



## **Operating Manual TANGO 3 mini**

Stepper Motor Controller for Micropositioning Systems

## **Document Version**

Original operating manual  
Version 3.4, Date: 11.09.2023  
First published: 13.10.2016

## **Product**

TANGO 3 mini  
Order no.: XXX-76-100-5800  
              XXX-76-101-5800  
              XXX-76-102-5800  
              XXX = 00–999, customer specific ID

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## 1 Basics of the Operating Manual

This operating manual provides you with the information required for trouble-free and safe use of the stepper motor controller TANGO 3 mini, termed *controller* from here on in this document. You must have fully read and understood this operating manual and especially the safety instructions before you unpack, put into service, operate, clean, take out of service or dispose of the controller.

This operating manual is directed at people with basic technical knowledge related to handling equipment such as is described here. If you do not have any experience with such equipment, have experienced people help you.

Märzhäuser Sensotech accepts no liability for damage and operating faults which result from ignoring this operating manual.

## 2 Safety

### 2.1 Intended Use

The controller has been designed and constructed exclusively for the connection of 2- and 4-phase stepper motors and such input devices which have been approved by Märzhäuser Sensotech for operation with this controller.

Märzhäuser Sensotech accepts no liability for faults which can be traced back to unusual or exceptional use or improper treatment.

### 2.2 Installation Requirements

Category	Condition
Ambient temperature	+5...+45 °C (ext. power supply: 0...+40 °C), protect from direct sunlight
Cooling	Normal convection, refer also to chapter 2.4 <i>General Safety Notes</i> , page 6
Humidity	Max. 85 % (ext. power supply: max. 80 %), non-condensing
Installation height	Max. 2,000 m
Installation location	Closed rooms, no risk of explosion
Protection class	See chapter 8.1 <i>External Power Supply</i> , page 22 (GND and TANGO housing are connected)
Protection type	IP20

### 2.3 Hazard Symbols

This operating manual contains symbols which warn the operator and point out dangers.



Danger for the user



Crushing hazard



Danger due to electrical current



Danger due to substances which are harmful to health



Possible damage of devices and parts

## 2.4 General Safety Notes

The controller may only be used for the purposes which are described in this operating manual. The operating manuals of connected peripheral devices (positioning systems, microscope, operating elements, PC etc.) must be heeded.



Never open the housing of the controller or the power supply. In case of violation, all warranty and liability claims will become void. Only have repair work carried out by our Customer Service Center.



If other power supplies than the one provided are used, the operator can suffer an electric shock and damage can be caused to the controller. In addition, the electromagnetic properties of the controller might be changed. For this reason, only use the provided 24 V wide range power supply or the one specified in this operating manual and on the declaration of conformity, in combination with a suitable certified mains cable. In case of violation, all warranty and liability claims will become void.



If the controller is not connected to the mains properly, the operator can suffer an electric shock and damage can be caused to the controller. Make sure that your mains voltage corresponds to that printed on the power supply. Only plug the mains plug into sockets which have a proper protective ground terminal. Make sure that the protective effect is not suspended e.g. by extension cables which do not have a protective ground conductor.



If unsuitable peripheral devices are connected, the operator can suffer an electric shock and damage can be caused to the controller. The controller itself does not have a protective ground terminal. Ensure that no dangerous voltages or currents are induced by peripheral devices into the controller. These can be routed from there to connected devices and cause a hazard there.



Controller and peripheral devices may only be operated by trained personnel who have been instructed about the hazards which can occur during operation of the controller and peripheral devices.



There can be a danger of hands being crushed by the positioning systems connected e.g. a microscope stage. Moving parts of the positioning system can collide with other microscope components or sample holders and cause damage. Please note that the operating element (Joystick digital, ERGODRIVE digital) is active after the controller has been switched on. Ensure that no potentially dangerous movement can occur either in *manual mode* or in *automatic mode*.



**Note:** You can configure the controller in such a way that the operating element connected is inactive after switch-on.



Controller and accessories are not suitable for use in a potentially explosive atmosphere.



Ensure that no chips, liquids or other objects can get into the housing of the controller or the power supply. Protect the controller and the power supply from dirt and dust as far as possible.



The controller and accessories are not protected against corrosive, infectious, radioactive or other substances which are harmful to health. When handling such substances, ensure that all legal requirements are fulfilled, especially the national regulations on accident prevention.



Ensure that the controller, in conjunction with your application, meets the applicable safety regulations and legal requirements.  
This controller was developed and manufactured in compliance with the standard *DIN EN 61010-1:2020-03 Safety requirements for electrical equipment for measurement, control and laboratory use - Part 1: General requirements*.  
Note that the effective motor voltage value can correspond to the DC voltage at the plug *24V DC/4A max.*



In the event of malfunction, faults or safety risks related to the controller or the power supply, switch off all the devices concerned and disconnect them from the mains supply by removing all plugs, for example. Secure the devices concerned to prevent them being switched back on again and contact our Customer Service Center.



The controller can become damaged if ventilation is prevented. Set the controller down on a firm, level surface. Keep other objects at least 1.5 cm away on all sides. Do not place any objects on the controller. When the mounting plate is used, the controller must not be fixed to thermally insulating bodies (e.g. made of plastic).



Disconnect the controller from the voltage supply before you connect a PC or other peripheral devices to the controller or disconnect them from the controller.



An improper load or violent treatment of the control stick can lead to uncertainties and damage to the joystick. Protect the joystick from falling, impact and forced deflection. Do not store the joystick with the bottom facing upwards.

### 3 Scope of Delivery

Standard scope of delivery	Quantity
TANGO 3 mini	1
Mounting plate (pre-fitted)	1
USB interface cable 1.8 m	1
Start-up adapter AUX mini	1
External 24 V power supply incl. mains cable (depending on order no.)	1
Operating manual	1

Optional components	Article no.
Activation encoder interface	00-76-650-5800
Activation Snapshot/Trigger	00-76-801-5800
Motor cable for 3 axes 2 m	00-76-700-5800
Encoder cable for 2 axes 2 m	00-76-650-5801
RS-232 cable	00-76-232-5803
Adapter cable LED 100	00-76-700-5801
ERGODRIVE 2 digital	00-27-322-7000
ERGODRIVE 3 digital	00-27-322-8000
2-Axes Joystick digital	00-76-200-1820
3-Axes Joystick digital	00-76-300-1820
3-Axes Joystick digital with Multi-Function Wheel	00-76-300-1821
4-Axes Joystick digital with Multi-Function Wheel	00-76-400-1820
Mounting adapter for 35 mm top-hat rail	00-76-100-0800

## 4 Product Description

### 4.1 Identification

You can find all required information for clear identification of the controller on the identification plate.

### 4.2 Area of Application

The controller can be operated in 2 different modes:

- **Manual mode:** Control of the connected axes exclusively via operating element (Joystick digital or ERGODRIVE digital)
- **Automatic mode:** Control of the connected axes via an external PC (USB-/RS-232 interface, optional: CAN interface) or via operating element (Joystick digital or ERGODRIVE digital)

There are 2 limit switch inputs available per axis for travel range limitation and for calibration. There is a trigger signal input and an output for a motor brake available at the port *Motor 1-3*.

Further digital and analog inputs/outputs at the port *AUX mini*, the special functions "Snapshot" and "Trigger" as well as an encoder interface for evaluating measuring systems of the type Märzhäuser nanoScale (MR/analogue 5Vpp), 1Vpp or RS-422 are available, depending on the order.



## 4.3 Compliance with Directives and Standards

We hereby declare that the controller is not a device ready for use or connection in the sense of the EMC, Low Voltage or Machinery Directive, or the Equipment and Product Safety Act, rather that it is a component.

