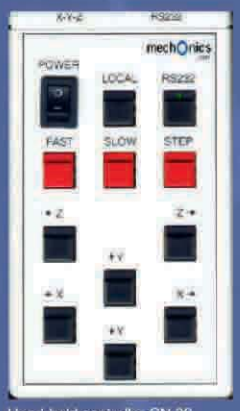
mechOnics.com

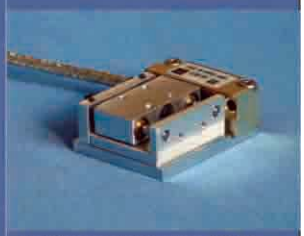
Micro Positioning Systems with Piezo Inertial Drives

- Piezo inertial drive with lowest hysteresis
- Reached position will be held without current
- Long lifetime
- Variable step width
  -open loop about 200 nm
  -closed loop about 50 nm
- High pushing or blocking force
- No limit switches necessary
- Ultra compact dimensions possible
- Customized solutions as
  -ultra high vacuum uses
  -ultra low temperature uses
  -ultracompact drives
- Compact hand-held controller with
  -battery- or power supply operation
  -RS 232 Interface
- Compact USB controller with
  -USB voltage operation
  -USB - Interface



Hand-held controller CN 30


Miniature translation stage MS 30


Miniature translation stage MS 30; preparation for vacuum with linear measuring system


Customized development (positioning of an aperture in vacuum)


Monomode Coupler MK 25


Compact XYZ-positioner MX 25

mechOnics ag
Unnützstr. 2/B
81825 Munich
Fon +49 (0) 89/4202 4207
Fax +49 (0) 89/4202 4206
info@mechonics.de
www.mechonics.de

Table of contents of the delivery program

MK 25 Miniature Monomode Coupler MK 25 with piezo electric inertial motor

Technical Data

Travel:	2 mm in xyz
Max. speed:	2 mm/s (depends on controller)
Optical height:	20 mm
Mass:	58 g

Resolution (calculated)

Single step	~ 200 nm
1/16-step (with controller CU 30)	~ 15 nm
Half step	~ 100 nm
Double step (with controller CN 30)	~ 400 nm

Lens type

Type A:	
Numerical aperture	0.40
Clear aperture	3.7 mm
Focal length	4.60 (670 nm) 4.64 (785 nm)
Type B:	
Numerical aperture	0.38
Clear aperture	2.5 mm

Specifications

- Piezo driven step motor with low hysteresis
- holds reached position without current
- aspherical lenses with different NA
- optical height 20 mm
- 2 mm travel in xyz
- different fibre couplers
- step width about 200 nm
- positioning accuracy better than 100 nm
- velocity up to 0.5 mm/s
- CNC-machined aluminium body
- no limit switches necessary
- vacuum preparation optionally
- customized designs possible
- driven by hand-held (CN.030.0001) or USB controller (CU.030.xx0x)

Application Examples

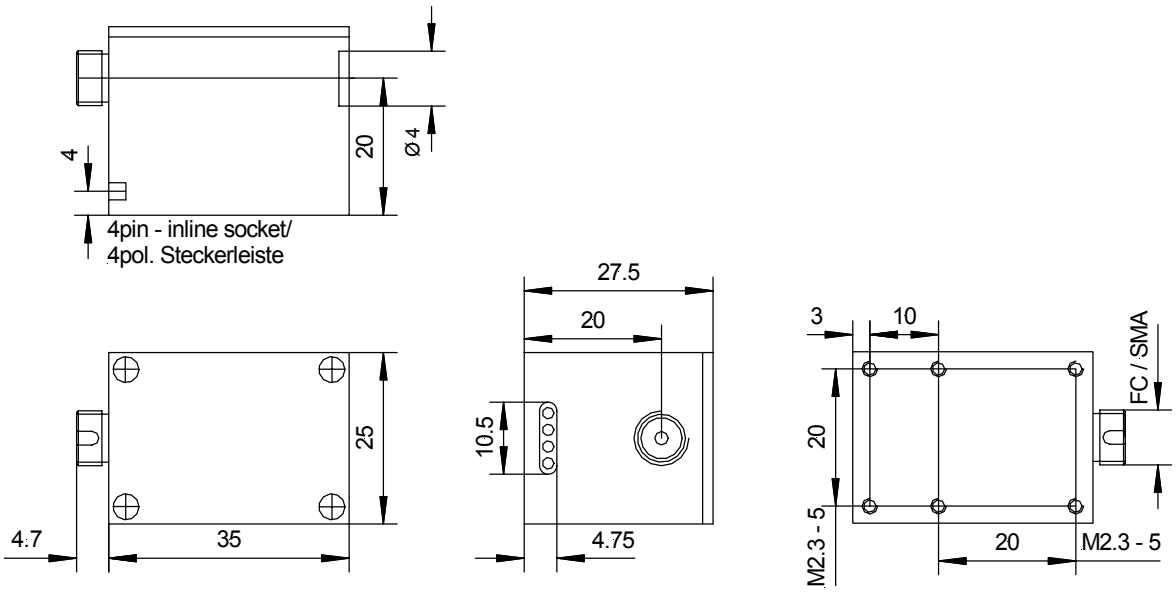
- Micro-/Nano Technology
- Bio Technology
- Microscopy
- Telecommunication
- Metrology
- R & D

Miniature Monomode-Coupler MK 25 **Part no.**

MK.025.1□□□

Coupler type	0 FC	1 SMA	
Vacuum	0 no	6 10^{-6}	x customized
Numerical aperture	A 0.40	B 0.38	x customized

Dimensions of the Monomode Coupler MK 25



mechOnics.com

MS 15 Ultra small Miniature Translation Stages with piezo electric inertial drive

Specifications

- Piezo driven step motor with low hysteresis
- holds reached position without current
- step width about 15 nm (depends on controller)
- positioning accuracy better than 50 nm
- velocity up to 1.5 mm/s (depends on controller)
- travel 3.5 mm
- xy or xyz combinations
- CNC-machined aluminium body
- precision ball bearing guides
- no limit switches necessary
- vacuum preparation optionally
- customized designs possible
- driven by hand-held (CN.030.0001) or USB controller (CU.030.xx0x)
- connection cable CK.030.1003 recommended

Technical Data

Travel:	3.5 mm
Max. speed:	1.5 mm/s (depends on controller)
Mass:	6 g

Load characteristics

Max. load	
M_x, M_y, M_z	0.4 Nm
F_x (blocking force)	4.5 (5) N
F_y, F_z	20 N

Resolution (calculated)

Single step	~ 300 nm
1/16-step (with controller CU 30)	~ 20 nm
Half step	~ 150 nm
Double step (with controller CN 30)	~ 600 nm

Guidance accuracy (without load)

Yaw angle	< 20 arc sec
Pitch angle	< 60 arc sec
Vertical deviation	< 1 µm
Lateral deviation	< 2 µm

