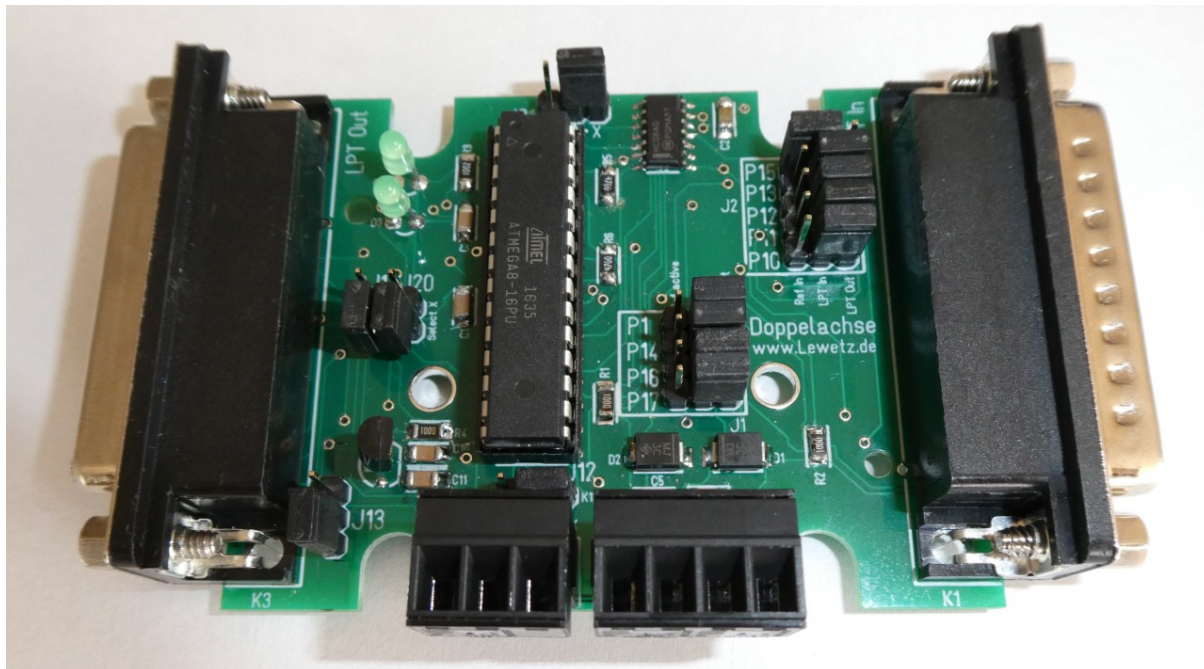# Documentation Double-axis board

This documentation supplies any required information for using the double-axis board and describes the various functions, the delivery settings and the diverse options for configuration. With the double-axis board it is possible to control an additional drive unit that operates in syncronism to the X- or Y axis. Based on a seperate reference switch exact positioning and automatic displacement compensation between the double-axes are granted.

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Description of functions

Special care must be taken with machines using two separate drives for one axial direction during the reference run. In this situation it must be ensured that both drives are equipped with a separate reference switch and the relevant surveillance. By using separate reference switches for each drive the axis can be completely aligned in parallel during the reference run. The reference switches are subject to be mounted precisely in parallel.

The term axis A and axis B is used for the axis equipped with two separate drives. The corresponding reference switches are called reference switch A and B. The double-axis board can be optionally used for the X- or Y-axis.
Separate pulse and direction signals as well as separate reference switches for axis A and axis B can be connected with the board.

