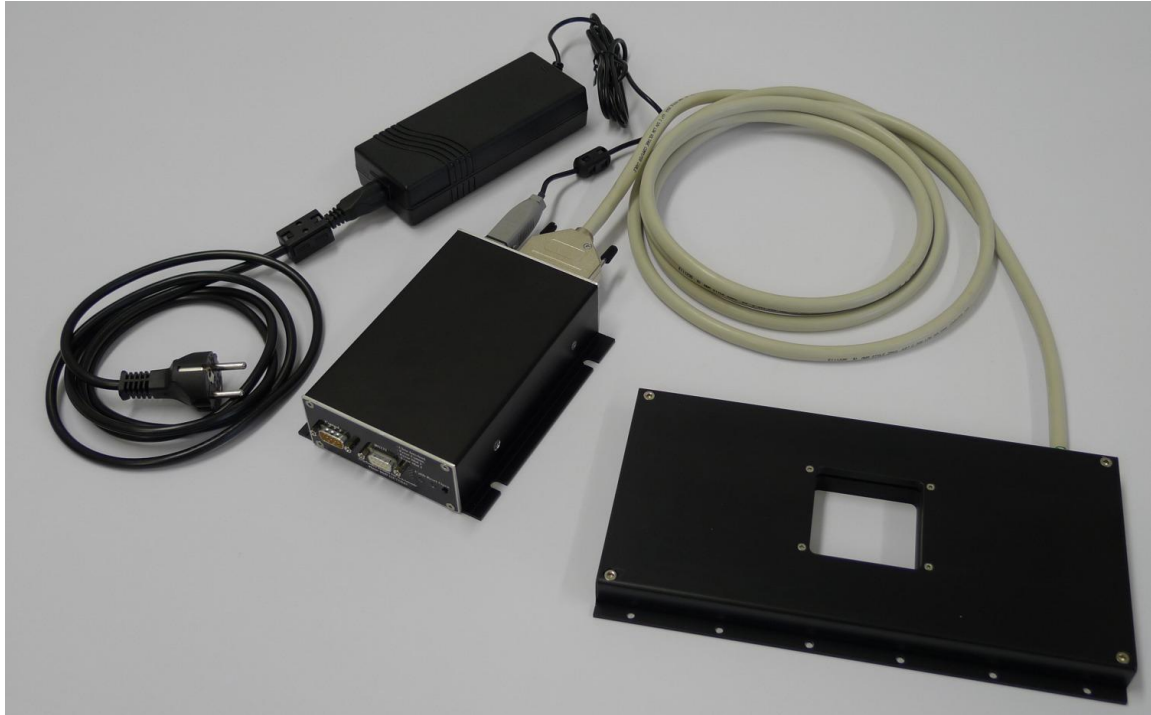


Bonn Shutter with 60mm x 60mm aperture



The Shutter system consists of:

- The mechanical shutter unit with cable.
- The shutter control unit with firmware and power supply.
- The shutter documentation.

Shutter specifications:

Mechanical Shutter Unit: General Specifications

| | |
|------------------------|---|
| Shutter type | Slit-type shutter with two independent blades driven by stepper motors. |
| Operation orientations | In all orientations without degradation. |
| Operation directions | In either direction without performance degradation |

Mechanical Shutter Unit: Mechanics

| | |
|----------------|---|
| Mass | ca. 1.0 kg |
| Aperture | The size of the free aperture is 60mm x 60mm. |
| Blade material | The shutter blades are made of carbon fiber material. Low reflectivity is achieved by a stable, resistant, black paint. |

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(haftungsbeschränkt)

Managing directors:
Dr. Klaus Reif
Dipl. Phys. Philipp Müller

Mechanical Shutter Unit: Electrics

| | |
|-------------------|---|
| Connector | DB-25 female. |
| Power dissipation | About 240mW in static state ("open" or "close" position). |

Mechanical Shutter Unit: Performance Specifications

| | |
|-------------------------|---|
| Minimum exposure time | <10ms. |
| Exposure time error | <300µs. |
| Exposure non-uniformity | <1ms over the full field of view. |
| Repetition rate | Minimum time interval between start of consecutive exposures is (exposure time + 0.2sec (ca.)). |
| Blade travel time | <0.2sec (ca.). Time the blade needs to cross the full width of the aperture. |