Application Examples

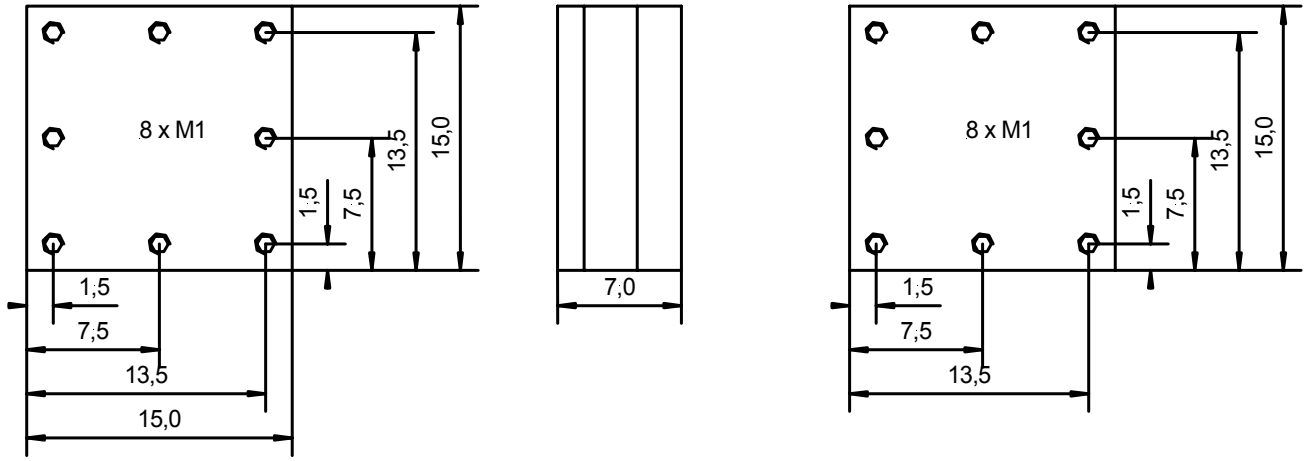
- Micro-/Nano Technology
- Bio Technology
- Microscopy
- Quality Control
- Metrology
- R & D

Miniature Translation Stage MS 15 — **Part no.** MS.015.04□□

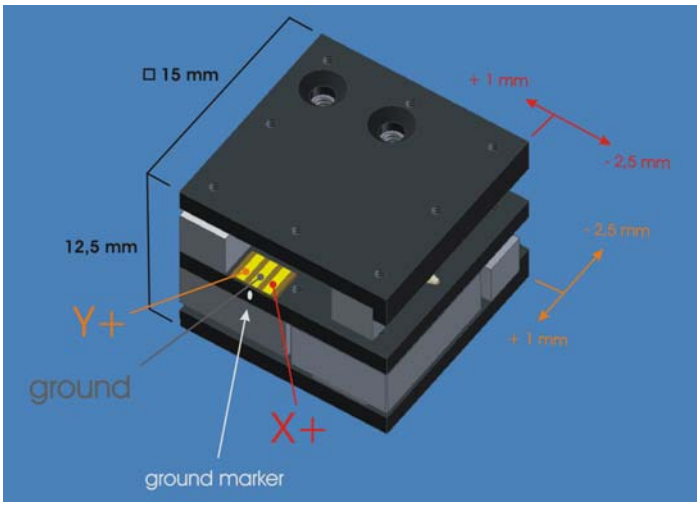
	0	6	9
Vacuum	no	10^{-6}	10^{-9}

	0	2	3
Mounting	x	xy (not removable)	xyz

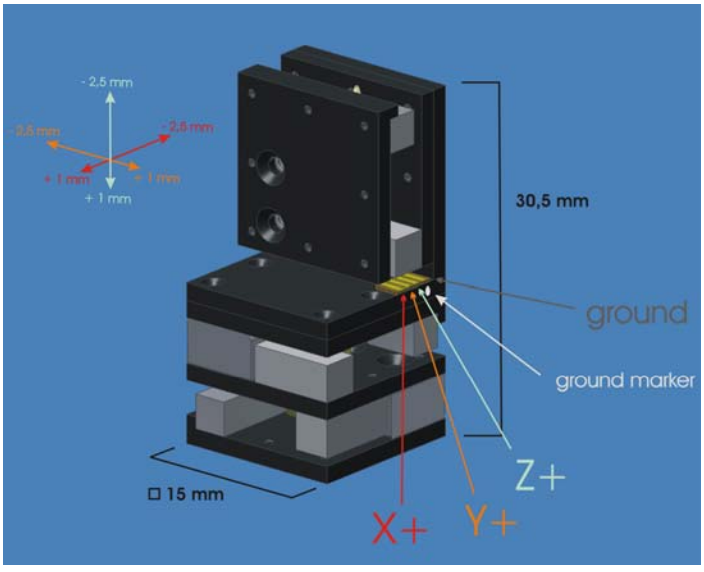
MS 15, 3.5 mm travel



Dimensions for xy – combination (not removable)



Dimensions for xyz – combination (xy – combination not removable)



mechOnics.com

MS 30 Miniature Translation Stages with piezo electric inertial drive

Specifications

- Piezo driven step motor with low hysteresis
- holds reached position without current
- step width about 15 nm (depends on controller)
- positioning accuracy better than 50 nm
- velocity up to 2 mm/s (depends on controller)
- travels up to 48 mm
- open- or closed loop-application
- xy or xyz combinations
- CNC-machined aluminium body
- precision ball bearing guides
- no limit switches necessary
- vacuum preparation optionally
- customized designs possible
- driven by hand-held (CN.030.0001) or USB controller (CU.030.xx0x)

Technical Data

Travel:	8, 18 or 30 mm
Max. speed:	2 mm/s (depends on controller)
Mass:	32, 38 or 54 g

Load characteristics

Max. load	
M_x, M_y, M_z	0.5 Nm
F_x (blocking force)	4.5 (5) N
F_y, F_z	30 N

Resolution (calculated)

Single step	~ 200 nm
1/16-step (with controller CU 30)	~ 15 nm
Half step	~ 100 nm
Double step (with controller CN 30)	~ 400 nm

Guidance accuracy (without load)

For 8 mm travel:	
Yaw angle	< 20 arc sec
Pitch angle	< 60 arc sec
Vertical deviation	< 1 µm
Lateral deviation	< 2 µm

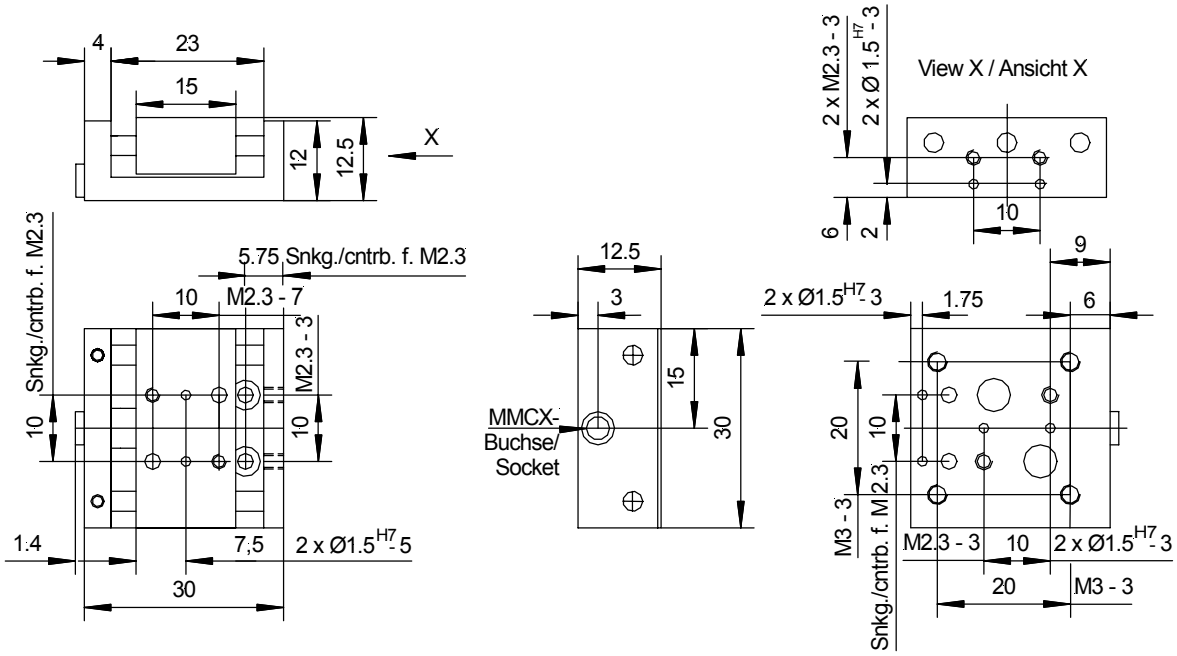
Application Examples

- Micro-/Nano Technology
- Bio Technology
- Microscopy
- Quality Control
- Metrology
- R & D

