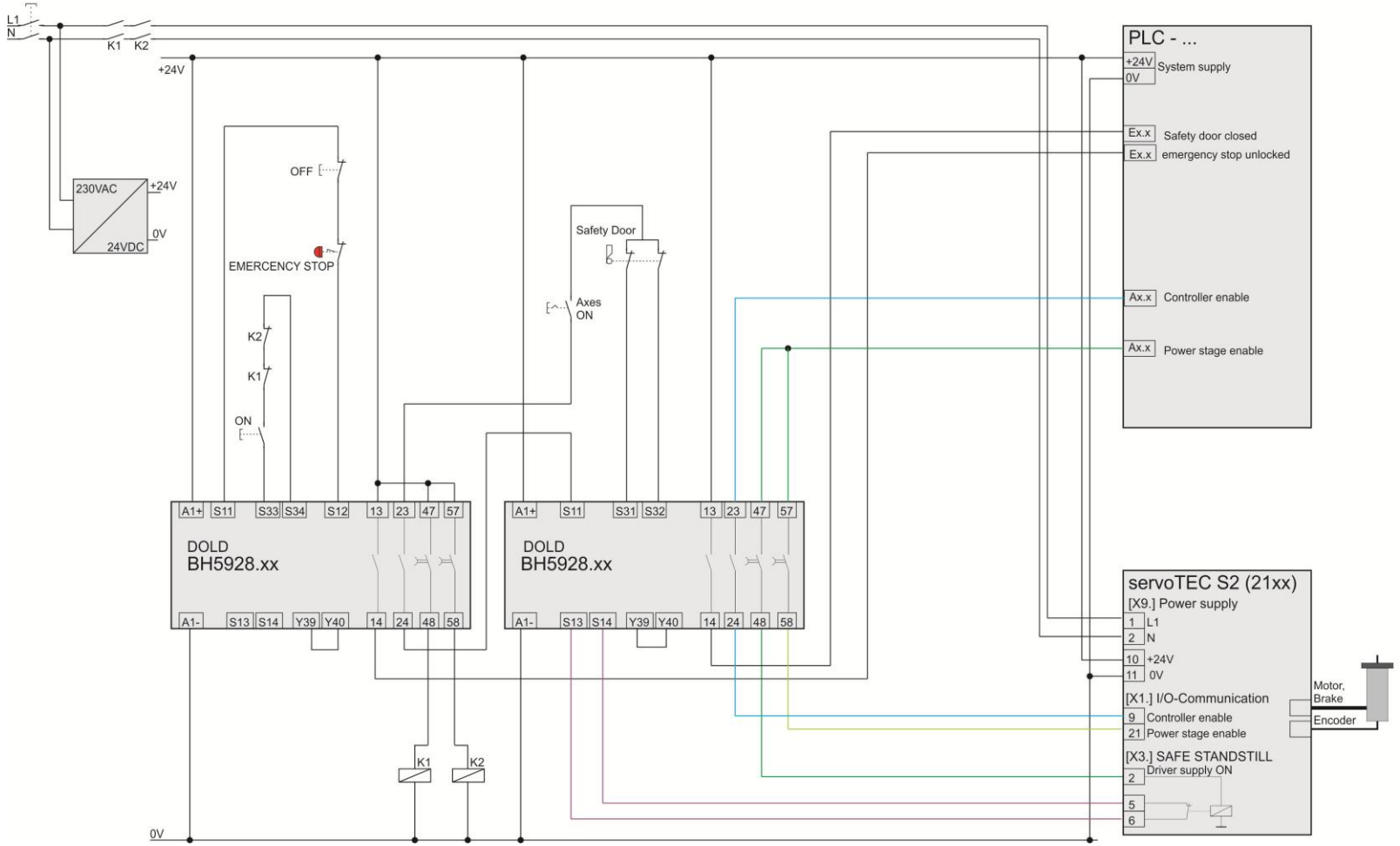
5 Principle wiring

5.1 Principle wiring with emergency stop and safety door



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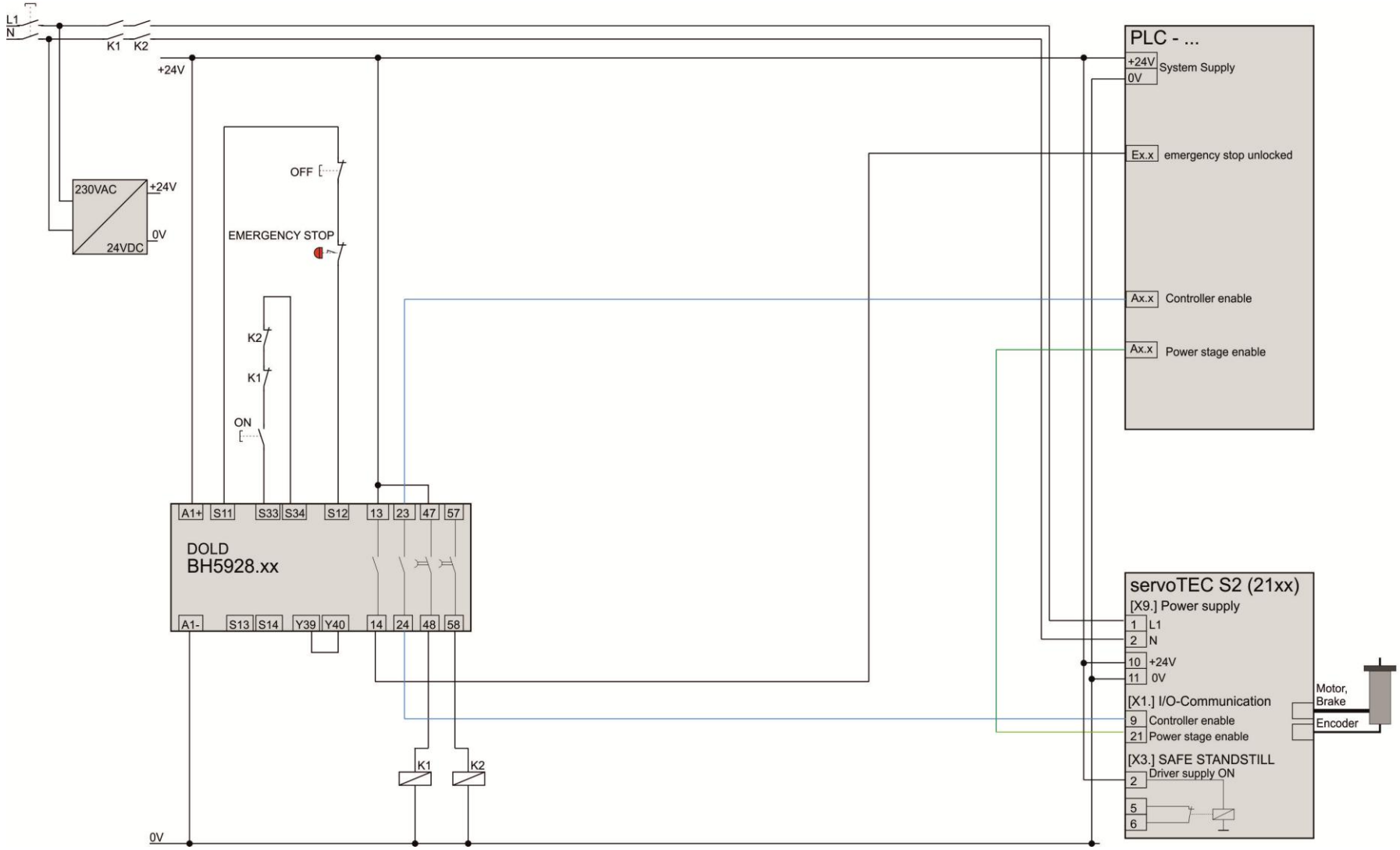
5.2 Principle wiring with emergency stop