Shutter Control Unit: General Specifications

| | |
|---------------------|--|
| Status requests | Information about the status of the shutter (i.e. position of blades, open/close states, faults) are accessible through a standard RS232 communication line. |
| Shutter reset | A reset button at the Shutter Control Unit allows to reset the shutter at whatever time. |
| Status signal lines | 3 TTL compatible status signal lines are provided. 1. "shutter closed" status, 2.+3. blade A/B in aperture (alternatively: blade A/B moving) |

Shutter Control Unit: Mechanical Specifications (see pictures and drawings below)

| | |
|--------------|--|
| Dimensions | about 230mm x 130mm x 45mm (connectors attached) |
| Mass | about 1 kg |
| Power supply | 170mm x 65mm x 40mm, 0.6 kg |

Shutter Control Unit: Electrical Specifications

| | |
|---------------------------------------|---|
| Power dissipation | 30-40 W. |
| Exposure control and Status connector | DB-9 male. All signals are low active TTL compatible. |
| Shutter Connector | DB-25 male. |
| RS232 Connector | DB-9 female. |
| Push buttons (3) | open/close, reset, auto-calibration |
| External power supply input | 95 230VAC and 50 60Hz. |

Cabling

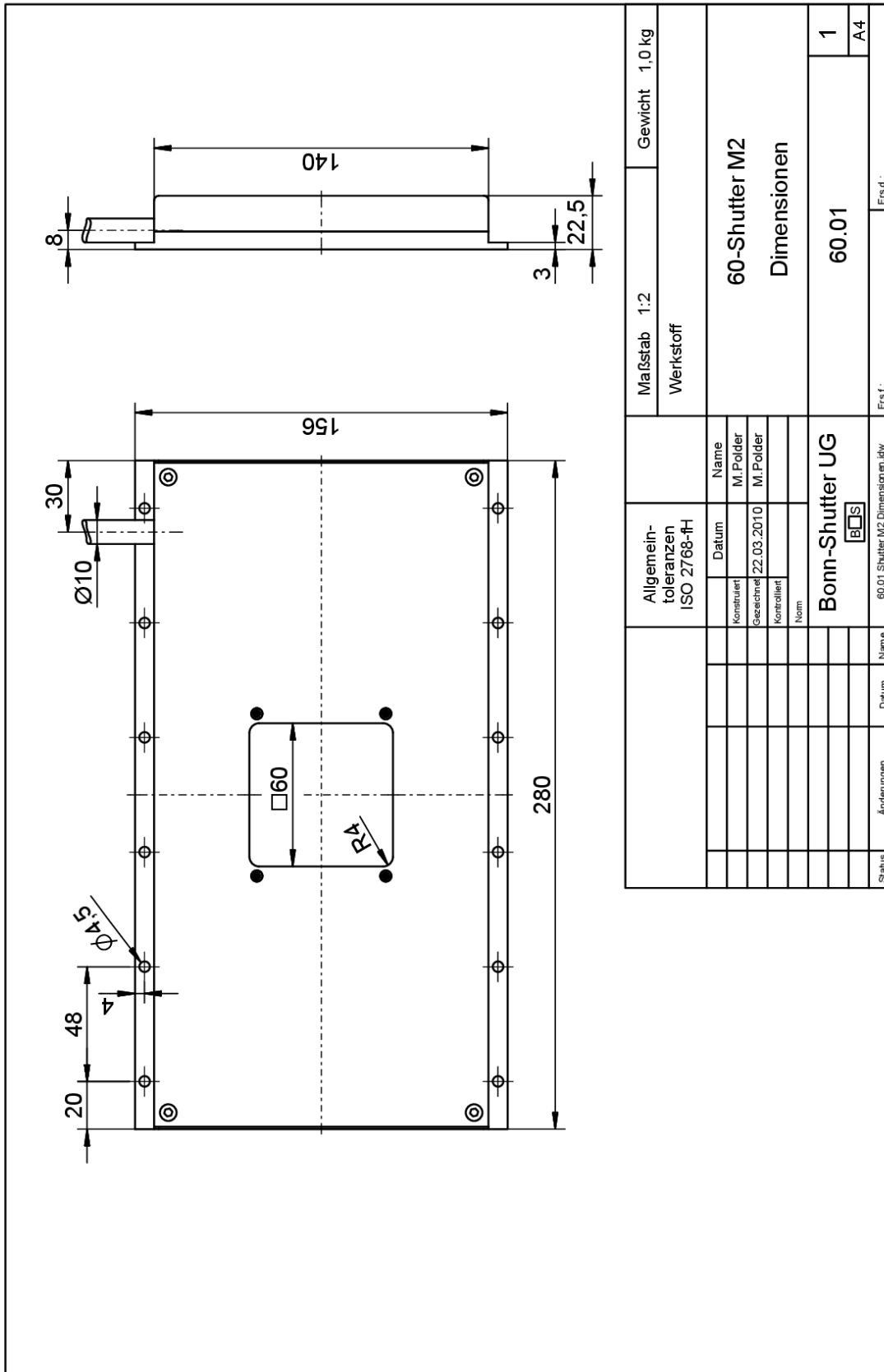
| | |
|---------------------|--|
| Shutter cable specs | Length: TBD, 8m maximum, Diameter: 10mm, Bending radius: 20mm, Connectors: 2 DB-25 (male/female) |
| Power cable | Standard 95-230VAC, 50-60Hz, length: 2m. |