The final mode of function is only defined when the controller is integrated in the overall system. Compliance of the overall system with existing safety regulations and legal requirements is the responsibility of the system integrator.

Information and recommendations on installation and intended use are included in this operating manual. The controller must not be put into service until it has been established that all the legal protective and safety regulations are kept.

The Declaration of Conformity for the controller can be found in chapter *14 Declaration of Conformity*, page 33.

## 4.4 Ports and Status LEDs

### 4.4.1 Ports

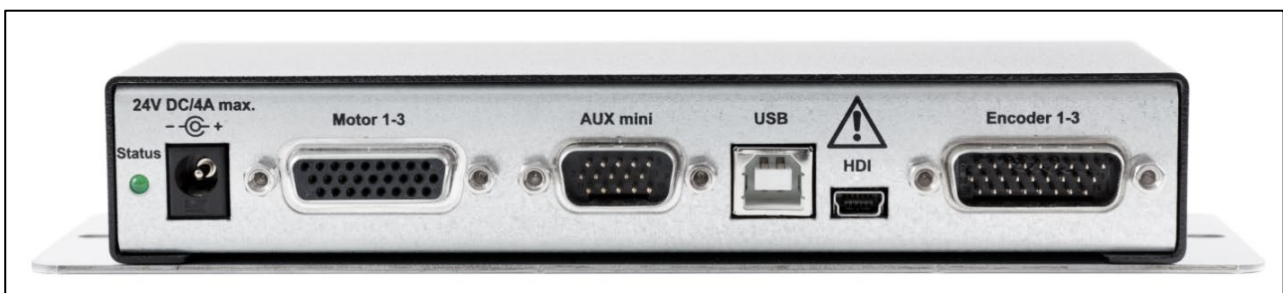


Fig. 1: Rear panel (port *Encoder 1-3* optional)

All the controller's ports are located on the rear panel. The assignment of the ports and the respective technical data can be found in chapter *6 Port Assignment*, page 15.

### 4.4.2 Status LED

Status	Description
Off	Controller is not ready
On	Controller is ready
Flashes approx. 1x/sec.	Bootloader active <sup>1</sup>
Flashes approx. 3x/sec.	Output stages switched off <sup>2</sup>
Flashes approx. 6x/sec.	Status not OK, e.g. wrong instruction
Flashes approx. 10x or 20x/sec.	Bootloader active, firmware update in progress <sup>1</sup>

<sup>1</sup> If a firmware update is being loaded to the controller with the aid of the Firmware Update Tool, the bootloader is active. The controller must not be switched off during this time.

<sup>2</sup> The output stages can be switched off for the following reasons:

- The PSE input (Power Stage Enable) is open or switched to 0 V.
- The start-up adapter AUX mini is not inserted.
- The closed-loop collision detection has tripped (if configured accordingly).
- The overcurrent switch-off of an output stage has responded.
- An operating voltage is outside of its specification.
- The temperature is too high.
- There has been a short-circuit.
- The power supply is faulty.

## 5 Putting into Service

### 5.1 Putting the Controller into Service

- 1 Read and make sure you understand chapter 2 *Safety* before you start putting the controller into service.
- 2 Mount the controller using the mounting plate (see chapter 8.5 *Mounting Plate*, page 28) or use the optional *mounting adapter for 35 mm top-hat rail* (see chapter 8.6 *Mounting Adapter for 35 mm Top-Hat Rail (Optional)*, page 29).

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**Note:** Do not mount the controller on thermally insulating bodies (e.g. made of plastic). The controller could become too hot and switch the output stages off.

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**Equipment damage possible through putting into/taking out of service with existing mains power connection.**

While the controller is connected to the voltage supply, connection and disconnection of cables can cause damage to the controller ports and the peripheral devices.

- Ensure that the controller is not connected to the power supply before you connect a PC or other peripheral devices to the controller or disconnect them from the controller.
- 

- 3 Connect the motor ports of your positioning system (scanning stage and/or focus drive) to the port *Motor 1-3*. Use a suitable motor cable from Märzhäuser Sensotech for this.
- 4 **Encoder interface option:** Connect the encoder ports of your positioning systems to the port *Encoder 1-3*. Use a suitable encoder cable from Märzhäuser Sensotech for this.
- 5 **Operating element option:** Connect the operating element (Joystick digital or ERGODRIVE digital) to the port *HDI*.

Heed the following warning if you use a **Joystick digital** as an operating element. Continue with step 6 if you are using an ERGODRIVE digital or no operating element at all.

---



**Crushing/shearing hazard when actuating the joystick during controller switch-on.**

If the joystick is deflected before the status LED on the controller lights up, the zero point of the joystick will not be calibrated correctly. The connected positioning systems can move unintentionally when the joystick is released. Fingers and objects can become crushed and sheared. Moving parts of the positioning systems can collide with other microscope components or sample holders and cause damage.

- Do not hold the joystick when switching the controller on.
  - Do not deflect the joystick when switching the controller on.
  - To calibrate the joystick again, switch the controller off and on again.
-

- 6 Check whether the mains voltage specified on the power supply corresponds to your mains voltage. If they do correspond, connect the cable of the power supply to the port *24V DC/4A max.* on the controller.
- 7 Then connect the power supply to the mains. For this purpose, use the mains cable included in the scope of delivery or another suitable certified mains cable.

The status LED starts to light up after 2–3 seconds.

- 8 Move the axes of the connected positioning systems carefully using the connected operating element.

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**Note:** If the axes of the connected positioning systems cannot be moved, connect the controller to the PC and use SwitchBoard to check whether the connected positioning systems have been configured correctly (polarity, normally closed/normally open, pull-up/pull-down resistor).

---

The controller is now ready for use (*manual mode* only).

- 9 **Optional:** To configure the controller individually or for operation in *automatic mode*, connect the controller to a PC:
  - 5.2.1 *Establishing a USB Connection*, page 11
  - 5.2.2 *Establishing an RS-232 Connection*, page 12
  - 5.2.3 *Establishing a CAN Connection*, page 12

## 5.2 Establishing Connection to a PC

### 5.2.1 Establishing a USB Connection

Communication between the controller and the PC takes place over a USB connection via a virtual COM port. To be able to connect the controller to your PC via USB cable, you require Windows 7 (32/64 bit), Windows 8 (32/64 bit), Windows 10 (32/64 bit) or Windows 11 (64 bit).

---

Observe the following notes, regardless of the version of your operating system:

- Do not connect to *Windows Update*.
- Continue installing the driver despite the message about the missing Windows-Logo-Test.
- If necessary, agree to the change query of the user account control.

- 
- 1 Disconnect the controller from the power supply.
  - 2 Switch the PC on.
  - 3 Download the current driver for the controller from the Märzhäuser website.

**Note:** You will find the download section at [www.marzhauser.com/downloads](http://www.marzhauser.com/downloads).

- 4 Connect the port *USB* on the controller to a USB port on your PC.  
Use the *USB interface cable* for this.
- 5 Connect the controller to the power supply.

The operating system automatically detects a new device (*Tango USB-Controller, USB Serial Port*).

- 6 Follow the installation instructions of your operating system.

**Note:** If the driver is not installed automatically, enter the storage location of the driver (.INF file) manually or install the driver manually using the *Device manager*.

Once installation has been completed, the controller is connected to the PC and ready for operation (*manual mode* and *automatic mode*).

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## 5.2.2 Establishing an RS-232 Connection

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**Note:** To be able to use the port *AUX mini* as an RS-232 interface, you require a special RS-232 cable. Please contact our Customer Service Center in this case.

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- 1 Disconnect the controller from the power supply.
- 2 Switch the PC off.
- 3 Connect the port *AUX mini* on the controller to a serial port on your PC. Use the RS-232 interface cable for this.
- 4 Switch the PC on.
- 5 Connect the controller to the power supply.

