HEIDELBERG
INSTRUMENTS

*Preinstallation Guide*


# µPG 101

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# INTRODUCTION

This guide is designed as a layout to aid in the planning stages of installation for a Heidelberg Instruments µPG laser pattern generator. The following information is provided in this guide:

**Assignment of Responsibilities**

Defines the responsibilities of both the supplier and the purchaser in preparing the site for installation.

**Environmental Requirements**

Outlines temperature, humidity and minimum particle contamination requirements.

**Air and Vacuum supply**

Defines requirements for compressed air, water and vacuum connections.

**Electrical Requirements**

Defines electrical requirements that must be met for safe operation.

**Operating PC**

Identifies requirements for the PC running the GUI software.

**Sizes and Space Requirements**

Discusses space requirements.

**Receiving**

Outlines procedures for receiving the Heidelberg Instruments µPG.

# ASSIGNMENT OF RESPONSIBILITIES

## HEIDELBERG INSTRUMENTS RESPONSIBILITIES:

1. Identify all site requirements and make site-planning recommendations.
2. Unpack and install systems and conduct standard Heidelberg Instruments operation verification tests.

## PURCHASER RESPONSIBILITIES:

1. Prepare site as to meet all requirements defined in this guide.
2. Complete the enclosed **Preinstallation Site Inspection Checklist** and return it to Heidelberg Instruments.
3. Receiving and delivery of system to destination.
4. Provide adequate indoor storage to accommodate coordinated shipments.
5. Provide labor and transportation process for uncrating and positioning the system under Heidelberg Instruments supervision.

# ENVIRONMENTAL REQUIREMENTS

**ROOM:**

| | |
|---|---|
| **Temperature:** | within 18 - 25°C, stability €± 1°C |
| **Humidity:** | 50% ± 10%, noncondensing |
| **Vibrations:** | As low as possible, see note below |
| **Lighting** | yellow light, or according to substrate manufacturers recommendation |

Clean room quality requirements depend on the products to be manufactured by the µPG 101. System specifications do not depend on the clean room quality, but the less particles in the air, the less defects are to be expected.

**VIBRATIONS:**

The µPG 101 is equipped with rubber feet for coarse vibration isolation. It is recommended to install it on a stable underconstruction. If additional vibration damping is required, it has to be provided in a way that is rigid against the lateral forces caused by the system stage movement (up to 20N) even when loaded with 100kg.

**HEAT PRODUCTION:**

The average heat generated by the µPG is around or below 500 W. This has to be taken into account when calculating the capacity for temperature setpoint and stability of the room climatization.

# AIR AND VACUUM SUPPLY

## COMPRESSED AIR:

| | |
|---|---|
| **Minimum Pressure** | 6 bar (88 psi) |
| **Maximum Pressure** | 10 bar (140 psi) |
| **Filter** | 40 µ |
| **Flow** | 7 sl*/min (0.2 scfm*/min) (17.5 l/min at standard pressure settings)<br>***Note:*** **Do not use gas cylinders!** With usual filling volume, gas cylinders can keep up this flow for only a few hours! Switching it off and on for exposures leads to unstable expsoure conditions! |
| **Temperature** | ±1 °C (±1.4° F) with respect to clean room temperature |
| **Conditions** | The supply must be free of all contaminating fluids, oil, and water, whether liquid or vapor. |
| **Connection** | Fast connector (male), which can be connected to (female) connector equivalent to FESTO-connector type: KD-3/8. (FESTO part# 2144).<br>**Note:** These air fittings are supplied with the system. The purchaser must provide 3/8 inch (9 mm) inside diameter (ID) hose. |

## VACUUM:

| | |
|---|---|
| **Minimum Pressure** | 0.5 bar (7 psi), negative |
| **Capacity** | min. 5 sl*/min (0.2 scfm*/min) |
| **Connection** | Connector for 1/4-inch (6mm) internal diameter hose. |