6 Configuring the digital interface

6.1 Function example with four destination positions and jogging mode

6.1.1 Setup configuration for digital inputs

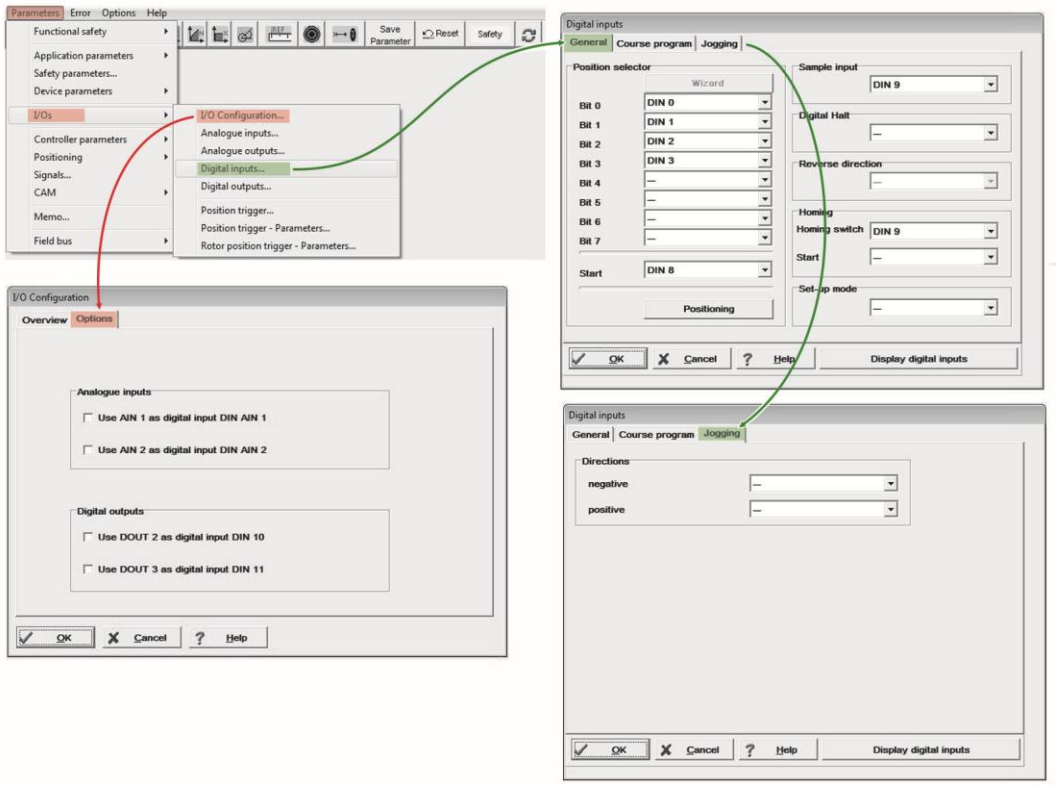
The analog inputs AIN1 and AIN2 will be set as digital input.

Functions of the inputs are:

- Position selection Bit 0: DIN 0
- Position selection Bit 1: DIN 1
- Start positioning: DIN 9
- Digital "halt" : DIN AIN 1
- Start homing: DIN AIN 2
- Setup mode: DIN 8

Jogging mode:

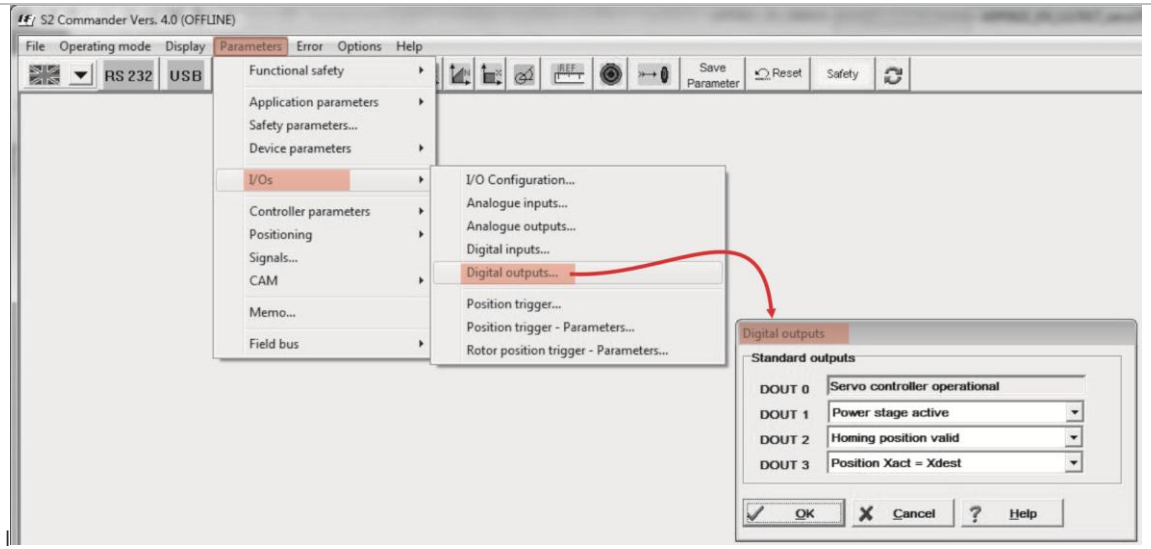
- negative direction of motion left: DIN 2
- positive direction of motion right: DIN 3