This plug-in connection has been specially conceived for using **WinPC-NC**. However, it can also be used with other control systems or with different applications.
The board is conceived for being switched between the LPT output of the CNC control and the machine electronics.
As a standard feature, the signals of the LPT input on Sub-D plug K1 and LPT output on Sub-D socket K3 are directly connected.
Thus merely the relevant signals are analyzed and the other signals are fully connected.
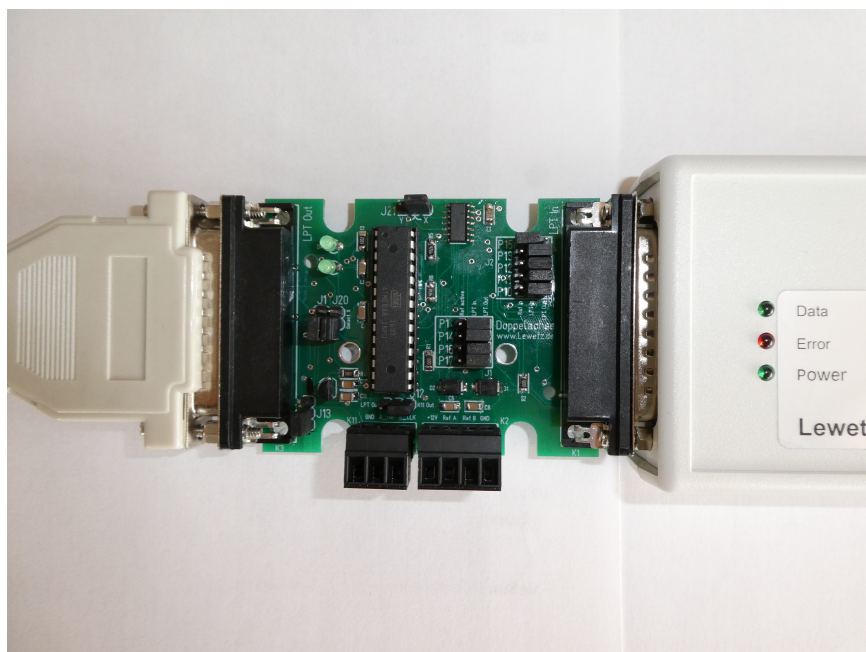This means minimal wiring complexity.

Illustration 1 on the left: connection to the machine electronics, on the right: connection to the LPT1-Port of the ncUSB module

General overview of plugs and jumpers

The graphic below illustrates the pin assignment. Great emphasis was placed on creating an easy to understand numbering. The individual functions of connectors and jumpers are indicated below. Detailed information can be found in the corresponding chapters.
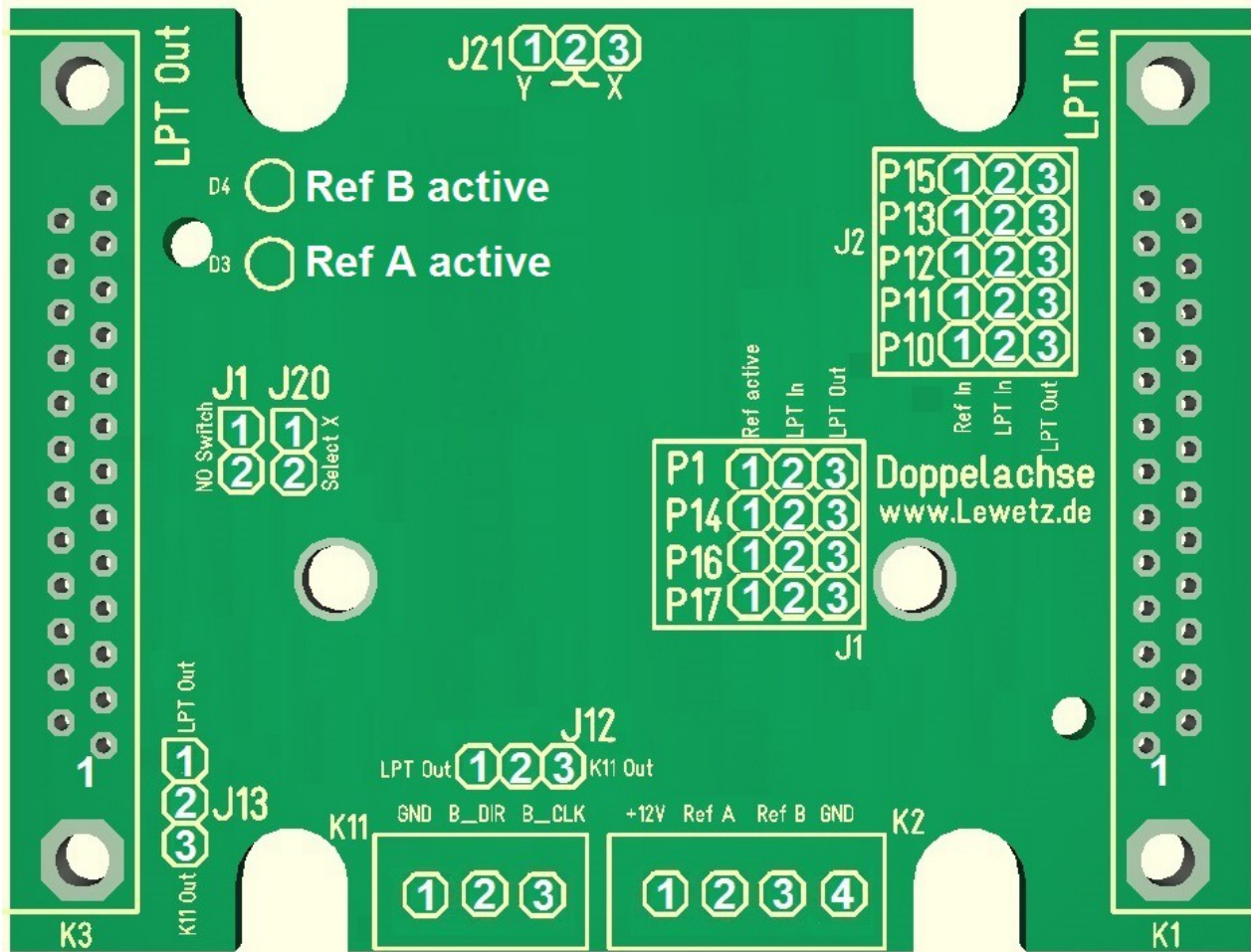
Connector	Function	Assignment
K1	LPT-input CNC control	Pin assignment: please refer to the *WinPC-NC* manual
K11	Pulse and direction for axis B	
K3	LPT-output CNC-electronics and output stages	Pin assignment as K1
K2	Power supply, input reference switch A and B	