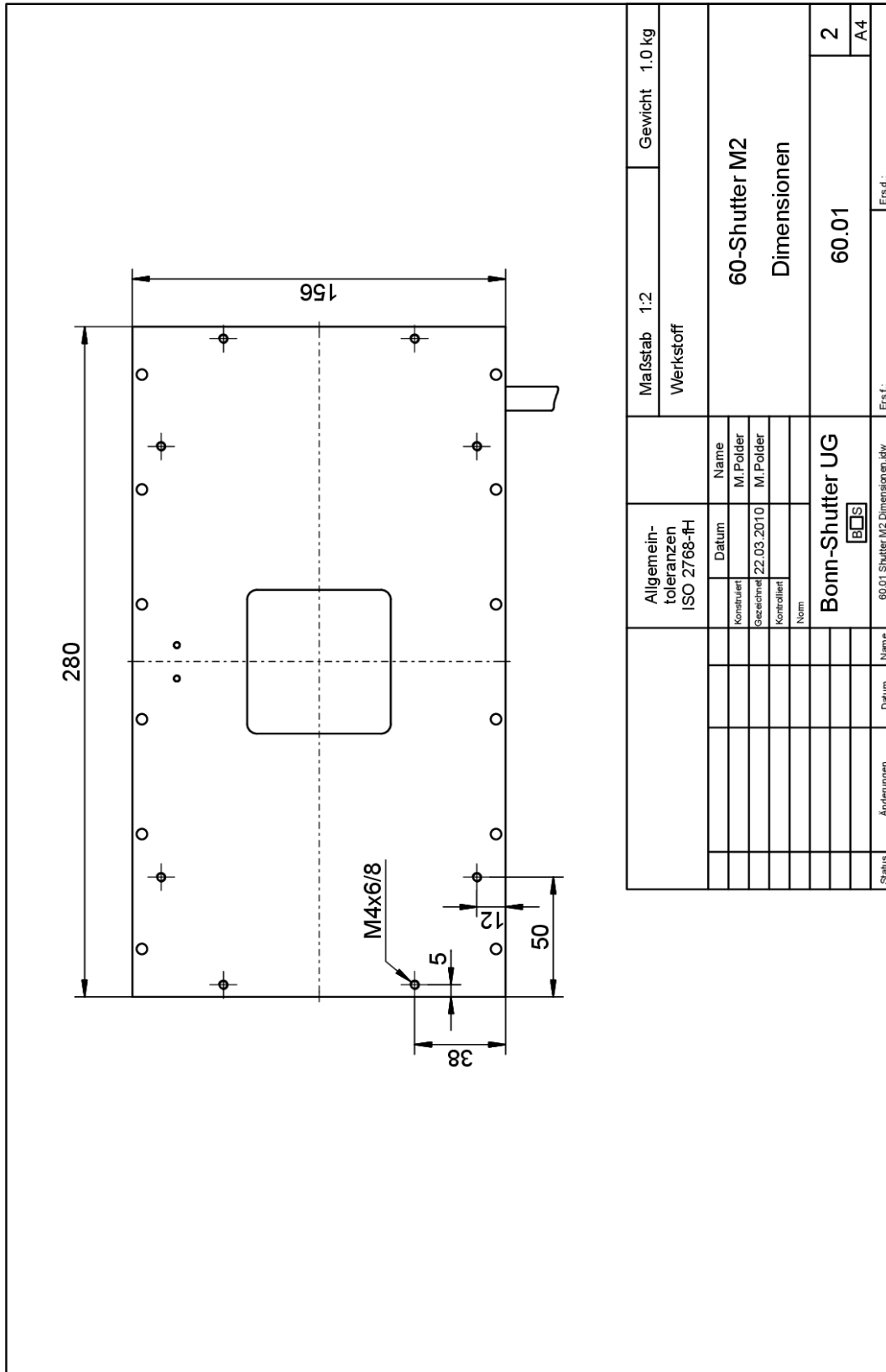
Documentation

| | |
|------------------------------------|--|
| Installation and operations manual | Detailed description of the shutter and shutter controller, including instructions for installation, definitions of connector pin assignments, operation modes descriptions. |