6.1.2 Setup configuration of digital outputs

Function of the output:

- controller operational: DOUT 0
- Power stage active: DOUT 1
- Homing position valid: DOUT 2
- Position Xactual = Xtarget (positioning set has driven ready) DOUT 3

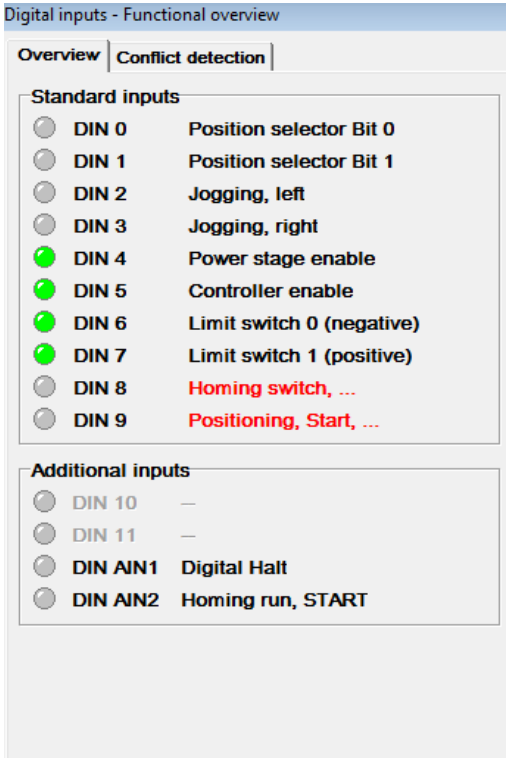


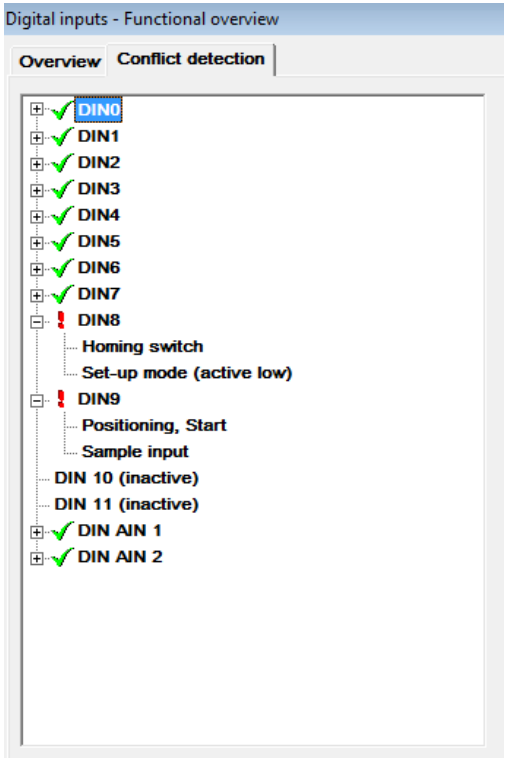
6.1.3 Functional overview of digital inputs and conflict recognition

The input DIN 8 is reference switch and set-up mode at the same time. As long as the reference switch is not used for homing of the axis, it is possible and acceptable.

The input DIN 9 is start switch and sample input at the same time. This double assignment is possible and acceptable, as long as the sample function is not used.

This double assignment is avoidable by not using these functions and expanding the number of inputs and outputs with EA88 interface.





6.2 Function example with 16 destination positions

6.2.1 Setup configuration of digital inputs

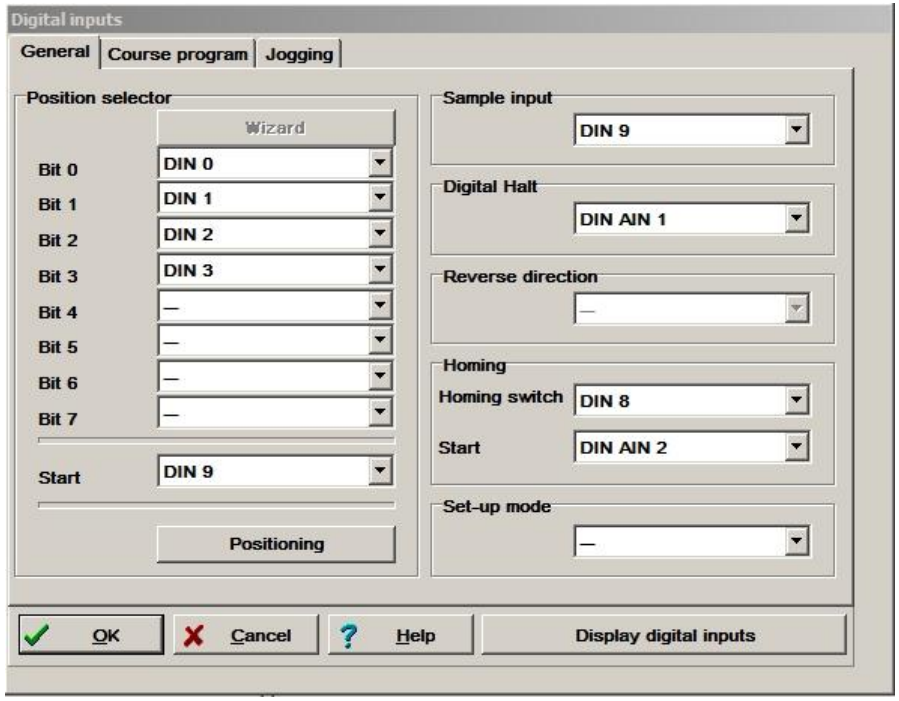
The analog inputs AIN1 and AIN2 will be set as digital input.

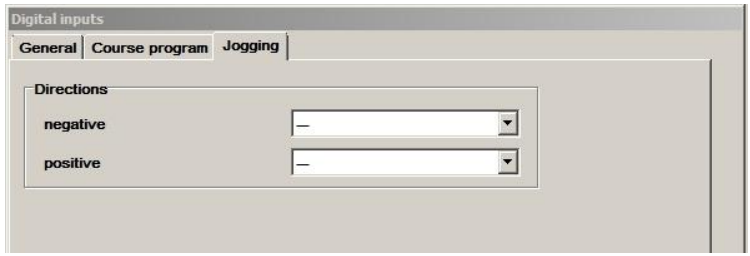
Functions of the inputs are:

- Position selection Bit 0: DIN 0
- Position selection Bit 1: DIN 1
- Position selection Bit 2: DIN 2
- Position selection Bit 3: DIN 3

- Start positioning: DIN 9
- Digital "halt" : DIN AIN 1
- Start homing: DIN AIN 2
- Set-up mode: DIN 8

Jogging mode: none





6.2.2 Functional overview of digital inputs and conflict recognition

The input DIN 8 is reference switch and set-up mode at the same time. As long as the reference switch is not used for homing of the axis, it is possible and acceptable.