** 1 sl = 1 standard liter = 1 liter at 20 °C and 1 bar pressure, 1 scfm = same for cfm*

# ELECTRICAL REQUIREMENTS

## ELECTRICAL SUPPLIES:

| Electrical Requirements | µPG101<br>(Including user PC) |
|---|---|
| **Power** | 230 VAC ±5% 50 Hz ±0.5% or<br>110 VAC ±5% 60 Hz ±0.5% |
| **Service** | 230V: 6 Ampere, 110V: 12 Ampere<br>dedicated, single phase (3-wire: phase, neutral, ground). |
| **Peak power** | < 350W |
| **Average power consumption** | 75 W (idle) / 120 W (operating) |

**Caution:** Heidelberg Instruments enforces strict design control over the electrical requirements for each system. Electrical service that does not meet stated requirements can seriously affect the performance and the reliability of a system and may, in some cases, cause damage to the electronics. There are no shortcuts to meeting the electrical requirements.

*If the power specifications cannot be met for any reason, then an online true sine wave UPS is mandatory.*

## REQUIRED OUTLETS:

The µPG 101 can, according to specification, be connected to any local type 230VAC or 110VAC wall plug. The cable included with the system will be European (230VAC) or US-american (110V) standard type. Contact Heidelberg Instruments for other options.

## ELECTRICAL PLANNING GUIDELINES:

High frequency power line transients, impulses, sag, and surges must not be present on the system input line and may be affected by sources inside or outside the building housing the system.

To achieve maximum reliability Heidelberg Instruments recommends the following:

- A separate power isolation transformer supplying only the system and its peripherals. Regulation transformers may be required if power exhibits drops or surges in the line voltage beyond those ranges stated above. A transformer must be of an adequate size to power all system components and to accept additional equipment in the future.
- A power cut-off device, such as a remote trip switch or circuit breaker, to shut off power to all system components in the event of an emergency. This device must be easily accessible and located near a principle exit to the room housing the DWL system.
- High frequency transients should not be present on the input line.
- An uninterruptible safety earth ground connection may feed no more than a 2Ω impedance into the system.

The voltage differential between neutral and earth ground must not exceed 1V when measured at the system power line input terminals. The fluctuation of this value must not exceed 25mV peak-to-peak.

# SIZES AND SPACE REQUIREMENTS

## EQUIPMENT DIMENSIONS:

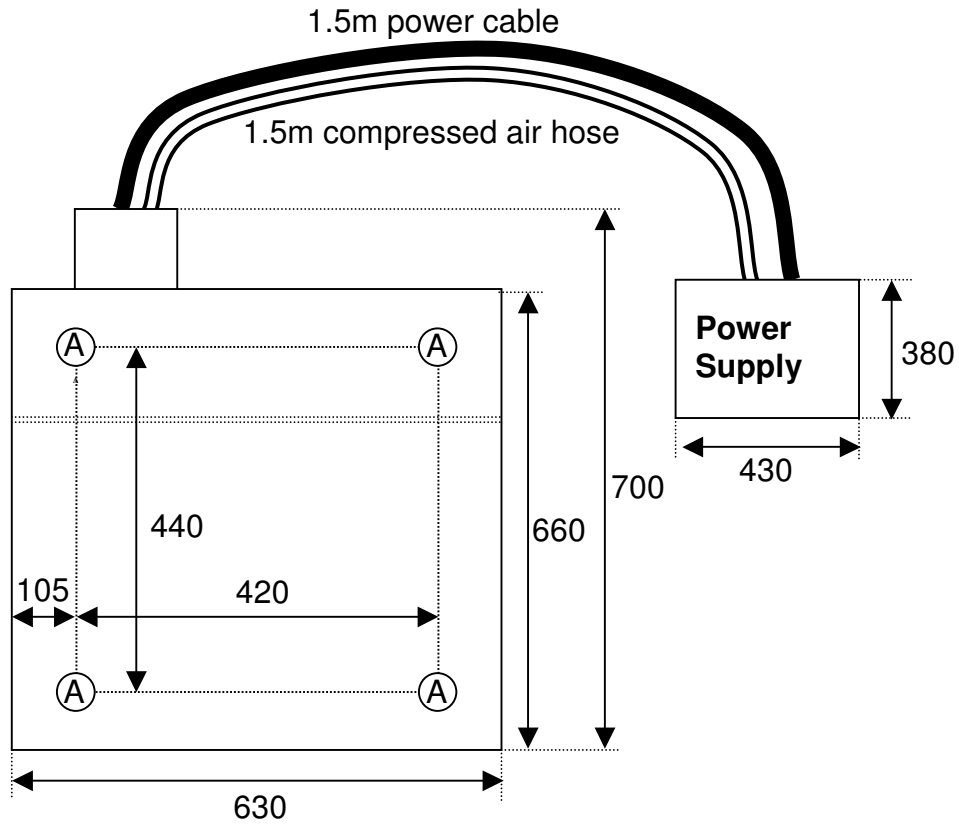
| µPG | Width | Depth | Height | Weight |
|---|---|---|---|---|
| **Main System housing** | 630 mm<br>25 inch | 700 mm<br>27.5 inch | 500 mm<br>19.7 inch | 120 kg<br>243 lbs |
| **Power Supply** | 430 mm<br>17 inch | 380 mm<br>15 inch | 230 mm<br>9 inch | 10 kg<br>22 lbs |

