

## M-228 Stepper-Mike Linear Actuator

### Compact & Cost-Effective with Limit Switches



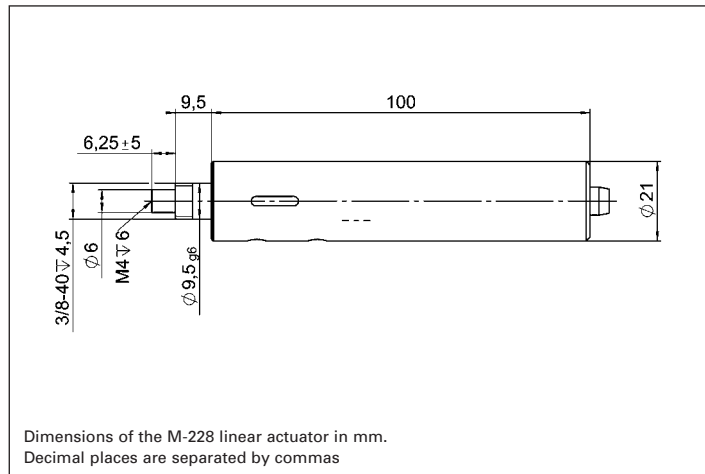
- **Cost-Effective Design**
- **10 mm Travel Range**
- **46 nm Resolution with C-663 Controller**
- **Non-Rotating Tip**
- **Max. Velocity 1.5 mm/s**
- **Non-contact Limit and Reference Switches**
- **Compact Design**

The linear actuators of the M-228 series provide a travel range of 10 mm and are equipped with high-resolution stepper motors with gearbox. Together with the C-663 controller, the M-228 provides a resolution of 46 nm for loads up to 20 N. The cost-effective

design offers many useful features such as a non-rotating tip, limit and reference switches and a mechanical position display.

#### Non-Rotating Tip

Compared to conventional rotating-tip micrometer drives,



the non-rotating-tip design offers several advantages:

- Elimination of torque-induced positioning errors
- Elimination of sinusoidal motion errors
- Elimination of wear at the contact point
- Elimination of tip-angle-dependent wobble

#### Limit and Reference Switches

For the protection of your equipment, non-contact Hall-effect limit and reference switches are installed. The direction-sensing reference switch supports advanced automation applications with high precision.

#### Ordering Information

**M-228.10S**  
Stepper-Mike Linear Actuator,  
10 mm, Limit Switches

**Ask about custom designs!**

#### Technical Data

| Model                         | M-228.10S                             | Units      |
|-------------------------------|---------------------------------------|------------|
| Active axes                   | X                                     |            |
| <b>Motion and positioning</b> |                                       |            |
| Travel range                  | 10                                    | mm         |
| Sensor resolution             |                                       | Cts./rev.  |
| Design resolution             | 0.046*                                | µm         |
| Minimum incremental motion    | 0.15*                                 | µm         |
| Backlash                      | 5**                                   | µm         |
| Unidirectional repeatability  | 2                                     | µm         |
| Accuracy                      | 10                                    | µm         |
| Max. velocity                 | 1.5*                                  | mm/s       |
| Origin repeatability          | 1                                     | µm         |
| <b>Mechanical properties</b>  |                                       |            |
| Spindle                       | Leadscrew                             |            |
| Spindle pitch                 | 0.5                                   | mm/rev.    |
| Gear ratio                    | 28.44444:1                            |            |
| Motor resolution              | 384*                                  | steps/rev. |
| Max. load                     | 20                                    | N          |
| Max. push/pull force          | 20                                    | N          |
| Max. lateral force            | 0.1                                   | N          |
| <b>Drive properties</b>       |                                       |            |
| Motor type                    | 2-phase stepper motor                 |            |
| Operating voltage             | 24***                                 | V          |
| Limit and reference switches  | Hall-effect                           |            |
| <b>Miscellaneous</b>          |                                       |            |
| Operating temperature range   | -20 to +65                            | °C         |
| Material                      | Aluminium anodized, stainless steel   |            |
| Mass                          | 0.23                                  | kg         |
| Cable length                  | 0.5                                   | m          |
| Connector                     | Sub-D connector 15-pin                |            |
| Recommended controller/driver | C-663 (single-channel) (see p. 4-112) |            |

\*with C-663 stepper motor controller  
\*\*preloaded  
\*\*\*2-phase stepper motor, 24 V chopper voltage, max. 0.25 A/phase, 24 full-steps/rev.