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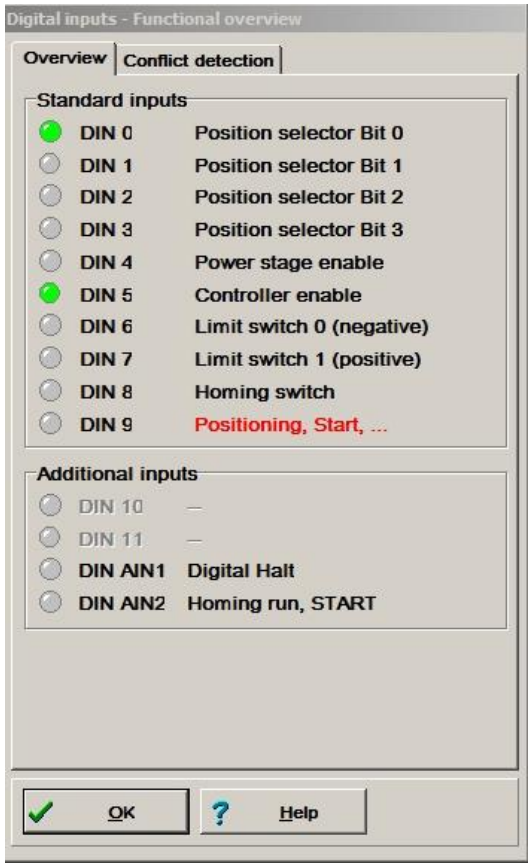
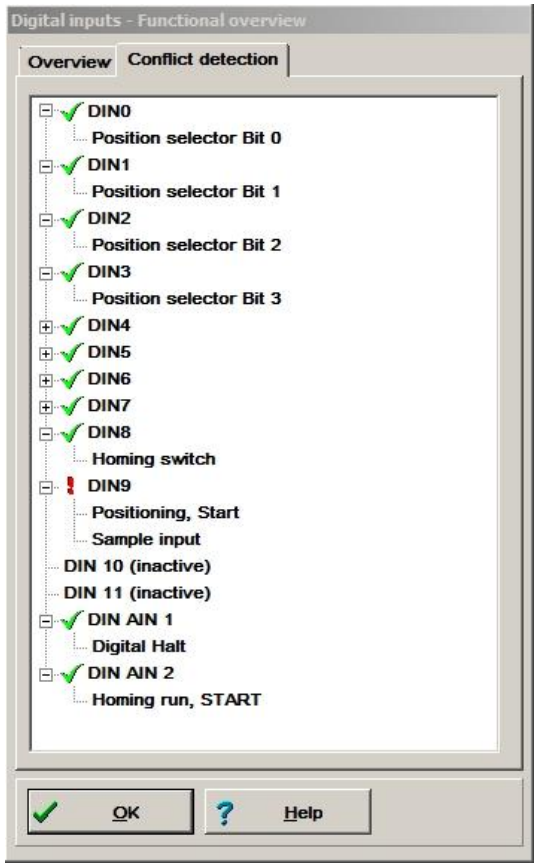




7 Error management

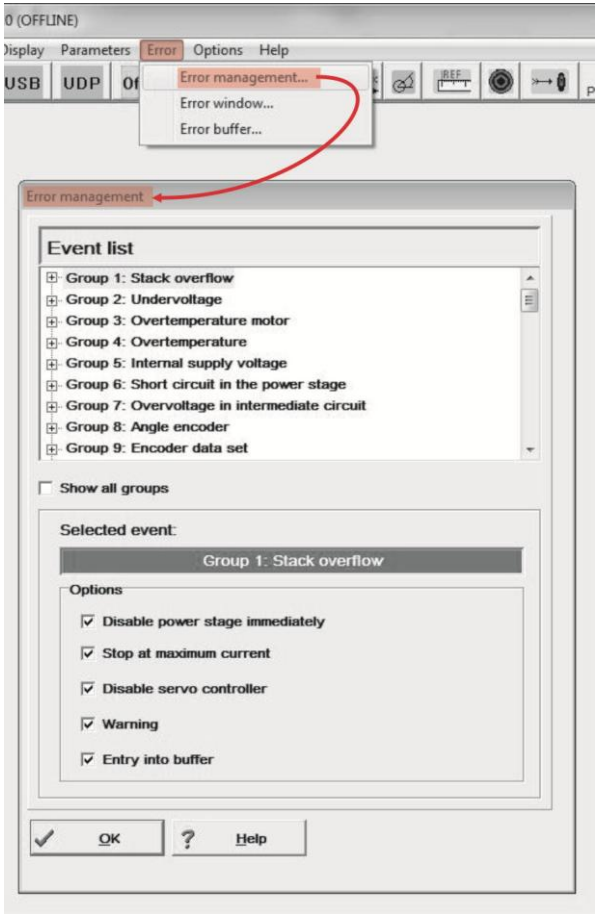
The communication between controller (PLC) and servoTEC S2 takes place only via digital inputs and outputs only. Therefore the settings in the error management have to be set in a way that in a case of failure the output "controller is ready" has to be reset.

For each error which can be found have to be distinguished the following actions:

- controller enable deactivate
- warning
- entry into buffer

The following error list helps to define your actions:

- undervoltage DC-link
- encoder data set
- rotation speed protection
- limit value exceeded of position error
- position error monitoring
- I^2T
- PFC
- parameters
- Software limit switch
- course program
- positioning
- Hardware limit switch
- IGBT driver supply
- setup mode
- technology modules