The controller is now connected to the PC and ready for operation (*manual mode* and *automatic mode*).

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If you are not programming the controller via the software provided by Märzhäuser Sensotech (SwitchBoard, DLL files), make sure that your RS-232 interface is configured correctly.

- 57,600 Baud
- 11 bit frame
- 1 start bit
- 8 data bits
- 2 stop bits

Check the connection of the PC with the controller using the *ver* instruction, for example. The controller sends the version number back as the feedback value.

**Note:** Further instructions can be found in the instruction set documentation (*Instruction Set of the TANGO Controller*). The instruction set documentation can be found in the download section of the Märzhäuser website at [www.marzhauser.com/downloads](http://www.marzhauser.com/downloads).

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## 5.2.3 Establishing a CAN Connection

The CAN interface is a customer-specific interface. You are welcome to contact our Customer Service Center if you have any questions.

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## 5.3 Installing SwitchBoard

- 1 Download the current version of SwitchBoard from the Märzhäuser website.  
**Note:** You will find the download section at [www.marzhauser.com/downloads](http://www.marzhauser.com/downloads).
- 2 Execute the file *SwitchBoard\_XXX\_Setup.exe* (file name depends on the version).
- 3 Follow the on-screen installation instructions.

As soon as the installation has been completed you can start SwitchBoard.

## 5.4 Familiarising Yourself with SwitchBoard

To familiarise yourself with the SwitchBoard functionalities you can connect SwitchBoard to a virtual positioning system.

- 1 Start SwitchBoard.
- 2 Click the grey display field on the right next to the button *Connect*.

*Offline mode* is now displayed in the bottom left-hand corner of the dialogue window next to the display field.

SwitchBoard is now being executed in offline mode. You now have access to the menu on the left-hand side of the dialogue window.

---

You will find more information about operation of SwitchBoard in the *SwitchBoard Operating Manual*:

- You can open the *SwitchBoard Operating Manual* after starting SwitchBoard by pressing the F1 key.
  - Alternatively, you will also find the *SwitchBoard Operating Manual* in the download section of the Märzhäuser website under [www.marzhauser.com/downloads](http://www.marzhauser.com/downloads).
- 

## 5.5 Connecting the Controller to SwitchBoard

### Identifying the COM Port

Before you can connect the controller to SwitchBoard, you must identify the COM port used by the controller.

- 1 Open the *Device manager*:
  - **Windows 7:** *Start > Control panel > System > Device manager*
  - **Windows 8:** Right-click in the left, lower corner of the desktop/start screen > *Device manager*
  - **Windows 10/11:** Right-click the Windows symbol > *Device manager*
- 2 Expand the category *Ports (COM and LPT)* by double-clicking.

The COM port used is listed in brackets after the *Communication port* entry (with an RS-232 connection) or after the entry *Tango USB-Port* (with a USB connection).

---

**Depending on the type of connection, please note the following information:**

- **USB connection:** The number of the virtual COM port is retained regardless of which USB port is used on your PC.
  - **RS-232 connection:** If your PC has more than one serial port, refer to the operating manual of your PC for information about the assignment of COM ports to serial ports.
-

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## Establishing a Connection to the Controller

- 1 Start SwitchBoard.
  - 2 Select the identified COM port from the *Serial Port* drop-down list.
  - 3 Enable the check box *Show protocol window* and *Scan for ETS when connecting*.
  - 4 Enable the radio button *Read out setup from controller*.
- 



### Possible operating errors and device damage due to faulty operation.

If you enable the radio button *Send setup to controller*, faulty settings can be transferred to the controller. Operating errors and device damage to your positioning or overall system can be the result.

- Ensure that the radio button *Read setup from controller* is always enabled.
  - Only enable the radio button *Send setup to controller* when our Customer Service Center requests you to do so.
- 

- 5 Click the button *Connect*.

When the colour of the display field on the right of the button *Connect* and the colour of the display field in the bottom left-hand corner of the dialogue window switches to green, the connection to the controller has been established successfully.

The COM port used and the connection speed are indicated next to the green display field in the bottom left-hand corner of the dialogue window.

The controller can now be operated and configured using SwitchBoard.

## 6 Port Assignment

**Note:** With all connections, the cable shield is connected to the controller housing.

### 6.1 Motor 1-3: D-Sub 26-Pin Socket

Pin	Designation	Function
1	MOT1PH1+	Motor 1, phase 1+
2	MOT1PH1-	Motor 1, phase 1-
3	MOT1PH2+	Motor 1, phase 2+
4	MOT1PH2-	Motor 1, phase 2-
5	END10	Limit switch axis 1, zero point <sup>1</sup>
6	END1END	Limit switch axis 1, end position <sup>1</sup>
7	TRIN1	Trigger IN <sup>1</sup>
8	+5VEXT1	+5 V <sup>2</sup>
9	GND	GND
10	MOT3PH1+	Motor 3, phase 1+
11	MOT3PH1-	Motor 3, phase 1-
12	MOT3PH2+	Motor 3, phase 2+
13	MOT3PH2-	Motor 3, phase 2-
14	END30	Limit switch axis 3, zero point <sup>1</sup>
15	END3END	Limit switch axis 3, end position <sup>1</sup>
16	BRAKE	Connection for a brake <sup>3</sup>
17	+5VEXT1	+5 V <sup>2</sup>
18	GND	GND
19	MOT2PH1+	Motor 2, phase 1+
20	MOT2PH1-	Motor 2, phase 1-
21	MOT2PH2+	Motor 2, phase 2+
22	MOT2PH2-	Motor 2, phase 2-
23	END20	Limit switch axis 2, zero point <sup>1</sup>
24	END2END	Limit switch axis 2, end position <sup>1</sup>
25	ETS A	Electronic identification plate A
26	ETS B	Electronic identification plate B

<sup>1</sup> TTL input, 1 k $\Omega$  pull-up/-down programmable by software, low-pass filter 1 k $\Omega$ , 100 nF

<sup>2</sup> +5VEXT1 can have a max. load of 500 mA

<sup>3</sup> Output, switches against +24 V, max. current: 0.5 A

## 6.2 HDI: 5-Pin Mini-USB

HDI = Human Device Interface (Joystick digital or ERGODRIVE digital)

Pin	HDI designation	Controller designation
1	VCC (+5V)	VCC_HDI (+5V) <sup>1</sup>
2	RXHDI (IN)	TX (OUT)
3	TXHDI (OUT)	RX (IN)
4	–	–
5	GND	GND