Miniature Translation Stage MS 30 — **Part no.** **MS.030.□□□□**

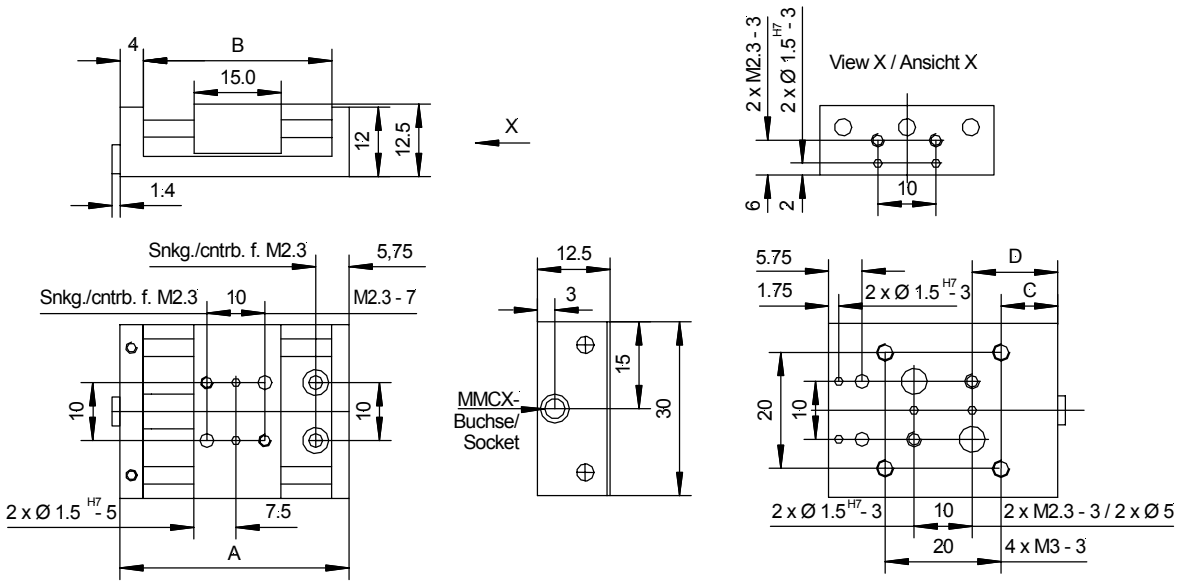
	08	18	30
Travel	8 mm	18 mm	30 mm
	0	6	9
Vacuum	no	10^{-6}	10^{-9}
	0	1	
Measuring-system	without	with (please specify with sensor)	

MS 30, 8 mm travel



MS 30, 18 and 30 mm travel

Travel	A	B	C	D
18	40	33	10	15
30	52	45	16	21



mechOnics.com

MS 38 Miniature Translation Stages with free opening dia 10 mm and piezo electric inertial drive

Specifications

- Piezo driven step motor with low hysteresis
- holds reached position without current
- step width about 15 nm (depends on controller)
- positioning accuracy better than 50 nm
- velocity up to 1.5 mm/s (depends on controller)
- travel up to 8 mm
- free opening of 10 mm (on whole travel)
- fits to optical bench systems (LINOS, OWIS aso.)
- xy or xyz combinations
- CNC-machined aluminium body
- precision ball bearing guides
- no limit switches necessary
- vacuum preparation optionally
- customized designs possible
- driven by hand-held (CN.030.0001) or USB controller (CU.030.xx0x)

Technical Data

Travel:	8 mm
Free opening	10 mm
Max. speed:	1.5 mm/s (depends on controller)
Mass:	32 g

Load characteristics

Max. load	
M_x, M_y, M_z	0.4 Nm
F_x (blocking force)	4.5 (5) N
F_y, F_z	20 N

Resolution (calculated)

Single step	~ 200 nm
1/16-step (with controller CU 30)	~ 15 nm
Half step	~ 100 nm
Double step (with controller CN 30)	~ 400 nm

Guidance accuracy (without load)

Yaw angle	< 20 arc sec
Pitch angle	< 60 arc sec
Vertical deviation	< 1 µm
Lateral deviation	< 2 µm

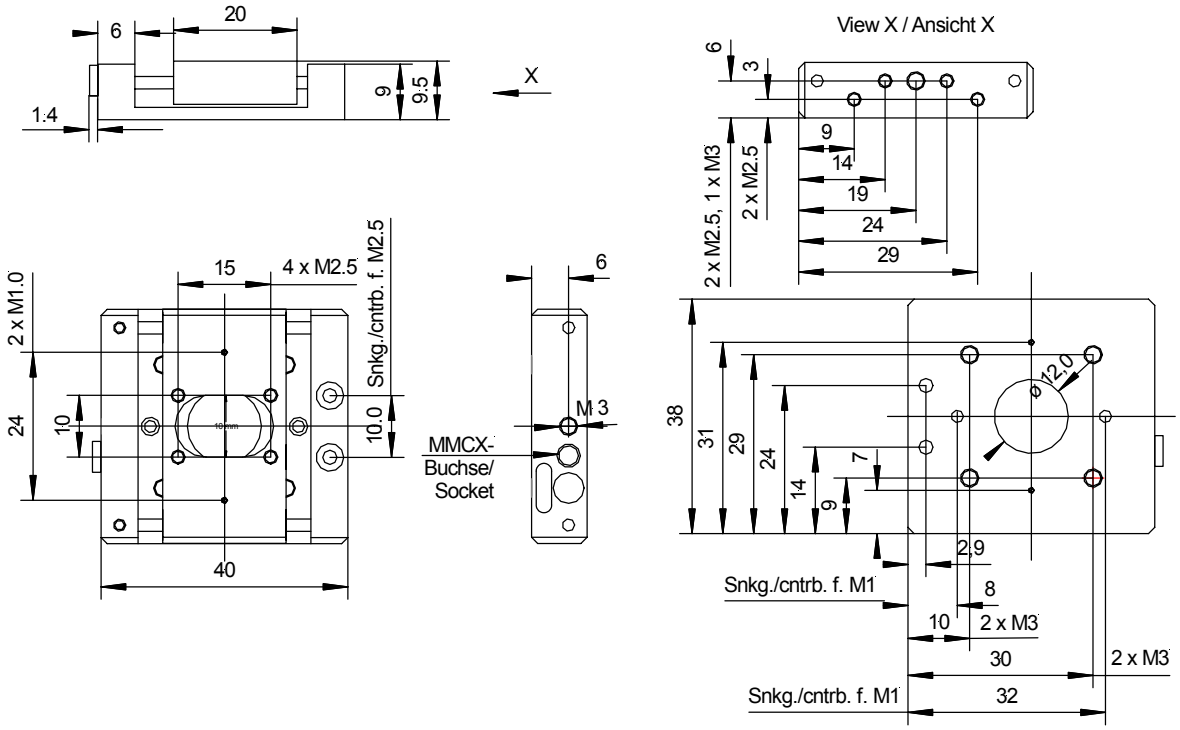
Miniature Translation Stage MS 38	Part no.
	MS.038.08□0