8 General configuration and parameters

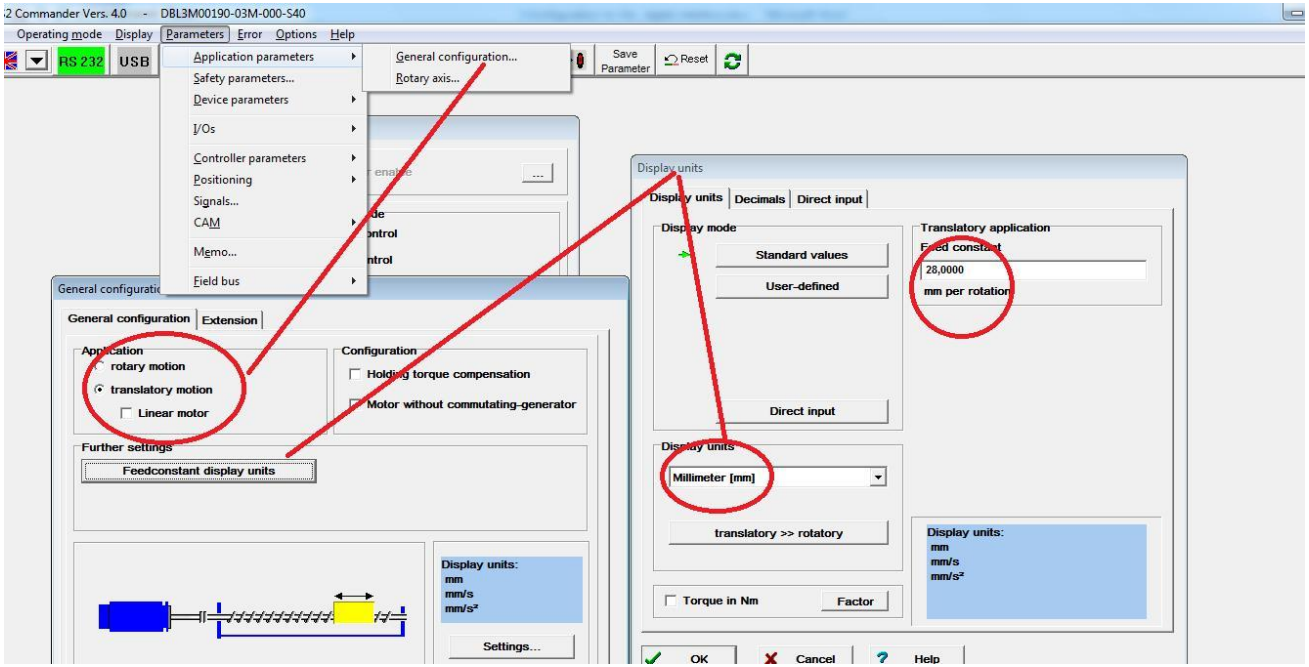
8.1 General configuration rotary motion / translational motion

In the general configuration first the rotary motion or the translatoty motion has to be set.

The feed constant display unit and the display device have to be setup.

Example: "Linear axis"

Application:	translational
Display device:	mm
Feed constant:	10 mm



8.2 Safety parameters and maximum traverse range

The safety parameters are displayed in the window for setting up:

Setup speed:

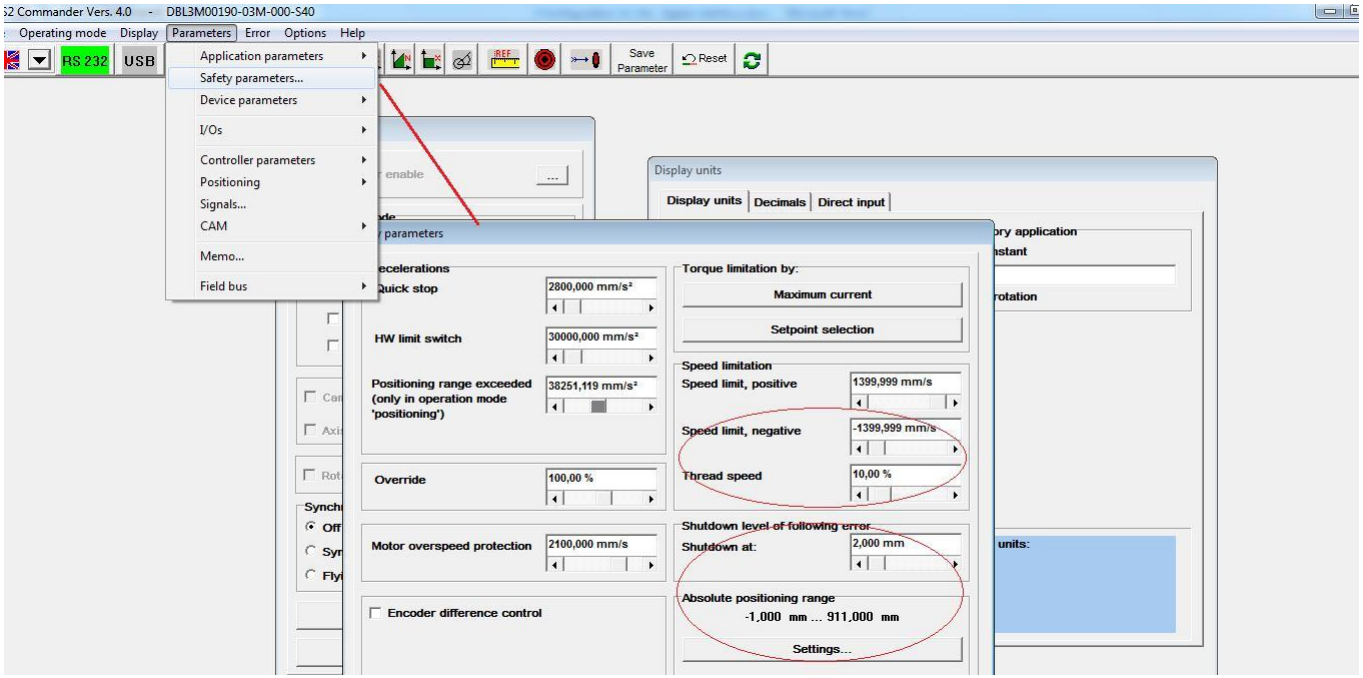
The setup speed is set in percent to the speed limit. If the input "set-up" will be energized, the speed of the active function will be limited of this speed (referencing, Jogging mode, positioning).

Shut off limit of position error:

The error is caused by limited position error.