Jumper	Function	Assignment
J2-Jumper Field	Selecting reference input CNC-control	
J1-Jumper Field	Selecting reference output CNC-control	
J20, J21	Selecting X- or Y-axis	
J1	Signal logic reference switch A and B	
J12, J13	Direction and Pulse of axis B on K3 (Pin 8 and Pin 9) or K11 (Pin 2 and Pin 3)	

Description of delivery settings

On delivery the double-axis board is configured as follows:
- The X-axis is selected with J20 and J21.
- The reference signal AB is set at Pin 15 of connector K1.
- Jumpers for the signal **Q252 Homing Active** and the reference output are not set. All outputs between K1 and K3 are directly connected.
- J1 is not plugged in and the signal logic is set for NC contacts.
- J12 and J13 are configured that the pulse and direction signals of axis B are connected to K11. The signals for the fourth axis are connected between K1 and K3.

Power supply / Connector K2 / Reference switch A and B / J1 / Signal logic reference switch A and B

The board requires a voltage source with an external 12V DC voltage supply. Therefore it is useful to utilize an external plug-in power supply or the integrated power supply of the control electronics. The power supply requires a minimum performance of 1,2 W.

K21 Pin	Function
4	GND power supply and GND reference switch
1	+12V supply voltage

Both reference switches of axis A and axis B are also connected with connector K2. So a normally closed contact as well as a normally open contact can be used
and they have to switch the corresponding reference switch pin against GND.

K21 Pin	Function
2	Reference switch A
3	Reference switch B

Additionally it is possible to set the switch logic of both reference switches by jumper J1. The jumper must be plugged in for NO contact and must be removed for NC contact.

Reference switches can be designed as manual switches or as inductive proximity switches. It is important to use proximity switches of type NPN.

Selecting X-axis or Y-axis / J20 / J21 / Pulse and direction signals for axis A and B / Connector K11 / J12 / J13 / Connector K3

Please select either axis X or Y for axis with double drive. The axis is selected by jumpers J20 and J21.

Axis	J21	J20
X	Plugged in on Pin 2 and 3	Open
Y	Plugged in on Pin 1 and 2	Plugged in

Depending on the selected axis (X or Y), pulse and direction signals for axis A are subject to variation. The signals are always connected to the regular pins at connector K3.

Signal for XA-axis	Connector	Pin
XA-clock pulse	K3	3
XA-direction signal	K3	2
XA-GND	K3	18-25

Signal for YA-axis	Connector	Pin
YA-clock pulse	K3	5
YA-direction signal	K3	4
YA-GND	K3	18-25

The pulse and directions signals for axis B are always connected to connector K11.

Signal for B-axis	Connector	Pin
X- or Y-axis B-clock pulse	K11	3
X- or Y-axis B-direction signal	K11	2
Axis B-GND	K11	1

The jumper J12 and J13 can configure the board that the clock and direction signal of axis B is available on pin 9 and pin 8 of connector K3 additionally. Normally these pins are used for the pulse and dirrection signals of the 4th axis. Dependent on the configuration of J12 and J13 the pins 8 and 9 are connected between K1 and K3 to use a 4th axis or not connected to provide the pulse and direction signals of the B-axis at connector K3.