0	6	9
Vacuum	no	10^{-6}	10^{-9}

Application Examples

- Micro-/Nano Technology
- Bio Technology
- Microscopy
- Quality Control
- Metrology
- R & D

MS 38, 8 mm travel



xy and xyz combinations

mechOnics.com

ML 17 Miniature Translation Stages for Ultra Low Temperatures with piezo electric inertial drive

Specifications

- Piezo driven step motor with low hysteresis
- holds reached position without current
- for use at ultra low temperatures up to 4 K
- step width about 200 nm
- positioning accuracy better than 1 µm
- velocity up to 1.0 mm/s
- travels up to 5 mm
- xy or xyz combinations possible (L-bracket ML.017.9001 for xyz needed)
- CNC-machined steel body
- precision linear bearings
- no limit switches necessary
- vacuum preparation optionally
- customized designs possible
- driven by USB controller (CU.017.0003)

Technical Data

Travel:	5 mm
Max. speed:	1.0 mm/s (with controller CU 17 LT)
Electrical connection:	2 solder points
Mass:	25 g

Load characteristics

Max. load	
M_x	3.0 Ncm
M_y, M_z	1.5 Ncm
F_x (blocking force)	1.0 (1.5) N
F_y, F_z	1.0 N

Resolution (calculated)

Single step	
with 22 V (at 4.2 K)	~ 200 nm
with 42 V (at 4.2 K)	~ 500 nm
with 82 V (at 4.2 K)	~ 1 µm

(with controller CU 17 LT)

Guidance accuracy (without load)

For 5 mm travel:	
Vertical deviation	< 2 µm
Lateral deviation	< 2 µm

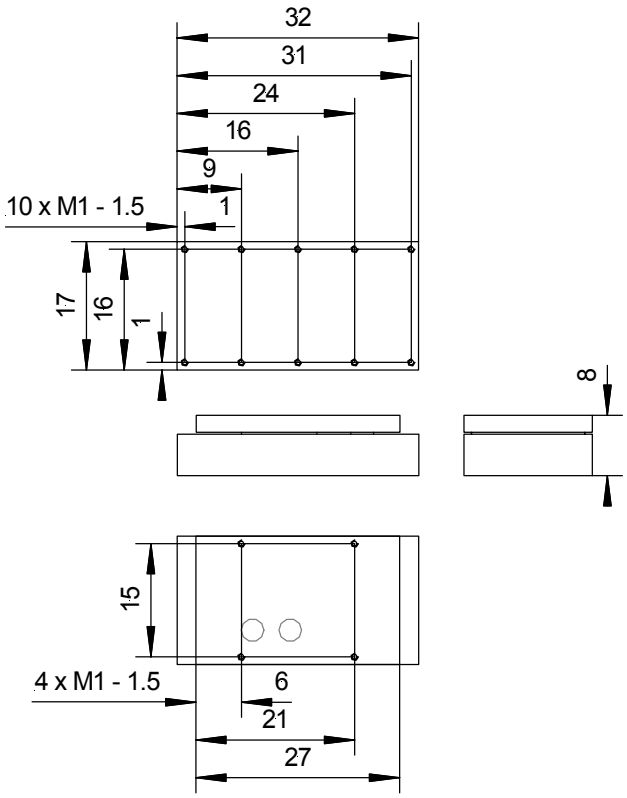
Application Examples

- Cryo - applications
- Micro-/Nano Technology
- Bio Technology
- Microscopy
- Quality Control
- Metrology
- R & D

Low Temperature Stage ML 17 — **Part no.** **ML.017.□□□0**

Travel	05	5 mm
	xx	customized
Vacuum	6	10^{-6}
	9	10^{-9}

Dimensions of the ML 17



xyz – combination of ML 17

mechOnics.com

MX 25/35 Miniature XYZ Positioners with piezo electric inertial drive

MX 25 with 2 mm travel in xyz-direction

Specifications

- Piezo driven step motor with low hysteresis
- holds position without power
- up to 10 mm travel in xyz
- full step width about 200 nm (micro stepping possible)
- positioning accuracy better than 50 nm
- velocity up to 2 mm/s (depends on controller)
- CNC-machined aluminium body
- no limit switches necessary
- vacuum preparation optionally
- customized designs possible
- driven by hand-held (CN.030.0001) or USB controller (CU.030.xx0x)

Application Examples

- Micro-/Nano Technology
- Bio Technology
- Microscopy
- Quality Control
- Metrology
- R & D

Technical Data

Travel:	
MX 25	2 mm in xyz
MX 35	10 mm in xyz
Max. speed:	2 mm/s (depends on the controller)
Mass:	
MX 25	46 g
MX 35	76 g

Load characteristics

Type of load	
M_x, M_y, M_z	0.15 Nm
F_x, F_y (jamming force)	< 2 N
F_z (jamming force)	< 3 N

Resolution (calculated)

Single step	~ 200 nm
1/16-step (with controller CU 30)	~ 15 nm
Half step	~ 100 nm
Double step (with controller CN 30)	~ 400 nm

Guidance accuracy (without load)

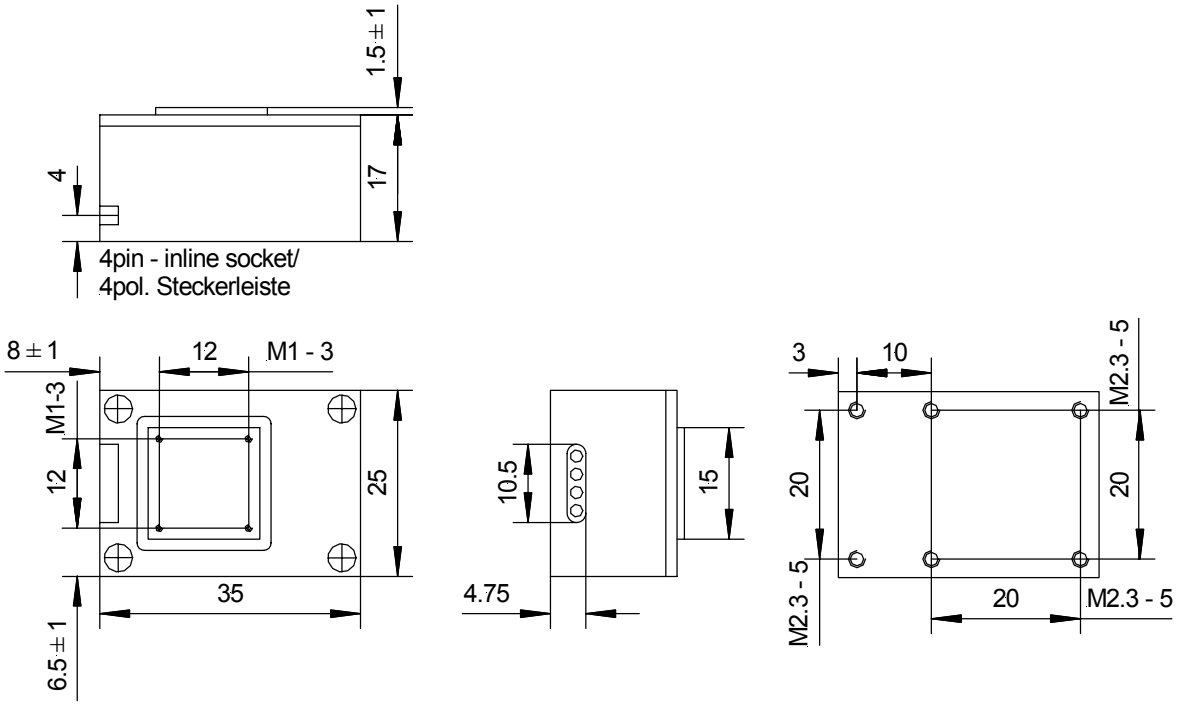
Vertical deviation	< 2 µm
Lateral deviation	< 2 µm