## C-663 Mercury™ Step Controller 1-Axis Networkable Stepper-Motor Controller



C-663 Mercury™ Step stepper motor controller for cost-sensitive micropositioning tasks

- High Performance at Low Cost
- Stand-Alone Functionality
- Network Capability for Multi-Axis Applications
- Compatible and Networkable with C-863 Mercury™ DC-Motor Controllers
- Joystick Port for Manual Control
- Non-Volatile Macro Memory
- Parameters Changeable On-the-Fly

The Mercury™ Step stepper motor controller is the perfect solution for cost-effective and flexible motion control applications where a precision positioner is to be controlled by a PC or PLC (programmable

logic controller). The C-663 supplements the successful C-863 Mercury™ servo motor controller.

Microstepping of 1/16 full step (up to 6400 steps/rev. with PI

stepper motors) provides for ultra-smooth, high-resolution motion.

### Multi-Axis Control, Combination of DC & Stepper Motors

The networking feature allows the user to start out with one Mercury™ controller and add more units later for multi-axis setups.

The Mercury™ Step stepper motor controller shares its programming language with the well-established Mercury™ DC-motor controller. Up to 16 Mercury™ controllers (DC and stepper) can be daisy chained and operated from one computer.

### Flexible Automation

The C-663 offers a number of features to achieve automation and handling tasks in a very cost-effective way. Programming is facilitated by the high-level mnemonic command language with macro and compound-command functionality. Macros can be stored in the non-volatile memory for later recall.

For easy synchronization of motion with internal or external trigger signals four input and four output lines are provided. A joystick can also be connected for manual control.

Stand-alone capability is provided by a user-programmable autostart macro to run automation tasks at power up (no runtime computer communication required!).

### User-Friendly: Comprehensive Software Package and Two Interface Options

Easy data interchange with laptop or PC is possible via the USB interface. To facilitate industrial applications, an RS-232 interface is also standard.

The included software supports networking of multiple controller devices. LabVIEW™ drivers and Windows DLLs allow for easy programming and integration into your system. Mercury™ Step controllers can also be operated using the PI General Command Set (GCS) via a DLL. PI-GCS allows networking of different PI-con-

### Ordering Information

**C-663.10**  
Mercury™ Step Stepper Motor Controller with Wide-Range Power Supply, 24 V

**C-819.20**  
2-Axis Analog Joystick for Mercury™ Controller

**C-819.20Y**  
Y-Cable for Connecting 2 Controllers to C-819.20

**C-170.IO**  
I/O cable, 2 m, open end

**C-170.PB**  
Push Button Box, 4 Buttons and 4 LEDs

trollers such as piezo drivers and multi-axis servo controllers with minimal programming effort.

### Contents of Delivery

Each Mercury™ Step comes with a wide-range power supply, RS-232 communications cables, a USB cable and a comprehensive software package.

### Application Examples

- Flexible automation
- Handling
- Quality control
- Testing equipment
- Photonics applications
- Fiber positioning



Mercury™ Step controller with M-403.62S precision translation stage

## Technical Data

|                                    |   |
|------------------------------------|---|
| <b>Model</b>                       | <b>C-663.10</b>   |
| Function                           | Stepper motor controller, stand-alone capability                          |
| Drive type                         | 2-phase stepper motor   |
| Channels                           | 1   |
| <b>Motion and control</b>          |   |
| Trajectory profile modes           | Trapezoidal, point-to-point   |
| Microstep resolution               | 1/16 full step  |
| Limit switches                     | 2 x TTL, programmable   |
| Reference switches                 | 1 x TTL, programmable   |
| Motor brake                        | 1 x TTL, programmable   |
| <b>Electrical properties</b>       |   |
| Operating voltage                  | 15 to 30 V  |
| Current limitation per motor phase | 1000 mA   |
| <b>Interface and operation</b>     |   |
| Interface/Communication            | USB, RS-232 (bus architecture)  |
| Motor connector                    | Sub-D 15 (f)  |
| Controller network                 | Up to 16 units* on single interface                                       |
| I/O ports                          | 4 analog/digital in, 4 digital out  |
| Command set                        | Mercury™ native command set, GCS  |
| User software                      | MMCRun, PIMikroMove®  |
| Software drivers                   | GCS (PI General Command Set)-DLL,<br>LabVIEW drivers, native Mercury™ DLL |
| Supported functionality            | Start-up macro  |
| Manual control                     | Joystick, Y-cable for 2D motion, pushbutton box                           |
| <b>Miscellaneous</b>               |   |
| Operating temperature range        | 0 to 50 °C  |
| Mass                               | 0.3 kg  |
| Dimensions                         | 130 x 76 x 40 mm <sup>3</sup>   |

\*16 with USB; 6 with RS-232 (depending on RS-232 output driver of PC)

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Nanometrology

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Parallel Kinematics

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Vertical (Y)

Multi-Axis

Rotary &amp; Tilt Stages

Accessories

**Servo & Stepper  
Motor Controllers**
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Hybrid

Multi-Channel

Micropositioning  
Fundamentals

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