<sup>1</sup> max. load: 500 mA

## 6.3 USB: 4-Pin USB Socket, Type B

Pin	Designation
1	VCC <sup>1</sup>
2	USBDM
3	USBDP
4	GND

<sup>1</sup> only 100nF → GND, current consumption: I < 1 mA

## 6.4 Encoder 1-3: HD D-Sub 26-Pin Plug

Pin	Designation	Function
1	-U1X1	Axis 1, phase 1 (sine), negative signal, 150 Ω → Pin 10 + filter <sup>1</sup>
2	-U2X1	Axis 1, phase 2 (cosine), negative signal, 150 Ω → Pin 11 + filter <sup>1</sup>
3	GND	–
4	-U1X2	Axis 2, phase 1 (sine), negative signal, 150 Ω → Pin 13 + filter <sup>1</sup>
5	-U2X2	Axis 2, phase 2 (cosine), negative signal, 150 Ω → Pin 14 + filter <sup>1</sup>
6	GND	–
7	-U1X3	Axis 3, phase 1 (sine), negative signal, 150 Ω → Pin 16 + filter <sup>1</sup>
8	-U2X3	Axis 3, phase 2 (cosine), negative signal, 150 Ω → Pin 17 + filter <sup>1</sup>
9	GND	–
10	+U1X1	Axis 1, phase 1 (sine), positive signal, 150 Ω → Pin 1 + filter <sup>1</sup>
11	+U2X1	Axis 1, phase 2 (cosine), positive signal, 150 Ω → Pin 2 + filter <sup>1</sup>
12	5V_ENC	5V_ENC: I <sub>max</sub> = 0.75 A
13	+U1X2	Axis 2, phase 1 (sine), positive signal, 150 Ω → Pin 4 + filter <sup>1</sup>
14	+U2X2	Axis 2, phase 2 (cosine), positive signal, 150 Ω → Pin 5 + filter <sup>1</sup>
15	5V_ENC	5V_ENC: I <sub>max</sub> = 0.75 A
16	+U1X3	Axis 3, phase 1 (sine), positive signal, 150 Ω → Pin 7 + filter <sup>1</sup>
17	+U2X3	Axis 3, phase 2 (cosine), positive signal, 150 Ω → Pin 8 + filter <sup>1</sup>
18	NASX3	Axis 3, error signal <sup>2</sup>
19	-U0X1	Axis 1, reference signal, negative input, 150 Ω → Pin 20 <sup>3</sup>
20	+U0X1	Axis 1, reference signal, positive input, 150 Ω → Pin 19 <sup>3</sup>
21	NASX1	Axis 1, error signal <sup>2</sup>
22	-U0X2	Axis 2, reference signal, negative input, 150 Ω → Pin 23 <sup>3</sup>
23	+U0X2	Axis 2, reference signal, positive input, 150 Ω → Pin 22 <sup>3</sup>
24	NASX2	Axis 2, error signal <sup>2</sup>
25	-U0X3	Axis 3, reference signal, negative input, 150 Ω → Pin 26 <sup>3</sup>



26 +U0X3 Axis 3, reference signal, positive input, 150  $\Omega$   $\rightarrow$  Pin 25<sup>3</sup>

- <sup>1</sup> for differential input voltages from 0.6...5 Vpp, input voltage range Pin  $\rightarrow$  GND = 0...5 V,  
Filter: each 470  $\Omega$  + 1 nF from Pin  $\rightarrow$  GND  
<sup>2</sup> Error signal is inactive on delivery, 1 k $\Omega$   $\rightarrow$  GND + low-pass filter 1 k $\Omega$  + 10 nF  $\rightarrow$  GND  
<sup>3</sup> Switching threshold: max.  $\pm$ 40 mV at a common-mode voltage of 2–3 V DC

### Technical Data

Pin	Description	1Vpp	MR/analog 5Vpp:	RS-422	Note
1	Input voltage position signal	0.6...1.2 Vpp	1.5...5 Vpp	> $\pm$ 0.2 V	Difference signals in the range 0...5 V
2	Reference voltage	> $\pm$ 40 mV	> $\pm$ 40 mV	> $\pm$ 40 mV	Common mode range: 0-5 V; 40 mV in the common mode range 2...3 V
3	NAS signal <sup>1</sup>	TTL	TTL	TTL	"H" = Measuring system OK "L" = Error 1 k $\Omega$ $\rightarrow$ GND Low-pass 1 k $\Omega$ / 1 nF
4	Cutoff frequency position signal	approx. 250 kHz	approx. 250 kHz	30 ns flank clearance	MR and 1Vpp signals are counted at even higher frequencies such as RS-422
5	Max. frequency of the position signal during reference run	6 kHz	6 kHz	> 40 ns flank clearance	Reference signal is synchronised with the position signal
6	Max. achievable interpolation factor	98,800-fold	205,800-fold	4-fold	Related to a signal period
7	Interpolation factor at max. position signal voltage	69,800-fold	145,500-fold	4-fold	Related to a signal period, calculated at the least favourable position
8	Interpolation factor at min. position signal voltage	34,900-fold	43,600-fold	4-fold	Related to a signal period, calculated at the least favourable position
9	Input resistance	150 $\Omega$ + filter <sup>2</sup>	150 $\Omega$ + filter <sup>2</sup>	150 $\Omega$ + filter <sup>2</sup>	Input resistance variable, adaptation on request
10	Supply voltage +5 V	–	–	–	Max. 0.25 A per encoder

<sup>1</sup> Input is inactive on delivery

<sup>2</sup> Filter: each 470  $\Omega$  + 1 nF from Pin  $\rightarrow$  GND

## 6.5 AUX mini: HD D-Sub 15-Pin Plug



### Possible device damage caused by insertion/removal of the plug at the port *AUX mini* with *24VBUS* port active (pin 15).

If a plug is inserted or removed at the port *AUX mini* with the port *24VBUS* active, pin 15 (24 V) may be applied first. There is a danger of a voltage of up to 24 V being applied to other pins as well through connected peripheral devices. This can lead to damage to the controller and the connected peripheral devices.

- Do not connect the controller to the voltage supply until all the plugs have been inserted!

Pin	Designation	Function	Note
1	TAKT_IN	TTL, PUD, FI 1 k $\Omega$ , 1 nF	Clock input for T, V/R operation of an axis <sup>2</sup>
2	SNAPSHOT_IN	TTL, PUD, FI 1 k $\Omega$ , 1 nF	Save position <sup>2</sup>
3	+5VEXT2	+5 V	$I_{\max} = 500 \text{ mA}$
4	GND		
5	PSE	Power Stage Enable	$U_{\text{PSE}} 3.5 \dots 6.6 \text{ V}$ : Output stages can be enabled, $U_{\text{PSE}} < 0.8 \text{ V}$ : Output stages are switched off by hardware, Input filter (low pass) 470 $\Omega$ + 100 nF, then $R_i > 6.8 \text{ k}\Omega$
6	TAKT_OUT	HCMOS-output 5 V	Clock output for T, V/R operation of an external axis <sup>2</sup>
7	V/R_OUT	HCMOS-output 5 V	Forward/backward output for T, V/R operation of an external axis <sup>2</sup>
8	SHUTTER_OUT	HCMOS-output 5 V	Actuation of an external shutter control <sup>2</sup>
9	TRIGGER_OUT	HCMOS-output 5 V	Synchronous trigger <sup>2</sup>
10	CANH	CANH	CAN-Bus port CANH
11	ANOUT0	Analog out	Resolution: 16 bit in the range 0-5 V, $U_a = 0 \dots 4.9 \text{ V}$ , $R_i = \text{approx. } 150 \Omega$
12	TXD_AUX	RS232 TXD	RS-232 V24 transmitter
13	RXD_AUX	RS232 RXD	RS-232 V24 receiver
14	CANL	CANL	CAN-Bus port CANL
15	24VBUS	+24 V	+24 V output switchable via software, max. 1 A

<sup>1</sup> TTL = TTL input, PUD = pull-up (4.7 k $\Omega$   $\rightarrow$  +5V) or pull-down (4.7 k $\Omega$   $\rightarrow$  GND) can be selected by software, FI = low-pass filter

<sup>2</sup> Other functions on request, these inputs can be read and outputs written via application software, Level HCMOS output 5 V: H-level:  $U_{\text{out}} > 3.7 \text{ V}$  @  $I_{\text{out}} = -6 \text{ mA}$ , L-level:  $U_{\text{out}} < 0.4 \text{ V}$  @  $I_{\text{out}} = 6 \text{ mA}$

## 6.6 DC IN: 2.1 mm DC Plug

Designation	Function	Description
Pin, inside	+24 V (20.1...28.9 V)	Protected in the controller by an SMD fuse 4 A
Housing, external	0 V, GND	Connected with the housing

## 7 Technical Data

### General data

Dimensions	Approx. 165 × 29 × 67 mm (W × H × D, without mounting accessories)
Weight	Approx. 500 g (incl. mounting plate, without cables/plugs)