J12	J13	K3 pin 8	K3 pin 9
Pin 2 and 3	Pin 2 and 3	K1 pin 8 for 4th axis	K1 pin 9 for 4th axis
Pin 1 and 2	Pin 1 and 2	B-axis direction signal	B-axis pulse clock

Please not that it is possible to plug in two of the double-axis boards behind each other with machines whose axes X and Y are featured with two drives each - to be followed by correct configuration.

Selecting reference input CNC control / Jumperfield2 / P10 / P11 / P12 / P13 / P15

The LPT port in **WinPC-NC** is equipped with five freely selectable inputs set at Pin 10, 11, 12, 13 and 15. For example, these inputs can be used for the reference switches. The double-axis board with integrated logic circuit provides merely one input signal, called reference signal AB, for reference switch A and B. As a consequence the remaining 4 inputs can be used for additional functions.

Due to jumper P10, P11, P12, P13 and P15 the reference signal AB can be freely assigned to any input. This means less wiring complexity and flexibility in selecting available inputs.

Input signal Reference signal AB					
K1 and LPT1	**To be plugged at the correct jumper**				
	P10	**P11**	**P12**	**P13**	**P15**
Pin 10	**1+2**	2+3	2+3	2+3	2+3
Pin 11	2+3	**1+2**	2+3	2+3	2+3
Pin 12	2+3	2+3	**1+2**	2+3	2+3
Pin 13	2+3	2+3	2+3	**1+2**	2+3
Pin 15	2+3	2+3	2+3	2+3	**1+2**

Always ensure that only one input pin has been selected and that only one of the jumpers P10, P11, P12, P13 and P15 is plugged in between Pin 1 and Pin 2. Otherwise a short-circuit fault may be caused in the CNC control. Please note that this input pin is not directly connected between plug K3 and K1.

Assignment in *WinPC-NC* is made as specified below. Serving as example Pin 15 inv of the LPT port at connector K1 and Input **I235 Homing switch X** is used. Make sure that the Input **I236 Homing switch Y** is used, if the Y axis has two seperate drives.
Please note, that the Pin No. **inv**, must be used.
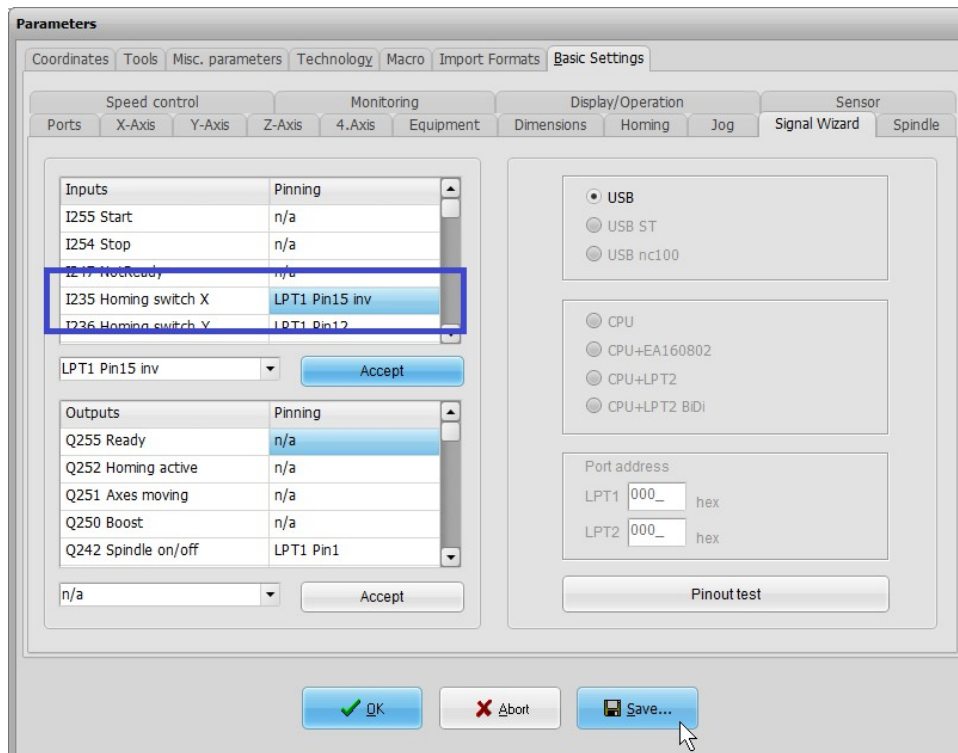
# Selecting reference output and moving over the referene switches/ Jumperfield 1 / P1 / P14 / P16 / P17

WinPC-NC evaluates reference switches merely during the reference run. Thus moving over the reference switch is possible in jog mode or during automatic machining.This is necessary if the reference switches are not positioned at the end of the respective axis. Due to the fact that the double-axis board is incapable to differentiate between reference run and automatic process on default, an additional adjustment is indispensable.