Miniature XYZ Positioner **Part no.**

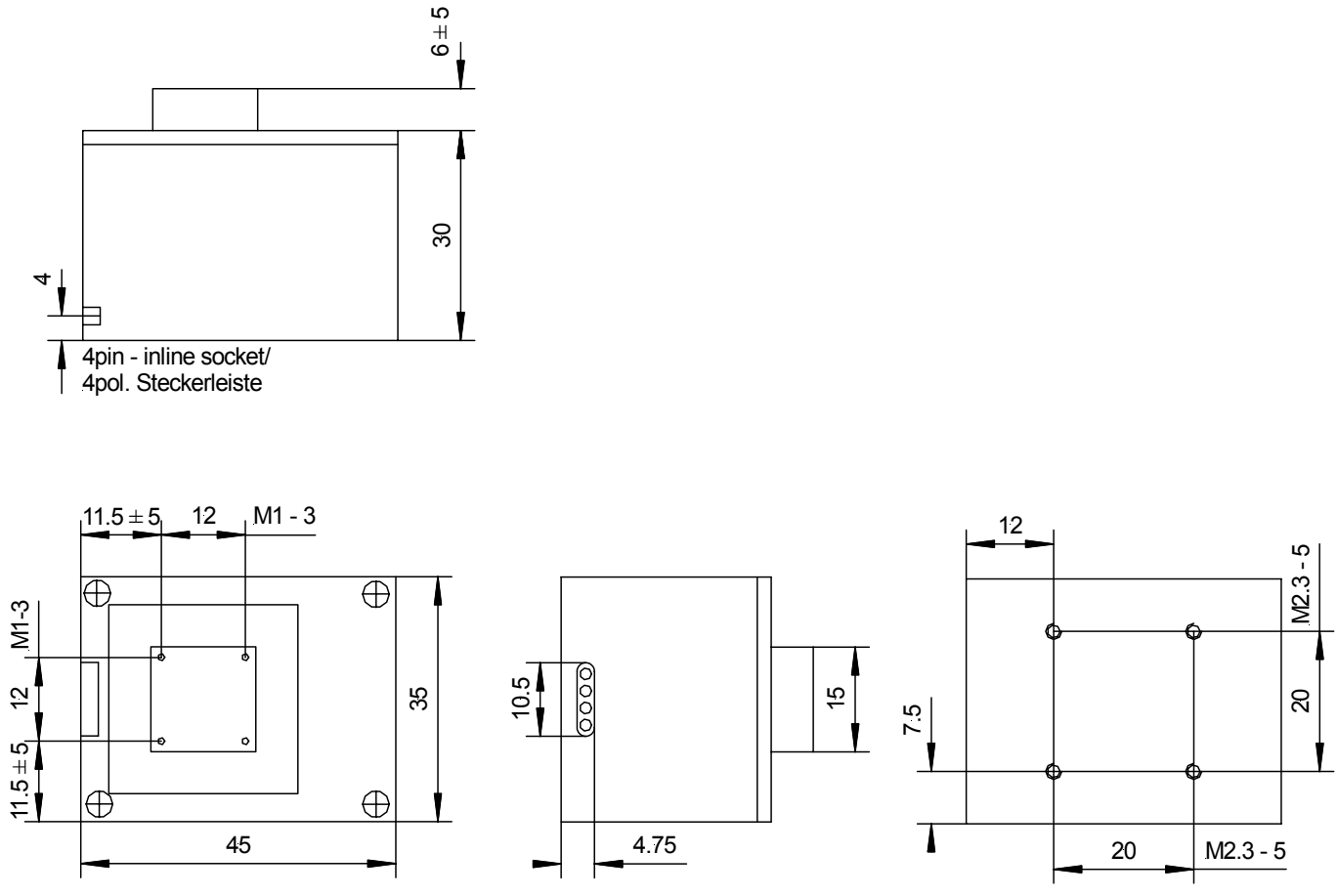
MX.0□5.1□□0

	2	3	
Type	MX 25	MX 35	
	0	x	
Top plate design	Standard	custom design	
	0	6	9
Vacuum	no	10^{-6}	10^{-9}

Drawings of the MX 25:



Drawings of the MX 35:



MT 25 Kinematical Mirror Tilting Stage with piezo electric inertial drive

Technical Data

Angular adjustment:	6 deg (± 3 deg)
Max. speed:	25 mrad/s (depends on controller)
Optical height:	11.5 mm (on rod) 12.5 mm (in plate)
Mirror mount:	dia. 12.7 mm (1/2 inch)
Free opening:	dia. 9 mm
Mass:	46 g

Resolution (calculated)	
Single step	~ 14 µrad
1/16 step (with controller CU 30)	~ 1 µrad
Half step	~ 7 µrad
Double step (with controller CN 30)	~ 28 µrad

Specifications

- Piezo driven step motor with low hysteresis
- holds reached position without current
- optical height 11.5 mm (on rod)
- angular adjustment 6 deg (± 3 deg)
- for mirror with dia. 12.7 mm (with mirror adapter also for larger mirrors)
- free opening of 9 mm
- solid state hinges
- step width about 14 µrad
- velocity up to 25 mrad/s (> 1 deg/s)
- also usable as prism stage
- no limit switches necessary
- vacuum preparation optionally
- customized designs possible
- driven by hand-held (CN.030.0001) or USB controller (CU.030.xx0x)

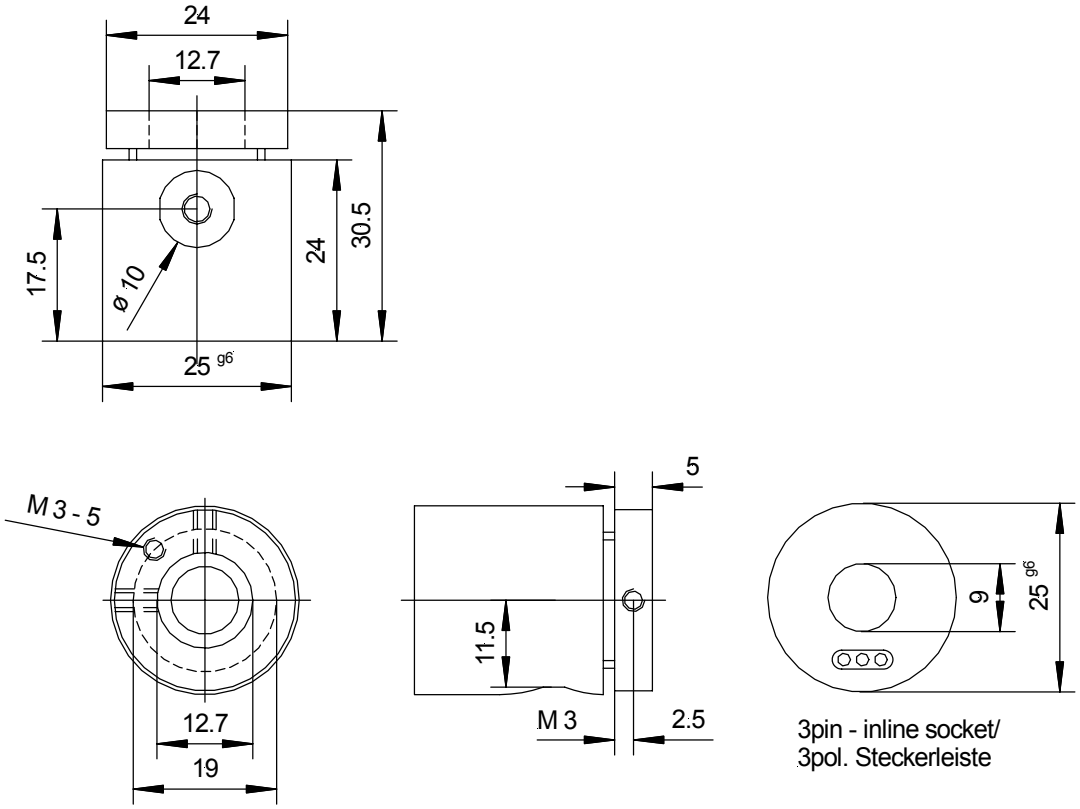
Application Examples

- Micro-/Nano Technology
- Bio Technology
- Microscopy
- Telecommunication
- Metrology
- R & D