### Motor unit

Number of axes	3
Motor type	2-/4-phase stepper motor, e.g. 100, 200 or 400 full steps per revolution
Step resolution	4,096 micro-steps/full step 819,200 steps per revolution (with 200-step motor)
Output stage	Automatic adaptation to many motor types
Max. phase current	1.25 A
Motor current	0.03...1.25 A, adjustable by software
Motor current reduction at standstill	0...100 % of the set motor current
Delay in motor current reduction	Adjustable from 0...65,000 ms
Motor voltage	20.1...28.9 V
Travel modes	Vector or individual axis movement possible
Max. vectors/s with PC	250 vectors/s (depending on PC and software used)
Speed range	0.000001...70 revolutions/s
Acceleration	0.0001...20 m/s <sup>2</sup> , programmable with only one instruction per axis
Travel range	depends on motor and ball screw pitch (e.g. max. ±2.6 m with 200-step motor and 1 mm ball screw pitch)
Instruction set	TANGO native, Venus-1, Venus-2 (others on request)

### Safety functions

Voltage monitoring 3.3 V + Reset	Monitors 3.3 V, triggers reset in the event of undervoltage
Voltage monitoring VCC5	Monitors 5.0 V, triggers PSE in the event of undervoltage
Undervoltage monitoring DC IN	Controller on: $U_e > 18.6...20.1$ V Controller off: $U_e < 16.9...19.0$ V
Overvoltage monitoring DC IN	Controller off: $U_e > 28.9...31.3$ V
Overcurrent/short-circuit protection output stage	Phase/phase and phase/ground, output stage switches off, can be reset using software
Overcurrent/short-circuit protection ext. voltages	VCC_HDI, +5VEXT1 ( <i>Motor 1-3</i> ), +5VEXT2 ( <i>AUX mini</i> ): automatic reset after fault 5V_ENC ( <i>Encoder 1-3</i> ), 24VBUS ( <i>AUX mini</i> ): switch-off after fault, reset by software or power cycle
Limit switch input	2 per axis, TTL-level, normally closed or normally open, switch after 0 V or +5 V, pull-up or pull-down resistors can be programmed separately for each input
Travel range limits	Programmable within ±2.6 m
Software stop	Stops the movement
PSE	Power Stage Enable, contacted to +5V: Output stages can be switched on, open or contacted to GND: Output stages 1-3 are switched off by hardware

Brake connection (Port <i>Motor 1-3</i> )	Output brake (24 V, max. 0.5 A, short-circuit proof), switches off in the case of excess load, can be controlled by software
Temperature monitoring	Temperature measurement of the board by software, switch-off of the output stages in the event of over-temperature

### Interfaces

Human Device Interface ( <i>HDI</i> , digital)	For connection of Joystick digital or ERGODRIVE digital; automatic detection (plug & play)
Encoder interface ( <i>Encoder 1-3</i> )	Up to 3 measuring systems can be connected, encoder type: 1Vpp / Märzhäuser nanoScale (MR/analog 5Vpp) / RS-422, selectable via software, analog resolution: 16 bit, max. frequency with RS-422: 33 MHz <b>Note:</b> The encoder interface is optionally available and can be activated later if required.
USB interface ( <i>USB</i> )	For connection of the controller to a PC, USB 2.0, type B
RS-232 interface ( <i>AUX mini</i> )	For connection of the controller to a PC; RS-232 V24, max. 115 kBaud (can also be used as a command interface) <b>Note:</b> To be able to use the port <i>AUX mini</i> as an RS-232 interface, you require a special RS-232 cable. Please contact our Customer Service Center in this case.
CAN interface ( <i>AUX mini</i> )	For connection of the controller to other peripheral devices, max. 1 MBaud <b>Note:</b> The CAN interface is a customer-specific interface. Please contact our Customer Service Center if you have any questions.

### Special functions at the port *Motor 1-3*

TRIN1	TTL input, can be read via software (e.g. to release the motor brake) <sup>1</sup>
BRAKE	Port for motor brake, 24 V, max. 0.5 A, can be controlled via software
ETS	Interface for an electronic identification plate

<sup>1</sup> Pull-up/pull-down resistor can be selected via software

### Special functions at the port *AUX mini*

Clock, V/R OUT	Clock and direction signal, e.g. in order to control an ext. axis controller
Clock IN <sup>1</sup>	Pulses can be counted
Trigger OUT	Position-synchronous trigger e.g. in order to trigger a camera
Shutter OUT	Signal can trigger e.g. a shutter unit
Snapshot IN <sup>1</sup>	Snapshot input, saves the current position, position can be read later
PSE	Power Stage Enable, contacted to +5V: Output stages can be switched on, open or contacted to GND: Output stages are off
Analog OUT	Outputs: 0...4.9 V, e.g. for control of the microscope lighting, resolution: 16 bit
TTL IN <sup>1</sup>	Up to 2 TTL inputs readable by the user
TTL OUT	Up to 4 TTL outputs that can be written by the user
24VBUS	Voltage supply for any external modules such as axis 4, LED etc., can be switched by software, I <sub>max</sub> = 1 A

<sup>1</sup> Pull-up/pull-down resistor can be selected via software

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**Power supply**

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Motor voltage	20.1...28.9 V DC <sup>1</sup>
Starting current limitation	Starting current limitation makes "hot plugging" of the external power supply possible
Measurement of current consumption	Current consumption can be read by software <sup>1</sup>

---

<sup>1</sup> The current consumption depends on motor type, motor current, voltage supply, number of motors, number of revolutions, current consumption of peripherals etc.. The following applies as a guidance value:  $I_{max} @ 24 V = \text{approx. } 1/3 \times \text{sum of all motor currents} + 0.2 \text{ A for logic voltages} + 0.1 \text{ A per encoder (without further peripherals)}$ . Separate measurements must always be made.

## 8 Accessories

### 8.1 External Power Supply

Model: Adapter Technology ATS072T-P240, 24 V, 3 A, C14 mains plug

**Note:** Protective ground and GND are connected.

ATS 065T / ATS 072T
Desktop Power Supply
60 W – 72 W

**Features**

- Compliant to DoE 2016 (Level VI)
- ErP Stage 2, NRCan & GEMS Level VI
- No Load Power Consumption < 0.1 W
- Regulated Output with Low Ripple Noise
- 1 Year Warranty

**Marks / Approvals**






Abbildung ähnlich, Abweichungen möglich  
Image similar, variations possible

P: C14 Inlet (Protection Class I)  
A: C8 Inlet (Protection Class II)

**Specifications**

MODEL	Voltage	Min. Load	Max. Load	Max. Power
ATS 065T-P/A120	12.0 V	0.00 A	5.00 A	60 W
ATS 065T-P/A135	13.5 V	0.00 A	4.82 A	65 W
ATS 065T-P/A150	15.0 V	0.00 A	4.34 A	65 W
ATS 065T-P/A160	16.0 V	0.00 A	4.07 A	65 W
ATS 065T-P/A180	18.0 V	0.00 A	3.62 A	65 W
ATS 065T-P/A190	19.0 V	0.00 A	3.43 A	65 W
ATS 065T-P/A200	20.0 V	0.00 A	3.25 A	65 W
ATS 065T-P/A240	24.0 V	0.00 A	2.71 A	65 W
ATS 072T-P/A240	24.0 V	0.00 A	3.00 A	72 W
ATS 065T-P/A241	24.0 V	0.00 A	2.71 A (Peak: 11 A)	65 W
ATS 065T-P/A300	30.0 V	0.00 A	2.17 A	65 W
ATS 065T-P/A320	32.0 V	0.00 A	2.04 A	65 W
ATS 065T-P/A321	32.0 V	0.00 A	2.04 A	65 W
ATS 065T-P/A480	48.0 V	0.00 A	1.36 A	65 W
ATS 065T-P/A560	56.0 V	0.00 A	1.17 A	65 W