Absolute positioning range:

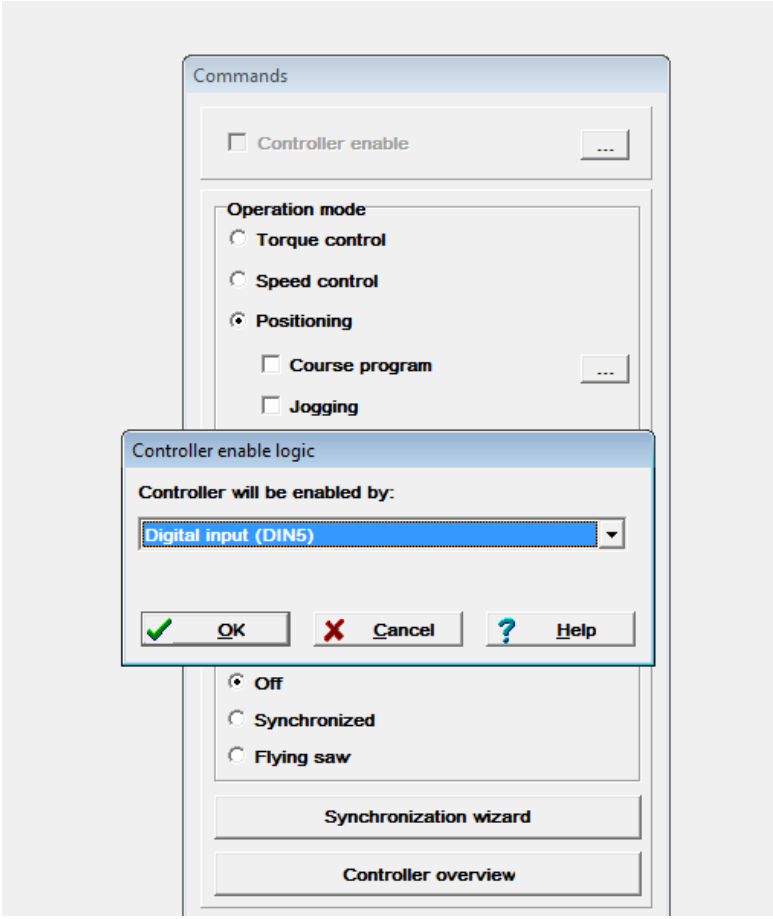
The absolute positioning range can be used as software limit switch within the Jogging mode and positioning.



8.3 Controller enable

The enabling of the controller must be set accordingly because the drive is controlled via digital inputs.

Only via digital inputs (DIN5) the controller can be enabled.

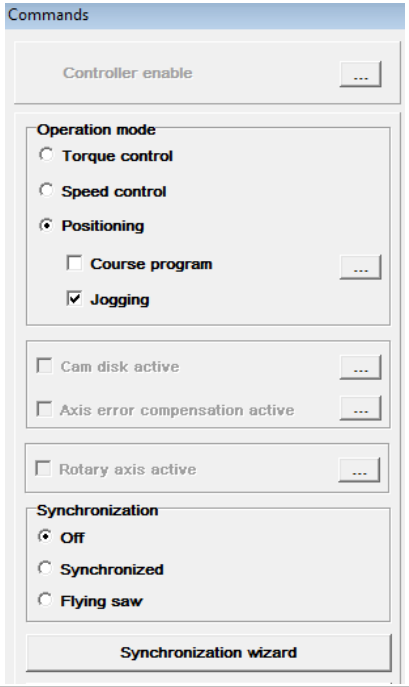


8.4 Operation mode

For positioning via digital inputs the operation mode is to set within the window "commands"

Operation mode:
- positioning
- course program
- Jogging mode

.

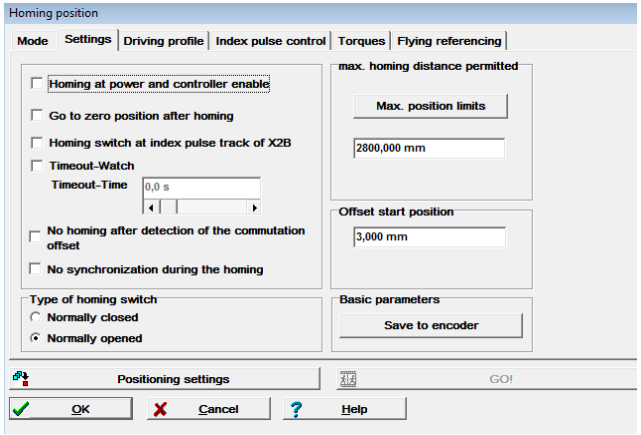


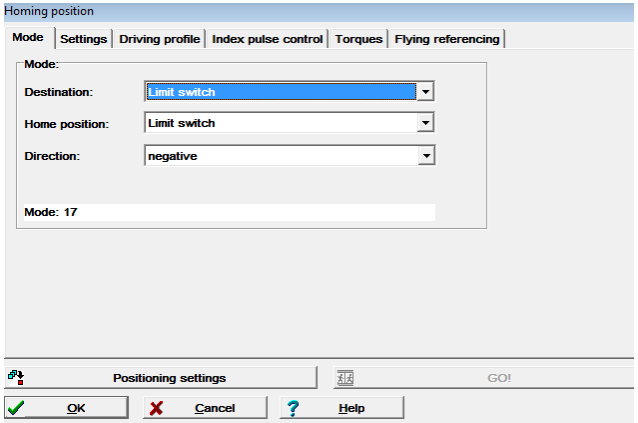
Note: To enable the function "Follow-on position" via tab "travel program" the "Positioning - travel program" should be active.

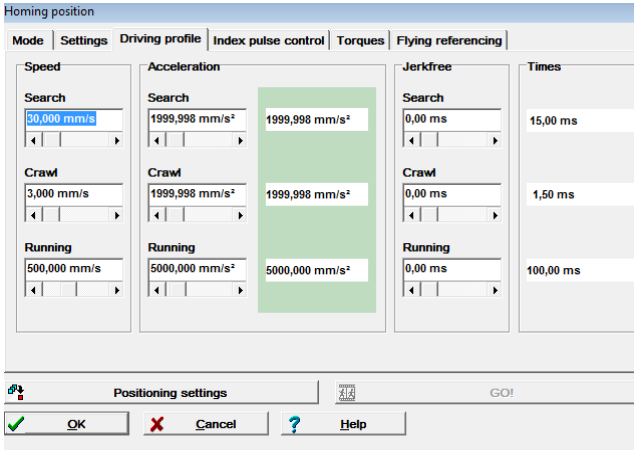
9 Homing

The setup for homing position of the axis will be done in the homing position window:

- homing methods
- homing-offset
- speed and acceleration during homing



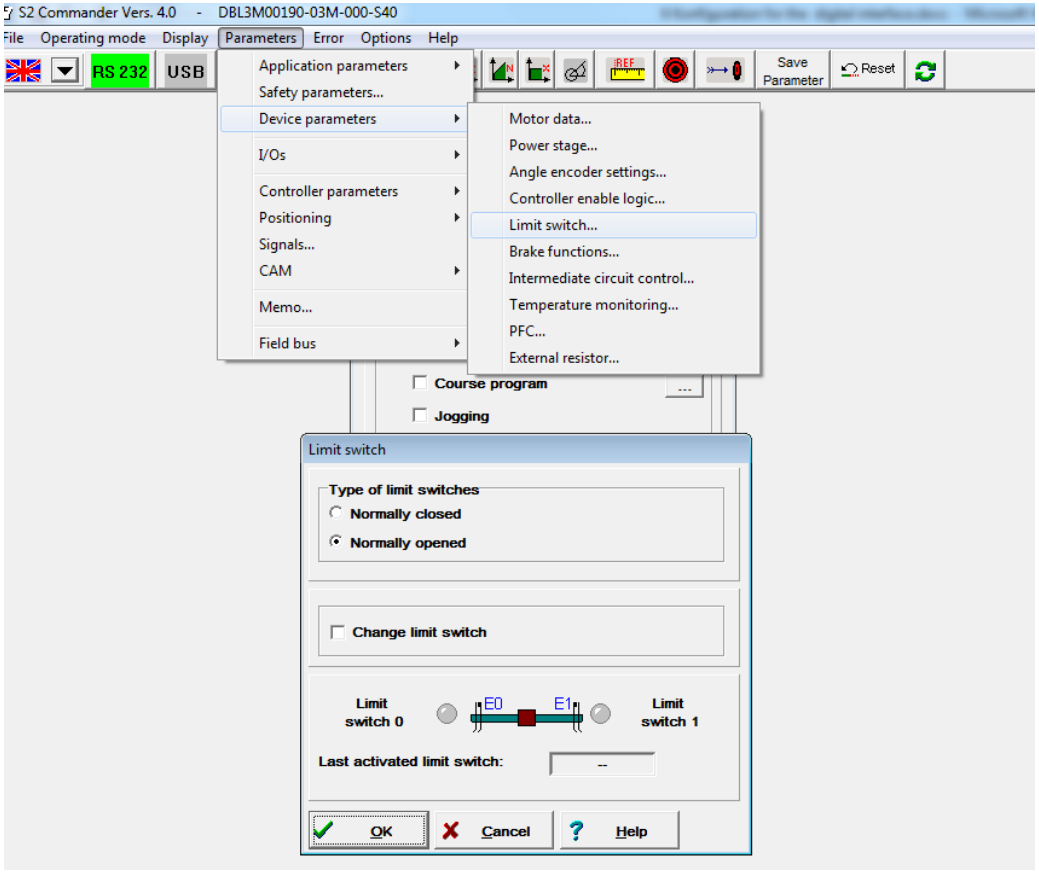




9.1 Setup for limit switch

IEF-Werner GmbH usually installs limit switches as normally open contact.

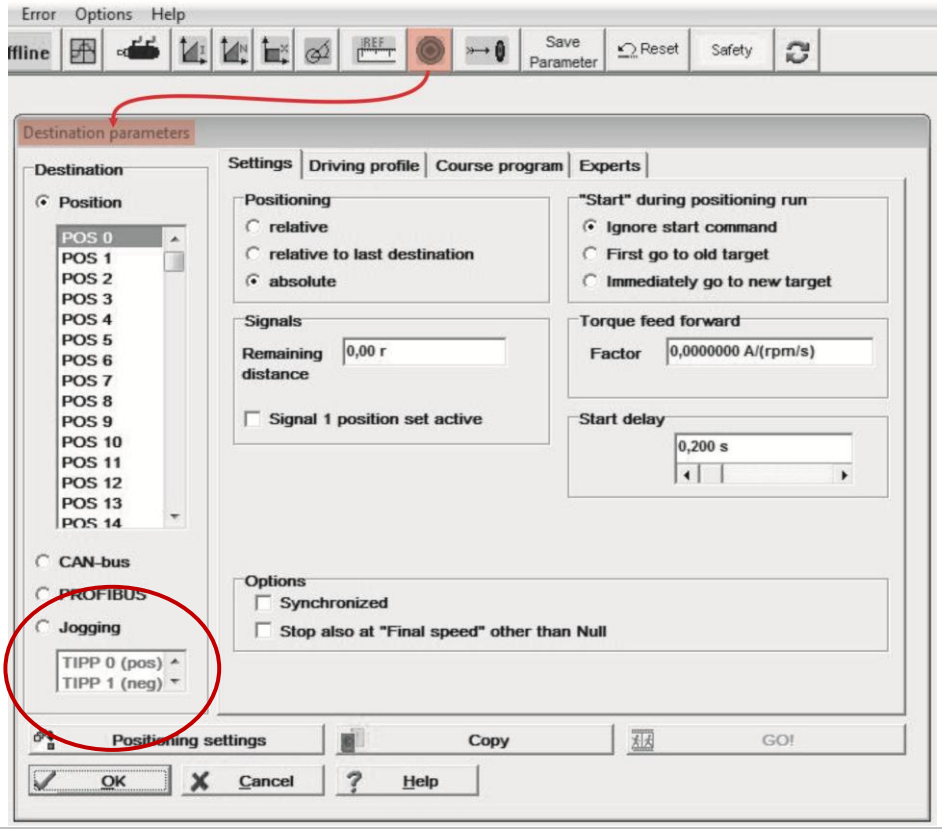
The negative limit switch is to find on the motor side. If the axis direction has to be changed (different mechanical direction) please also change the direction of the limit switches (change limit switch).



10 Jogging mode

For the function "Jogging-mode" there are two data sets stored in the window "destination parameters".

- Jogging mode right: TIPP 0 (pos) and
- Jogging mode left: TIPP 1 (neg)



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11 Parameterize destinations

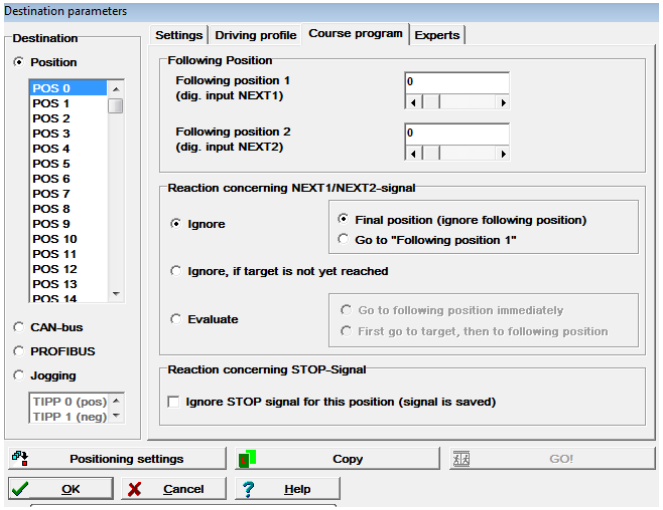
With the Servo Positioning Controller servoTEC S2 it is possible to set more than 256 destinations. Using this application 5021 as an example it is possible to choose up to 4 destinations via digital inputs DIN0 and DIN1.
If more than 4 destinations are needed the function can be changed of existing inputs or extending the digital inputs (technology module).