## SYSTEM LAYOUT:

**Note:** Picture is not drawn to scale. All dimensions shown are in mm (millimeters). To obtain inches divide these by 25.4.

## WEIGHT LOADS AT SUPPORTING POINTS:

| Location | Description | Footprint Size (mm) | Footprint Area ($cm^2$) | Vertical Load (Newton) | |
|---|---|---|---|---|---|
| | | | | Maximum | Typical |
| **A** | System | 50 Diameter | 20 | 400 | 300 |



# LITHOGRAPHY MATERIALS AND PROCESSING CAPABILITIES

## SUBSTRATES

The µPG works with a laser wavelength of either 405 nm or 375 nm (UV option). To do lithographic exposures, the photosensitive coating of the substrates has to be chosen according to the wavelength used and the intended application. Standard substrates for masks are flat (< ±10µm) chromium coated plates of float glass or quartz (depending on the requirements concerning temperature stability) with anti-reflection layer (e.g., chromium-oxide), or silicium wafers. Recommended photoresist coatings are:

- binary exposures (2D) on thin resists (~5000 Å):
  - **S1805**: A Shipley resist from the S1800 family that is spin-coated to 0.5 µm thickness
  - **AZ1350, AZ1505**: Clariant resists which are comparable to the S1805
- 3D resists structuring:
  - **AZ4562**: A Clariant resist with a thickness of ~6 µm (exact number depends on coating process),
  - **AZ9260**: Another Clariant resist with higher quality that can be coated with higher thickness.
  - **SU-8**: negative photoresist, requires **UV option**

Apart from SU-8, all resists listed are positive resists, i.e. exposed areas are developed during processing. Please contact resist manufacturers for more detailed data and recommendations on applications.
**Note**: All specifications given for the system are only referring to binary exposures on plates like those listed above, coated with one of the above quoted 2D resists, if not stated otherwise (e.g., gray value specifications).