<b>INPUT</b>	<i>Voltage</i>	AC 100 V – 240 V
	<i>Frequency</i>	50 Hz - 60 Hz
	<i>Current</i>	1.40 A max.
	<i>Protection</i>	Internal Primary Current Fuse, Inrush Limiting
<b>OUTPUT</b>	<i>Load Regulation</i>	± 5 % (typical)
	<i>Ripple</i>	1 % – 2 % V p-p max. for output voltage at full load
	<i>Transient Response</i>	0.5 ms for 50 % load change typical
	<i>Leakage Current</i>	0.25 mA max.
	<i>Protection</i>	Short circuit Protection • Over Voltage Protection • Over Current Protection
<b>OTHERS</b>	<i>Cooling</i>	Convection
	<i>Efficiency</i>	DoE Level VI • Energy Star • ErP Stage 2 • NRCan & GEMS Level VI Certified
	<i>Holdup Time</i>	10 ms at full load
	<i>Dielectric Withstand</i>	AC 3000 V Primary – Secondary
	<i>MTBF</i>	300,000 calculated hours at 25 °C by telcordia SR-332
	<i>Output Cable</i>	UL 1185 20 AWG / 18 AWG / 16 AWG, Ferrit Core, Length: 150 cm
	<i>Output Connector Type</i>	Standard: 5.5 x 2.1 x 11 mm ATS 065T-P/A241 only: 3 Pin Mini DIN
<b>ENVIRONMENT</b>	<i>Temperature</i>	Operating: 0 °C – 40 °C / Storage: -20 °C – 80 °C
	<i>Humidity</i>	Operating: 20 % RH – 80 % RH / Storage: 10 % RH – 90 % RH
<b>EMI Conduction &amp; Radiation</b>	Compliance to EN 55032 Class B	
<b>Harmonic Current</b>	Compliance to EN 61000-3-2, -3	
<b>EMS Immunity</b>	Compliance to IEC 61000-1-2, -3, -4, -5, -6, -8, -11	
<b>Safety</b>	IEC / EN / UL 62368-1 • IEC / EN / UL 60950-1 • CE • RCM • PSE • BSMI	
<b>Case Dimensions</b>	115 mm x 53 mm x 38 mm	
<b>Weight</b>	310 g	

Specifications subject to change without notice

Fig. 2: Data sheet for external power supply

## 8.2 Start-up Adapter AUX mini



Fig. 3: Start-up adapter AUX mini

The *start-up adapter AUX mini* connects Pin 5 (*PSE*) to Pin 3 +5V at the port *AUX mini*.

- If the *start-up adapter AUX mini* has been inserted the output stages can be enabled.
- If the *start-up adapter AUX mini* is not inserted or if Pin 5 is open at port *AUX mini* or set to GND, the output stages are disabled.

### 8.3 Joystick Digital (Optional)

#### Product Description

In connection with the controller, the joystick is used for the manual movement of motorized micropositioning systems and is available in the following 4 versions:



Fig. 4: 2-Axes Joystick digital  
Art. no.: 00-76-200-1820



Fig. 5: 3-Axes Joystick digital  
Art. no.: 00-76-300-1820



Fig. 6: 3-Axes Joystick digital with Multi-Function Wheel  
Art. no.: 00-76-300-1821



Fig. 7: 4-Axes Joystick digital with Multi-Function Wheel  
Art. no.: 00-76-400-1820

#### Operating Elements and LED

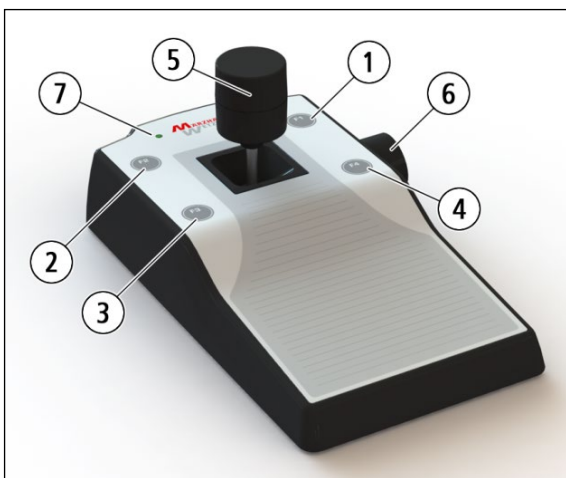


Fig. 8: Operating elements and LEDs (Fig. shows 4-Axes Joystick digital with Multi-Function Wheel)

No.	Operating element/LED
1	F1 key
2	F2 key
3	F3 key
4	F4 key
5	Control stick with rotary potentiometer <i>(rotary potentiometer only on 3-Axes Joystick digital and 4-Axes Joystick digital with Multi-Function Wheel)</i>
6	Multi-function wheel <i>(only on 3-Axes Joystick digital with Multi-Function Wheel and 4-Axes Joystick digital with Multi-Function Wheel)</i>
7	Status LED



The deflection of control stick and rotary potentiometer is in relation to speed (e.g. small deflection – low speed, large deflection – high speed).

Rotation of the multi-function wheel is synchronous to travel (e.g. 1 revolution on the multi-function wheel  $\triangleq$  0.1 mm change in position in the Z-axis).

## Functional Scope

On delivery, the operating elements of the joystick are configured as follows:

Operating element	Assigned function/axis
F1/F2/F3/F4 key	No assignment
Control stick	X-axis (axis 1) / Y-axis (axis 2)
Rotary potentiometer	Z-axis (axis 3)
Multi-function wheel	Z-axis (axis 3)

## Configuration Options

There is a multitude of configuration options for the joystick using SwitchBoard or manual programming of the controller. The states of control stick, rotary potentiometer, multi-function wheel and function keys can be queried via the software interface or be evaluated by the controller.

Configuration options for the joystick (excerpt):

- Free and precise programming of the maximum travel speed per axis (mm/s)
- Assignment of different speed curves per axis
- Inversion of direction of travel for control stick, rotary potentiometer and multi-function wheel
- Exchange of assignment of control stick deflection and axis to be moved (X/Y)
- Blocking of axes
- Programming of the path to be travelled per revolution of the multi-function wheel
- Assignment of the multi-function wheel to any axis
- Control of the LED illumination LED 100 by control stick or multi-function wheel

Depending on the configuration, the function keys F1-F4 permit fast access to various functions (excerpt):

- Switchover of joystick behaviour
- Switchover of the rotary potentiometer between Z and A-axis
- Change in speed
- Saving and approaching of coordinates (Snapshot function)
- Enabling the LED 100 illumination control
- Enabling the speed-proportional joystick functionality for the multi-function wheel

You will find detailed information about the joystick configuration in the following documents:

- *The Instruction Set of the TANGO Controller*
- *Operating Manual SwitchBoard*

## Technical Data

	2-Axes Joystick digital	3-Axes Joystick digital	3-Axes Joystick digital with Multi- Function Wheel	4-Axes Joystick digital with Multi- Function Wheel
Art. no.	00-76-200-1820	00-76-300-1820	00-76-300-1821	00-76-400-1820
No. of axes	2	3	3	4
Dimensions	229 × 122 × 90 mm	229 × 122 × 96 mm	229 × 139 × 90 mm	229 × 139 × 96 mm
Interface	TANGO HDI digital			
Material	Membrane keyboard (control panel), ABS polymer with haptic coating (housing), stainless steel (housing bottom)			
Weight	Approx. 1 kg			

## 8.4 ERGODRIVE Digital (Optional)

### Product Description

In connection with the controller, the ERGODRIVE is used for the manual movement of motorized micropositioning systems and is available in the following 2 versions:



Fig. 9: ERGODRIVE 2 digital  
Art. no.: 00-27-322-7000



Fig. 10: ERGODRIVE 3 digital  
Art. no.: 00-27-322-8000

### Operating Elements and LED



Fig. 11: Control elements (Fig. shows ERGODRIVE 3 digital)

Rotation of the drive knobs and the Z-wheel is synchronous to travel (e.g. 1 revolution on the drive knob/Z-wheel  $\cong$  0.1 mm change in position in the corresponding axis).