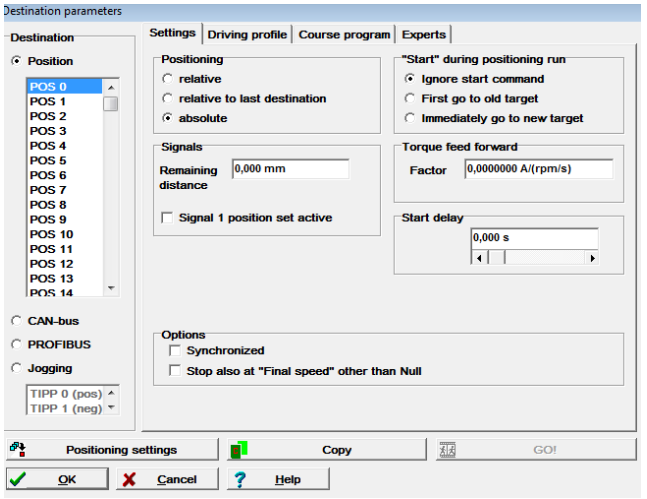
For each destination there are a lot of parameters for optimal adjustment to the function of the machine:

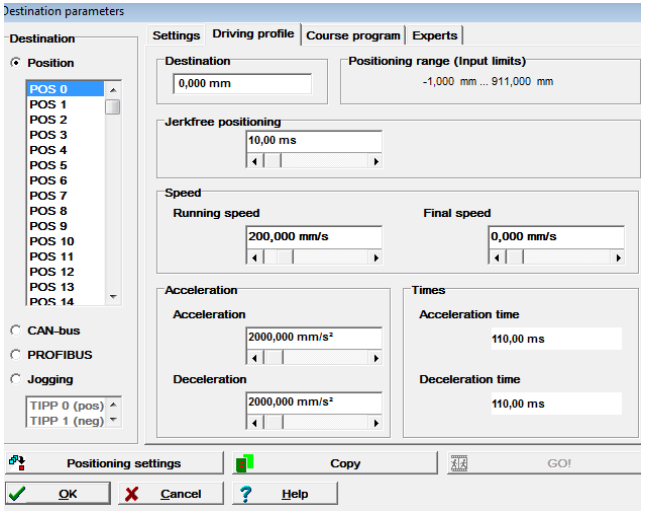
- Positioning: relative, absolute
- Messages:
- Destination position:
- Acceleration, braking acceleration
- Follow-on position:

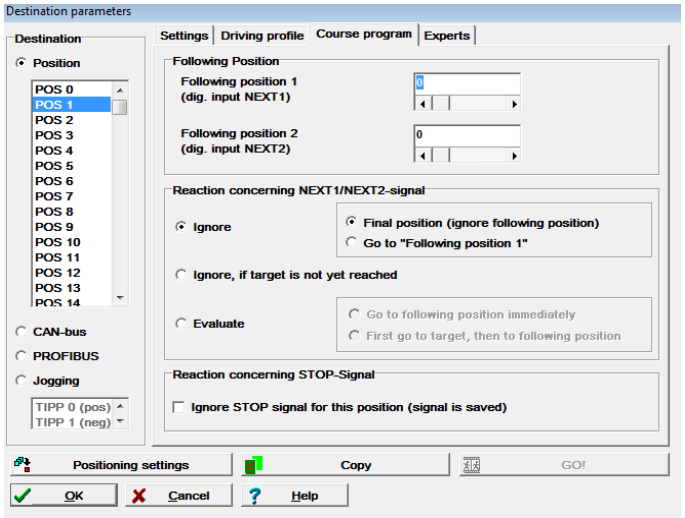
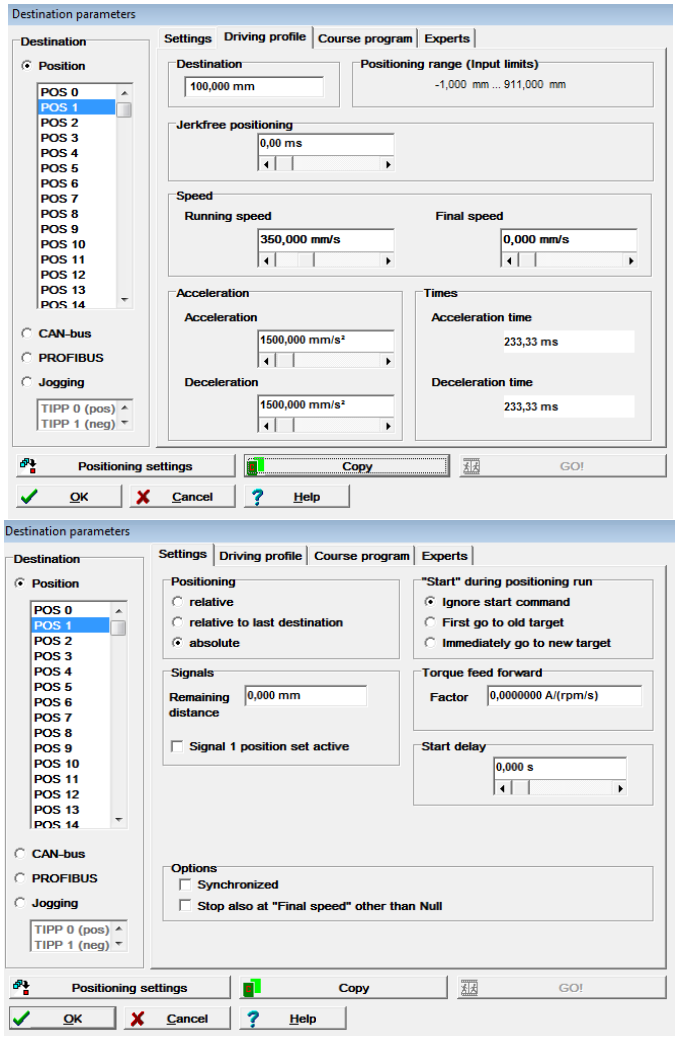
11.1 Destination position 0

- Positioning: absolute
- Destination position: 10,00 mm
- Speed: 200mm/s
- Acceleration: 2000mm/s2
- Breaking acceleration: 2000mm/s2
- Following position: 0







11.2 Destination position 1

- Positioning: absolute
- Destination position: 100,00 mm
- Speed: 350mm/s
- Acceleration: 1500mm/s2
- Breaking acceleration: 500mm/s2
- Following position: 0