Mirror Tilting Stage MT 25 — **Part no.** **MT.025.0□□0**

Mirror adapter	0	without	
	1	glas substrate	
Vacuum	0	no	
	6	10^{-6}	
	x	customized	

Dimensions of the Mirror Tilting Stage MT 25



PS 30 Linear Measuring System for Miniature Translation Stage MS 30

Miniature Translation Stage MS 30, 8 mm travel with PS 30

Spezifications

- measuring lengths up to 30 mm
- resolution better than 50 nm
- open- or closed loop-application
- xy combinations
- ultra high vacuum preparation optionally
- customized designs possible
- driven by USB-Controller CU 30 (CU.030.xx0x)

Technical Data

Measuring length	8, 18 or 30 mm
Mass	about 20 g

Resolution

Standard	1 µm
Premium	0.5 µm
High End	0.1 µm
Excellence	0.05 µm
(other resolutions on request)	

Scale tape

Material	Steel
Grating period	20 µm
Length of scale	measuring length + 22 mm
Reference mark	at the center of the scale
Linear expansion coefficient	23.8 x 10^{-6} grd^{-1}
Accuracy class	± 1 µm/m

Electrical Data

Scanning frequency	max. 400 kHz
Output signal	RS 422 with interpolation
Supply voltage	5 V DC +/- 10%
Power consumption	150 mA
Cable length	1.5 m
Operating temperature	0° – 55° C
Vibration (50 – 2,000 Hz)	< 200 ms^{-2}
Shock (11 ms)	< 400 ms^{-2}

Application Examples

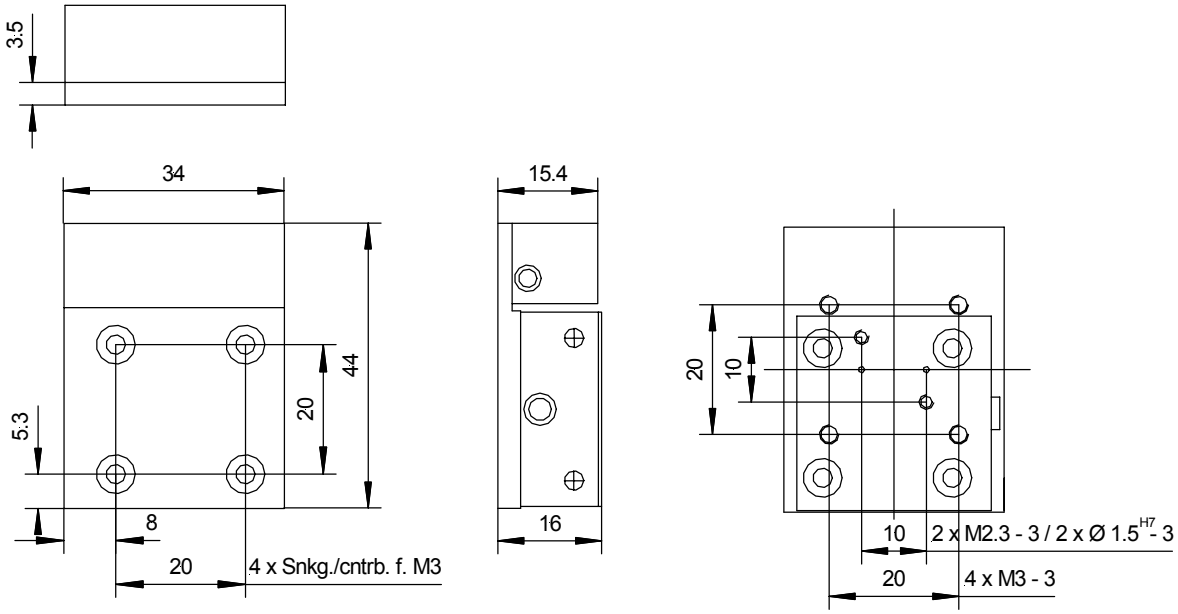
- Micro-/Nano Technology
- Bio Technology
- Microscopy
- Quality Control
- Metrology
- R & D

Linear Measuring System PS30 for Miniature Stage MS 30 **Part no.**

PS.030.□□□□

	08	18	30	
Travel	8 mm	18 mm	30 mm	
	0	3	6	9
Vacuum	no	10^{-3}	10^{-6}	10^{-9}
	2	3	5	6
Resolution	1 µm	0.5 µm	0.1 µm	0.05 µm

Linear Measuring System PS 30 with adapter plate for MS 30



XYZ-arrangement with MS 30 (8 mm travel) and PS 30 (8 mm travel and 50 nm resolution)

CN 30 Controller for Piezo Electric Inertial Motors

Specifications

- Special design for piezo driven step motor
- works with batteries or external power supply
- operates up to 3 axes
- customized designs possible
- USB-interface optionally

Technical Data

Power supply:	4 x round cell LR6 (Alkaline ~ 2000 mAh) and portable power supply in: 100 – 240 V out: 6 VDC with user-plug Ø 5.5/2.1 mm
Operation modes:	“Local” with keyboard (current consumption ~ 20 µA) “Remote” with RS 232-Interface (current consumption ~6 mA incl. LED) change switch for both modes on keyboard
Connections:	9pin Sub D-connector (male) 9pin Sub D-connector (female) 2pin Socket (female)
Speed modes:	“Fast” (ca. 0.7 mm/s) “Slow” (“Fast”/2) “Single step”
Step modes:	“Full step” “Half step” (“full step”/2) “Double step” (“full step” x 2)

RS 232-interface to the internal controller

Connection:	9pin Sub D-connector (male)
Data rate:	19200 Baud

Software for PC

- for DOS, Win 95, Win 2000, Win XP and Win NT:
  executable software with action buttons (similar to the stand-alone keyboard)
- for use with own programs:
  Borland Pascal Unit (DOS)
  DLL for Windows

Mass:	340 g incl. batteries
Dimensions:	158 x 96 x 52 mm
Delivery includes:	- miniature power supply - 4 x round cell LR6 - RS 232 connecting cable

CN 30 Controller	Part no.
	CN.030.0001

Application Examples

- Micro-/Nano Technology
- Bio Technology
- Microscopy
- Quality Control
- Metrology
- R & D

CU 30 USB-Controller for Piezo Electric Inertial Drives

CU 30 without sensor (for three axes)

Specifications

- Special design for piezo driven inertial motors
- works with USB-voltage (without sensor)
  or an additional power supply (closed loop controller)
- applications without position sensor or closed loop
- operates up to 3 axes
- customized designs possible
  (interfaces or number of axes)