No.	Operating element/LED
1	X-drive knob
2	Y-drive knob
3	Z-wheel (only on ERGODRIVE 3 digital )
4	F1 key
5	Z-key (only on ERGODRIVE 3 digital )
6	XY-key

## Functional Scope

On delivery, the operating elements of the ERGODRIVE are configured as follows:

Operating element	Assigned function <sup>1</sup>
F1 key <sup>2</sup>	No assignment
XY-key <sup>2</sup>	Switch over XY-travel speed Value 1 (preset): 1.0 mm/rev Value 2: 14.0 mm/rev
Z-key <sup>2,3</sup>	Switch over Z-travel speed Value 1 (preset): 0.1 mm/rev Value 2: 1.0 mm/rev
X-drive knob	Move X-axis (axis 1)
Y-drive knob	Move Y-axis (axis 2)
Z-wheel	Move Z-axis (axis 3)

1 Factory setting, functions can be configured individually, see SwitchBoard operating manual or TANGO instruction set

2 On both sides of the ERGODRIVE

3 Only on ERGODRIVE 3 digital

## Configuration Options

There is a multitude of configuration options for the ERGODRIVE using SwitchBoard or manual programming of the controller. The states of drive knobs, Z-wheel and function keys can be queried via the software interface or be evaluated by the controller.

Configuration options for the ERGODRIVE (excerpt):

- Individual configuration of travel speeds
- Move X/Y-axis synchronously using X-drive knob
- Configure Z-wheel assignment (any axis, LED 100)
- Enable/disable toggle mode for XY/Z-key
- Configure F1 key (Snapshot, LED 100)
- Read out states of all function keys
- Enable/disable ERGODRIVE

You will find detailed information about the ERGODRIVE configuration in the following documents:

- *The Instruction Set of the TANGO Controller*
- *Operating Manual SwitchBoard*

## Technical Data

	ERGODRIVE 2 digital	ERGODRIVE 3 digital
Art. no.	00-27-322-7000	00-27-322-8000
No. of axes	2	3
Dimensions	139 × 170 × 188 mm	139 × 170 × 188 mm
Weight	Approx. 1.5 kg	Approx. 1.6 kg
Interface	TANGO HDI digital	
Material	Aluminium, anodised and lacquered black (housing), membrane keyboard (control panel)	

## 8.5 Mounting Plate



Fig. 12: Mounting plate for screw attachment

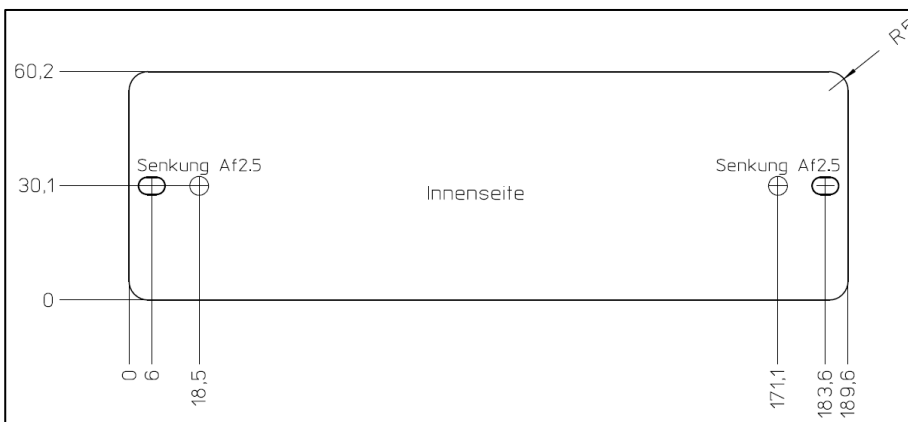


Fig. 13: Dimensions of the mounting plate

Dimensions (controller incl. mounting plate): 189.6 × 31.5 × 62 mm (W × H × D)

Dimensions (slotted holes): 4.5 × 7 mm

## 8.6 Mounting Adapter for 35 mm Top-Hat Rail (Optional)



Fig. 14: Mounting adapter for 35 mm top-hat rail

Dimensions (controller incl. mounting adapter): 164 × 48 × 62 mm (W × H × D)

## 9 Cleaning

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### **Danger to life and possible equipment damage due to improper cleaning.**

Liquids which penetrate the **power supply** can cause an electric shock, a short-circuit and damage to the power supply itself, the controller and connected devices.



Liquids which penetrate the **controller** can cause a short-circuit and damage to the controller and connected devices.

- Disconnect the power supply from the mains before starting cleaning work.
  - Ensure that no liquids enter the interior of the controller or the power supply.
  - Protect the connections/ports of the controller and the power supply from liquids.
  - Allow the controller and the power supply to dry before you connect the controller or the power supply to the mains again.
  - Never touch the ports/connections on the controller or the wall socket with wet hands.
- 



### **Danger to life and possible device damage through the spread of substances which are harmful to health.**

The controller and accessories are not protected against corrosive, infectious, toxic, radioactive or other substances which are harmful to health. Improper use of the controller can lead to health damage or even death as well as to device damage on the controller and surrounding devices.



- In the event of possible contamination with corrosive, infectious, toxic, radioactive or other substances which are harmful to health, disinfect/decontaminate the controller properly.
- 

- 1 Disconnect the controller from the mains.
- 2 Clean the controller with a lint-free cleaning cloth.  
With greater contamination, slightly dampen the cleaning cloth with water or a mild solvent-free disinfectant/cleaning agent.
- 3 Allow the controller to dry.
- 4 Connect the controller to the mains.

The controller is now ready to use again.

## 10 Maintenance

The controller is maintenance-free.

## 11 Service

If you notice a fault or malfunction during operation, check the outer circuitry first (voltage supply, cabling etc.). If the fault or malfunction persists, please contact our Customer Service Center.

The staff at our Customer Service Center will be happy to help with support queries, complaints and suggestions about our products and services.

Overview of the services from our Customer Service Center:

- Advice and support
- Support for customer-specific application questions
- Support for putting equipment into service
- Inspection and repair of equipment
- Fault analysis (also online via web conference)
- Delivery of spare parts and replacements
- User training (also online via web conference)

You can reach our Customer Service Center Mondays to Fridays from 08:00 am to 16:00 pm CET.

**Tel.:** +49 6441 9116-36

**Fax:** +49 6441 9116-40

**E-mail:** [service@marzhauser.com](mailto:service@marzhauser.com)

## 12 Taking out of Service



**Equipment damage possible through putting into/taking out of service with existing mains power connection.**

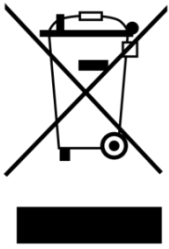
While the controller is connected to the voltage supply, connection and disconnection of cables can cause damage to the controller ports and the peripheral devices.

- Ensure that the controller is not connected to the power supply before you connect a PC or other peripheral devices to the controller or disconnect them from the controller.

- 1 Disconnect the controller from the power supply.
- 2 Disconnect all connected cables from the controller.
- 3 Clean the controller (see chapter 9 *Cleaning*, page 30).

Taking out of service is now complete.