## PROCESSING

After exposure, the substrates have to be processed according to the directions of the resist manufacturer and the required application. Please contact your supplier or the resist manufacturer on recommendations on the processing chemistry and process steps to be used for your application.
Standard materials used with the above quoted resists are:

| | binary (2D) | gray value (3D) |
|---|---|---|
| **Resist** | S1805 or AZ1350 or AZ1550 | *positive*: AZ4562 or AZ9260<br>*negative, UV option only*: SU-8 |
| **Developer** | AZ351B / MF351B in 1:4 dilution (1 part developer, 4 parts DI water), alternatively MF319 undiluted | *AZ resists*: AZ400K in a 1:3.5 ... 1:5 dilution (depends on application)<br>*SU-8*: SU-8 developer |

| | | |
|---|---|---|
| **Etcher** | Shipley chrome etch 18 | N/A |

For clean processing, a wetbench has to be prepared including a sink and several trays of appropriate size and material to hold the chemicals during processing. Also, many applications require a hot plate for pre-bake or post-bake of the resist-coated substrates to achieve optimum results.

## INSTALLATION REQUIREMENTS

| ***Materials*** | **binary (2D)** | **gray value (3D)** |
|---|---|---|
| **Plates:** | | |
| **Substrate** | chromium on glass, AR coated | glass |
| **Resist** | S1805 or AZ1350 or AZ1550 | AZ4562 or AZ9260 |
| **Size** | 2"x2" … 4"x4" | 2"x2" … 4"x4" |
| **Quantity** | 5 | 5 |
| **Developer** | 10l | 5l |
| **Etcher** | 1l Shipley chrome etch 18 | N/A |
| **De-ionized water** | 40l | 20l |

| ***Processing and Evaluation Equipment*** | |
|---|---|
| **Wet bench** | minimum requirements:<br>- fume hood<br>- sink connected to a DI water supply (additional DI connection with a shower head recommended)<br>- work space for three trays |
| **Trays** | at least 5 trays of size 6"x6" or bigger, material glass or other etch resistant material<br>(only required if no chemicals sinks for processing are included in the wet bench) |
| **Compressed Air / Nitrogen** | connection to a compressed air or nitrogen (for very clean high quality plates) reservoir with an air gun, for drying of plates after processing |
| **Microscope** | with appropriate resolution to view and assess the minimum structures specified (at least 100x, recommended 160x). |

# RECEIVING AND UNPACKING

## CRATED DIMENSIONS:

| Length (cm) | Width (cm) | Height (cm) | Tara (kg) | Weight (kg) |
|---|---|---|---|---|
| 125 | 90 | 75 | 60 | 190 |

## PLANNING GUIDELINES:

1. Systems can be delivered to a local warehouse equipped to handle computer equipment and transferred to the purchaser's facility later, if requested. Under no circumstance is equipment to be temporarily stored outside, not even crated.

**CAUTION:**

*The system must not be stored in damp, humid, or uncontrolled environment. If systems are stored for any length of time, the providing storage facility must adhere to a clean, controlled environment that will safeguard equipment from damage due to dust, humidity, and extreme temperature variations.*