Technical Data

Power supply:	USB-interface (without sensor) or portable power supply (for CU 30CL) in: 100 – 240 V out: 6 VDC with user-plug
Operation:	via USB-Interface 1.1 (without sensor) via USB-Interface 2.0 (closed loop)
Connections:	
without sensor	1 x 9pin Sub D-connector (female) 1 x USB Type B socket (USB 1.1)
closed loop	3 x 2pin MMCX sockets (female) 3 x 9pin Sub D-connectors (female) 1 x USB Type B socket (USB 2.0)
Speed modes:	0 to 1000 (0 to ca. 1.2 mm/s) for CU 30 0 to 255 (0 to ca. 1.2 mm/s) for CU 30CL
Software for PC	
- for DOS, Win 95, Win 2000, Win XP and Win NT:	executable software with action buttons
- for use with own programs:	Borland Delphi 7.0 Unit DLL for Windows Wrapper-DLL for LabView etc.
Mass:	about 150 g (without sensor) (also closed loop for 1 axis) about 470 g (closed loop for 3 axes)
Dimensions:	
without sensor	118 x 86 x 26 mm (L x W x H)
closed loop	124 x 170 x 55 mm (L x W x H)
Delivery includes:	USB connecting cable (CK.030.USB0) power supply (for 3 axes closed loop)

Application Examples

- Micro-/Nano Technology
- Bio Technology
- Microscopy
- Quality Control
- Metrology
- R & D

USB-Controller CU 30 **Part no.** **CU.030.□□0□**

Operation	0	without sensor	
	1	closed loop (CL) (with position sensor)	
Interface	0	USB	
	X	customized	
No. of axes	3	3	
	X	customized	

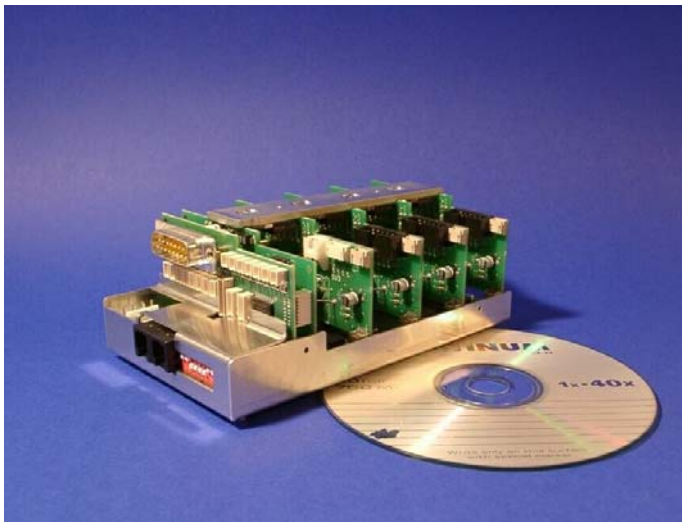
CU 30 closed loop (for three axes)

CK 25/30 Connecting Cables for Piezo Electric Inertial Drives

Part-no.	Description	Connections	Length
CK.025.0002	connecting cable for 1 x MT 25 (standard)	9pin Sub D-connector (male) to 3pin inline plug	1 m
CK.025.0003	connecting cable for 1 x MK 25 or 1 x MX 25/35 (standard)	9pin Sub D-connector (male) to 4pin inline plug	1 m
CK.025.1002	connecting cable for 1 x MT 25 (open wire)	9pin Sub D-connector (male) to 3 open wires	1 m
CK.025.1003	connecting cable for 1 x MK 25 or 1 x MX 25/35 (open wire)	9pin Sub D-connector (male) to 4 open wires	1 m
CK.025.1092	vacuum connecting cable for 1 x MT 25 (open wire)	open wire to 3pin inline plug	1 m
CK.025.1093	vacuum connecting cable for 1 x MK 25 or 1 x MX 25/35 (open wire)	open wire to 4pin inline plug	1 m
CK.030.0001	connecting cable for 1 x MS 30 (for closed loop controller CU 30 CL)	1 MMCX-plug to 1 MMCX-plug	1 m
CK.030.0003	connecting cable for up to 3 x MS 30 (standard)	9pin Sub D-connector (male) to 3 MMCX-plugs	1 m
CK.030.1003	connecting cable for up to 3 x MS 30 (open wire)	9pin Sub D-connector (male) to 3 open wires	1 m
CK.030.1091	vacuum connecting cable for 1 x MS 30 (open wire)	open wire to 1 MMCX-plug (up to 10^{-9} mbar)	1 m
CK.030.USBU	RS 232 – USB Transformer (only applicable with CN 30)	9pin Sub D-connector (male) to USB A – plug	1 m
CK.030.USB0	USB connecting cable	USB A – to USB B connectors	1.8 m

For vacuum connections please ask with detailed technical specifications.

CD 85 Controller for Servo Motors



Technical Data

No. of motors:	1 to 4 motors
Types of motors:	brushed or brushless servo
Encoder:	incremental
Types of profiles:	trapezoidal, s-curve, velocity profile, electronical gear, closed curves
Contr. commands:	user friendly and self-instructional commands and parameters
Electronical gear:	master encoder selectable, slave-axis selectable, factor “in motion” alterable
Outline buffer:	any outline with up to 65,000 points programmable
Control parameter:	PID-portion, acceleration/velocity parameter changeable during motion
Monitoring functions:	error limit and position error window selectable, comparator function, simultaneous tracing of different parameters during motion
Inputs per axis:	Encoder signals A, B, Index, Home, End+, End-
Free inputs:	16 inputs, protected against misconnection, short-circuit proof
Free outputs:	16 outputs
Status/Errordisplay:	6 LED
Interfaces:	RS 232, CAN-Bus (standard CAN 2.0B)
Supply voltage:	24 V

Specifications

- compact design, only 146 x 85 x 55 mm
- for up to 4 motors with 100 Watts
- power supply 24 Volts
- I/O card with 16 cannels optionally

Application Examples

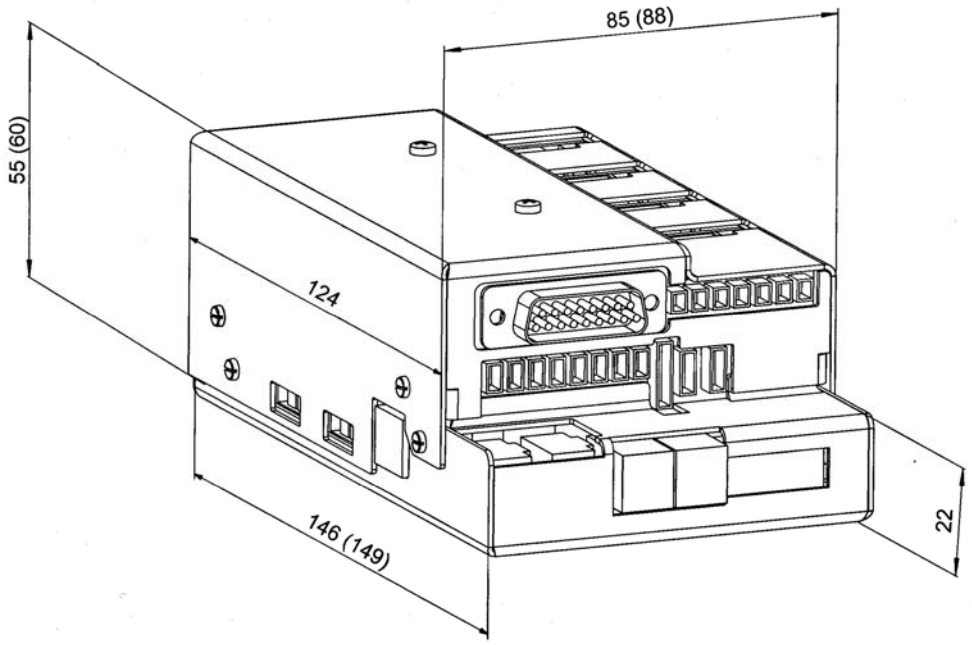
Motion control in
- Bio Technology
- Microscopy
- Quality Control
- Metrology
- R & D

Controller for Servo Motors Part no.