Use one of the four outputs in **WinPC-NC** for providing the output signal **Q252 Homing Active**. In **WinPC-NC** the outputs can be used at pin 1, 14, 16 and 17 of connector K1. The appropriate pin can be selected by jumper P1 / P14 / P16 / P17 and must be correctly assigned within the signal assistent in **WinPC-NC**.

Output signal reference run active				
K1 and LPT1	To be plugged at the correct jumper			
	P1	**P14**	**P16**	**P17**
Pin 1	**1+2**	2+3	2+3	2+3
Pin 14	2+3	**1+2**	2+3	2+3
Pin 16	2+3	2+3	**1+2**	2+3
Pin 17	2+3	2+3	2+3	**1+2**

Always ensure that only one output pin has been selected and that only one of the jumpers P1, P14, P16 and P17 is plugged in between Pin 1 and Pin 2. Otherwise a short-circuit fault may be caused in the CNC control. Please note that this output pin is not directly connected between connector K3 and K1.

Assignment in **WinPC-NC** is made as specified below. Serving as example Pin 1 of the LPT port at connector K1 is used. Please note that output Q252 Homing Active is only available by **WinPC-NC** version 3.40/26.
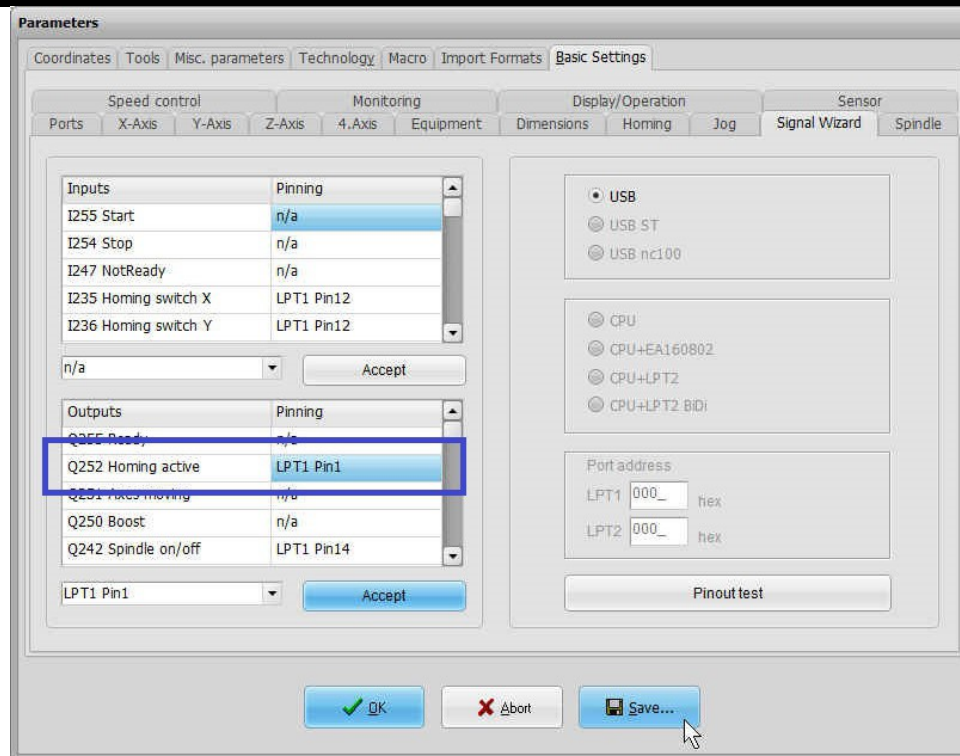
If the reference switches are mounted on drives at the end position or if moving over the reference switch is not required, jumpers P1, P14, P16 and P17 can be plugged at Pin 2 and Pin 3. This may result in a stop of axis A or B after activating the particular reference switch until the next change of direction.

Further information / Queries

For further information concerning the double-axis board please consult our homepage www.Lewetz.de.