2. The purchaser must notify the carrier if there are any restrictions on delivery time, or location.

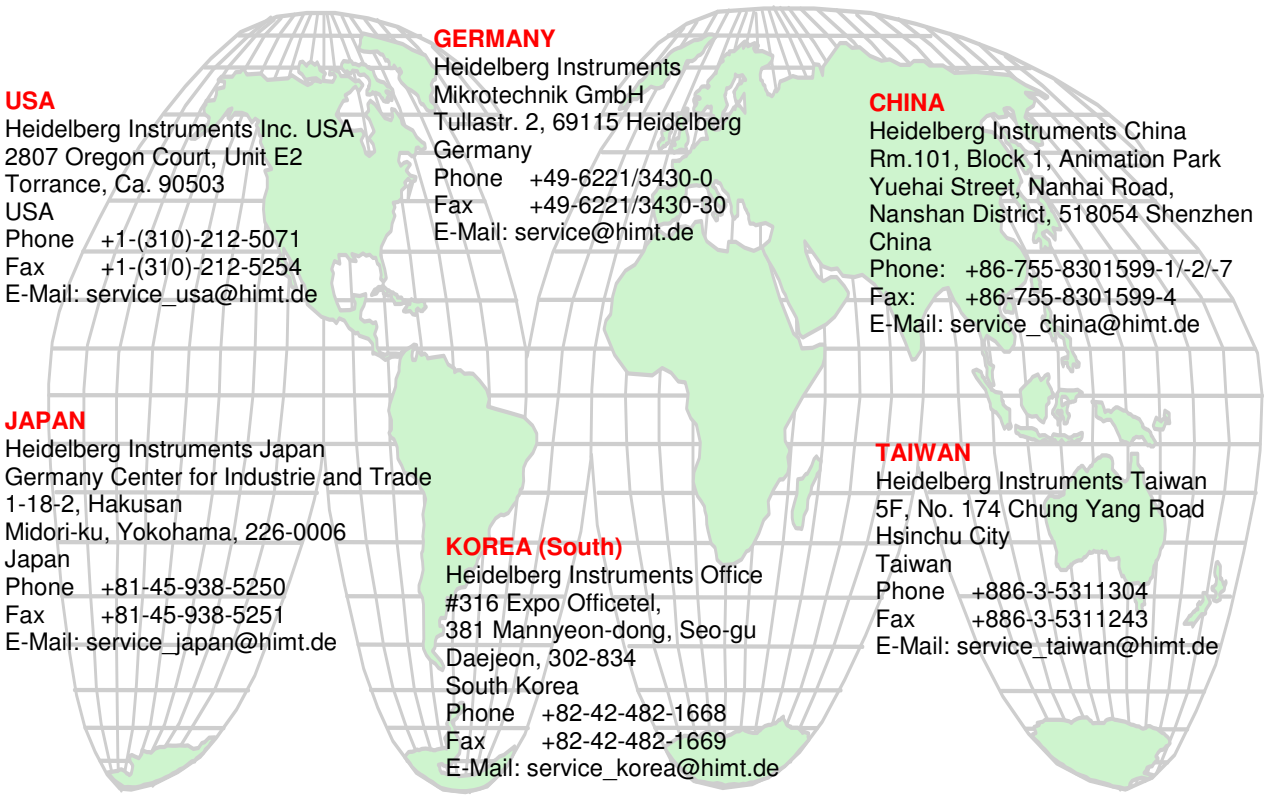
**RECEIVING GUIDELINES*:***

1. The purchaser's Receiving Department must conduct a thorough inspection of all incoming equipment and cartons.
   - *The number of packages or crates must match the number listed on the bill of loading.*
   - *Please make note of any missing items.*
   - *Make note if any of the shock watch or tilt watch labels shows red or is broken.*
   - *There should be no signs of abuse, mishandling, or damage due to shipping.*
2. If damage or discrepancies are detected, make the following notifications **immediately:**
   a. Driver of the delivery vehicle -*Make note of the damage or discrepancies on the bill of loading*
   b. Shipping carrier
   c. Your insurance company
   d. The carrier's insurance company
   e. Heidelberg Instruments or your HIMT representative.

# INSTALLATION CONSIDERATIONS OVERVIEW

| | | | |
|---|---|---|---|
| TEMPERATURE | 18 - 25°C, stability ±1°C | | |
| HUMIDITY | Non-condensing | | |
| VACUUM | 0.5 bar | | |
| COMPRESSED AIR | 6-10 bar, flow 17.5 l/min | | |
| ELECTRICAL | 230 VAC ± 5% 50Hz 6A, or 110VAC ± 5% 60Hz 12A | | |
| DIMENSIONS<br>SYSTEM:<br>POWER SUPPLY: | Width:<br>610 mm<br>430mm | Depth:<br>700 mm<br>380mm | Height:<br>500 mm<br>230 mm |
| WEIGHT | 130kg | | |
| SYSTEM BASE | stable, level, vibration dampened | | |

**FOR MORE INFORMATION ON OUR DIRECT WRITE LASER SYSTEMS, PLEASE CONTACT OUR WORLDWIDE SERVICE ORGANIZATION:**



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