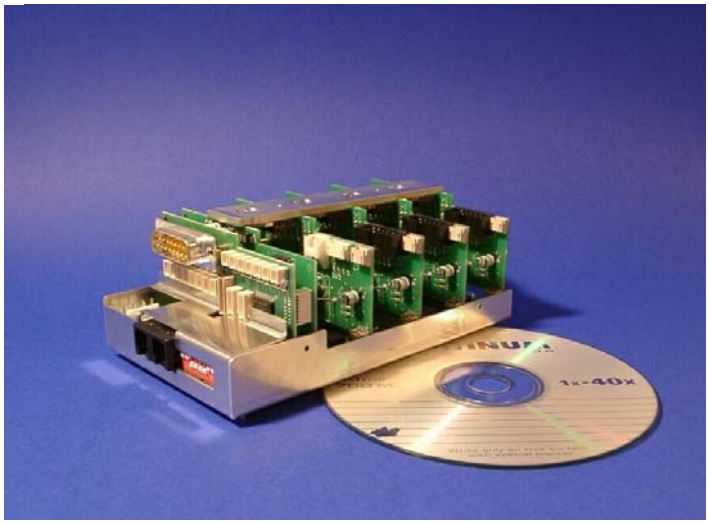
CD.085.□00□

Servo-type	1 Brushed servo	2 Brushless servo		
No. of axes	1	2	3	4

Dimensions:



CS 85 Controller for Stepper Motors



Technical Data

No. of motors:	1 to 4 motors
Types of motors:	stepper or micro stepper motors
Encoder:	incremental
Types of profiles:	trapezoidal, s-curve, velocity profile, electronical gear, closed curves
Contr. commands:	user friendly and self-instructional commands and parameters
Electronical gear:	master encoder selectable, slave-axis selectable, factor “in motion” alterable
Outline buffer:	any outline with up to 65,000 points programmable
Control parameter:	PID-portion, acceleration/velocity parameter changeable during motion
Monitoring functions:	error limit and position error window selectable, comparator function, simultaneous tracing of different parameters during motion
Inputs per axis:	Encoder signals A, B, Index, Home, End+, End-
Free inputs:	16 inputs, protected against misconnection, short-circuit proof
Free outputs:	16 outputs
Status/Errordisplay:	6 LED
Interfaces:	RS 232, CAN-Bus (standard CAN 2.0B)
Supply voltage:	24 V

Specifications

- compact design, only 146 x 85 x 55 mm
- for up to 4 motors with 100 Watts
- power supply 24 Volts
- I/O card with 16 cannels optionally

Application Examples

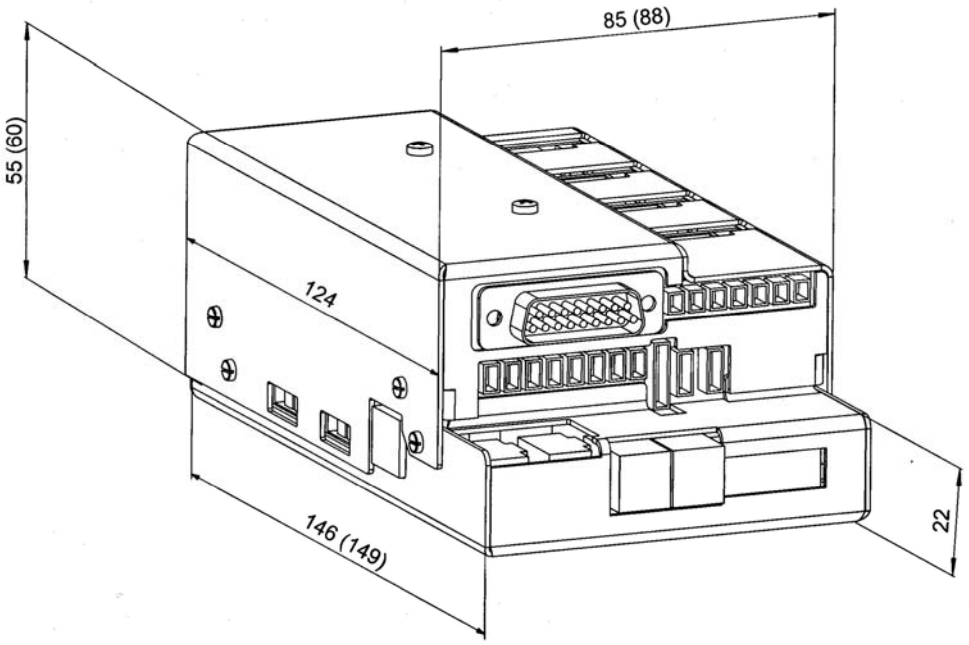
Motion control in
- Bio Technology
- Microscopy
- Quality Control
- Metrology
- R & D

Controller for Stepper Motors Part no.

CS.085.□00□

Type	1 Stepper	2 Micro stepper		
No. of axes	1	2	3	4

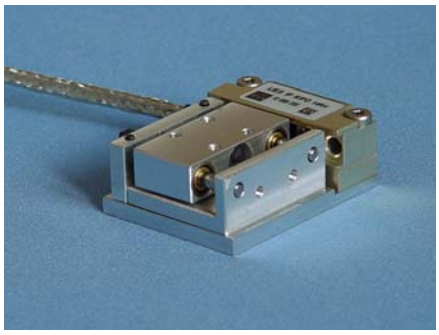
Dimensions:



mechOnics.com

Customized items of the mechOnics ag

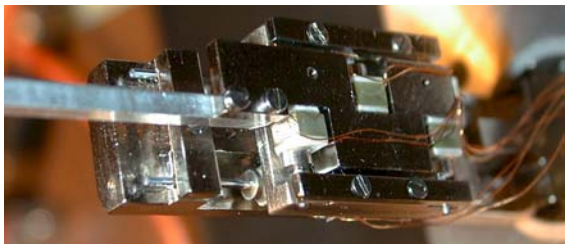
Linear measuring stage MS 30 with linear measuring system and vacuum preparation



MS 30 with
- 8 mm travel
- vacuum preparation for 10^{-6} mbar

Linear measuring system PS 30 with
- grating period 20 µm
- measuring increments 0.1 µm
- vacuum preparation for 10^{-6} mbar

Motorized aperture for REM

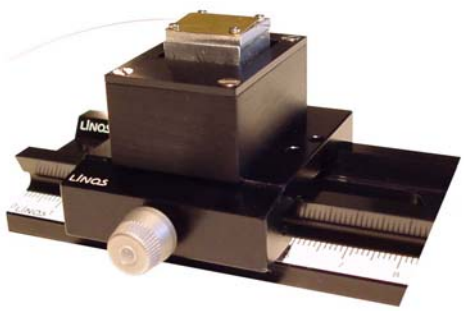


Linear positioner for an aperture with
- 7 mm travel in x – direction
- 1 mm travel in y – direction
- positioning accuracy better 1 µm
- vacuum preparation for 10^{-6} mbar
- nonmagnetic materials

XYZ – Positioner for ultra low temperature microscope

- 3 mm travel in xyz
- About 250 nm step width
- Working temperature 4.2K
- vacuum preparation for 10^{-6} mbar
- Compact design

XYZ – Positioner MX 25 as Fiberpositioner



XYZ – Positioner MX 25 with
- 2 mm travel
- About 200 nm step width
- Velocity about 0.5 mm
- On profile rail with optical height 40 mm