## 13 Disposal



The adjacent symbol means that the controller is classified as electrical or electronic equipment in accordance with the EU Directive 2012/19/EU (WEEE) and thus cannot be disposed of with household waste.

Since the equipment is used commercially, it may not be disposed of via a communal collection point for electrical and electronic equipment.

Return the controller to Märzhäuser Sensotech for free and proper disposal.

- 1 Take the controller out of service.
- 2 Pack the controller and accessories properly.
- 3 Send the controller to:

**Märzhäuser Sensotech GmbH**  
**An den Fichten 35**  
**35579 Wetzlar (Germany)**

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**Note:** All equipment purchased from Märzhäuser Sensotech can be returned at any time for free disposal. If you wish to dispose of the equipment yourself, heed local laws and regulations.

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## 14 Declaration of Conformity



### Konformitätserklärung

Der Hersteller

**Märzhäuser Sensotech GmbH**  
An den Fichten 35  
35579 Wetzlar  
DEUTSCHLAND

erklärt, dass folgendes Produkt

Produktname: **TANGO 3 mini**  
Artikel-Nr.: **XXX-76-100-5800**  
**XXX-76-101-5800**  
**XXX-76-102-5800**  
XXX = 00-999, kundenspezifische Nummer  
Produkttyp: **Schrittmotorsteuerung**  
Verwendungszweck: **Steuerung von Mikropositioniersystemen**  
im Einsatz mit: **Externes Netzteil**  
**Adapter Technology ATS072T-P240**  
**(00-76-024-5800)**

bei Betrieb entsprechend der Betriebsanleitung die folgenden einschlägigen Harmonisierungsrechtsvorschriften der Europäischen Union erfüllt:

**EMV-Richtlinie 2014/30/EU**  
**Niederspannungsrichtlinie 2014/35/EU**  
**RoHS-Richtlinie 2011/65/EU**

Folgende harmonisierte Normen wurden angewandt:

**EN 61010-1:2010** **Sicherheitsbestimmungen für elektrische**  
+ A1:2019 + A1:2019/AC:2019 **Mess-, Steuer-, Regel- und Laborgeräte -**  
**Teil 1: Allgemeine Anforderungen**

**EN 61326-1:2013** **Elektrische Mess-, Steuer-, Regel- und**  
**Laborgeräte – EMV-Anforderungen –**  
**Teil 1: Allgemeine Anforderungen**

Bei einer Änderung des Produktes, die nicht von Seiten des Herstellers freigegeben wurde, verliert diese Konformitätserklärung ihre Gültigkeit.  
Die alleinige Verantwortung für die Ausstellung dieser Konformitätserklärung trägt der Hersteller.

Wetzlar, 25.08.2023

**Dr. Andreas Nolte** Geschäftsleitung | Management

**Uwe Schnitter** Qualitätsmanagement | Quality Management

**Approved by** Uwe Schnitter | 25.08.2023  
**Issued by** Christopher Koch | 25.08.2023

**Proved to be QMS conform by** Uwe Schnitter | 25.08.2023  
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EU

### Declaration of Conformity

The manufacturer

**Märzhäuser Sensotech GmbH**  
An den Fichten 35  
35579 Wetzlar  
GERMANY

declares that the following product

Product name: **TANGO 3 mini**  
Article No.: **XXX-76-100-5800**  
**XXX-76-101-5800**  
**XXX-76-102-5800**  
XXX = 00-999, customer specific ID  
Product type: **Stepper motor controller**  
Indented use: **Control of micropositioning systems**  
in use with: **External power supply**  
**Adapter Technology ATS072T-P240**  
**(00-76-024-5800)**

is in conformity with the following relevant European Union harmonisation legislation, when operated in accordance with the operating manual:

**EMC directive 2014/30/EU**  
**Low Voltage directive 2014/35/EU**  
**RoHS directive 2011/65/EU**

The following harmonised standards have been applied:

**EN 61010-1:2010** **Safety requirements for electrical**  
+ A1:2019 + A1:2019/AC:2019 **equipment for measurement, control,**  
**and laboratory use – Part 1:**  
**General requirements**

**EN 61326-1:2013** **Electrical equipment for measurement,**  
**control and laboratory use – EMC require-**  
**ments – Part 1: General requirements**

In case of a modification of the product, which was not approved by the manufacturer, this Declaration of Conformity loses its validity.  
This Declaration of Conformity is issued under the sole responsibility of the manufacturer.

Fig. 15: Declaration of Conformity EU



### Konformitätserklärung

### Declaration of Conformity

Der Hersteller  
**Märzhäuser Sensotech GmbH**  
 An den Fichten 35  
 35579 Wetzlar  
 DEUTSCHLAND

The manufacturer  
**Märzhäuser Sensotech GmbH**  
 An den Fichten 35  
 35579 Wetzlar  
 GERMANY

erklärt, dass folgendes Produkt

declares that the following product

Produktname: **TANGO 3 mini**  
 Artikel-Nr.: **XXX-76-100-5800**  
                   **XXX-76-101-5800**  
                   **XXX-76-102-5800**  
                   XXX = 00-999, kundenspezifische Nummer  
 Produkttyp: **Schrittmotorsteuerung**  
 Verwendungszweck: **Steuerung von Mikropositioniersystemen**  
 im Einsatz mit: **Externes Netzteil**  
                       **Adapter Technology ATS072T-P240**  
                       **(00-76-024-5800)**

Product name: **TANGO 3 mini**  
 Article No.: **XXX-76-100-5800**  
                   **XXX-76-101-5800**  
                   **XXX-76-102-5800**  
                   XXX = 00-999, customer specific ID  
 Product type: **Stepper motor controller**  
 Indented use: **Control of micropositioning systems**  
 in use with: **External power supply**  
                   **Adapter Technology ATS072T-P240**  
                   **(00-76-024-5800)**

bei Betrieb entsprechend der Betriebsanleitung die folgenden einschlägigen Harmonisierungsrechtsvorschriften erfüllt:

is in conformity with the following additional relevant provisions, when operated in accordance with the operating manual:

- The Electromagnetic Compatibility Regulations 2016**
- The Electrical Equipment (Safety) Regulations 2016**
- The Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations 2012**

- The Electromagnetic Compatibility Regulations 2016**
- The Electrical Equipment (Safety) Regulations 2016**
- The Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations 2012**

Folgende harmonisierte Normen wurden angewandt:

The following harmonised standards have been applied:

- EN 61010-1:2010** **Sicherheitsbestimmungen für elektrische Mess-, Steuer-, Regel- und Laborgeräte - Teil 1: Allgemeine Anforderungen**  
+ A1:2019 + A1:2019/AC:2019
- EN 61326-1:2013** **Elektrische Mess-, Steuer-, Regel- und Laborgeräte – EMV-Anforderungen – Teil 1: Allgemeine Anforderungen**

- EN 61010-1:2010** **Safety requirements for electrical equipment for measurement, control, and laboratory use – Part 1: General requirements**  
+ A1:2019 + A1:2019/AC:2019
- EN 61326-1:2013** **Electrical equipment for measurement, control and laboratory use – EMC requirements – Part 1: General requirements**

Bei einer Änderung des Produktes, die nicht von Seiten des Herstellers freigegeben wurde, verliert diese Konformitätserklärung ihre Gültigkeit.  
 Die alleinige Verantwortung für die Ausstellung dieser Konformitätsklärung trägt der Hersteller.

In case of a modification of the product, which was not approved by the manufacturer, this Declaration of Conformity loses its validity.  
 This Declaration of Conformity is issued under the sole responsibility of the manufacturer.

Wetzlar, 25.08.2023

**Dr. Andreas Nolte** Geschäftsleitung | Management

**Uwe Schnitter** Qualitätsmanagement | Quality Management

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Fig. 16: Declaration of Conformity UK