| Software protocol description | Includes the set-up parameters of the data link, command listing, command syntax, parameter limits, default set-up parameters (velocity profile data, etc.). |

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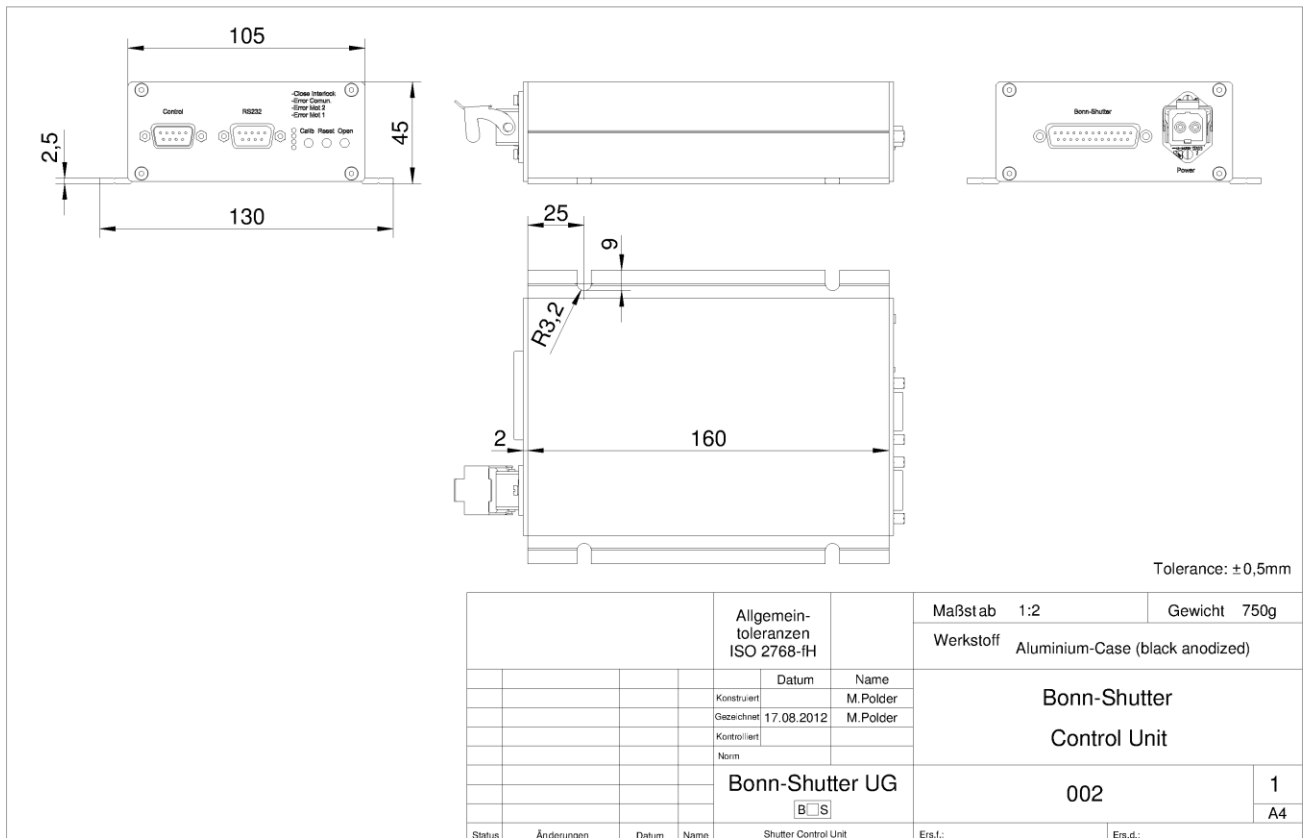
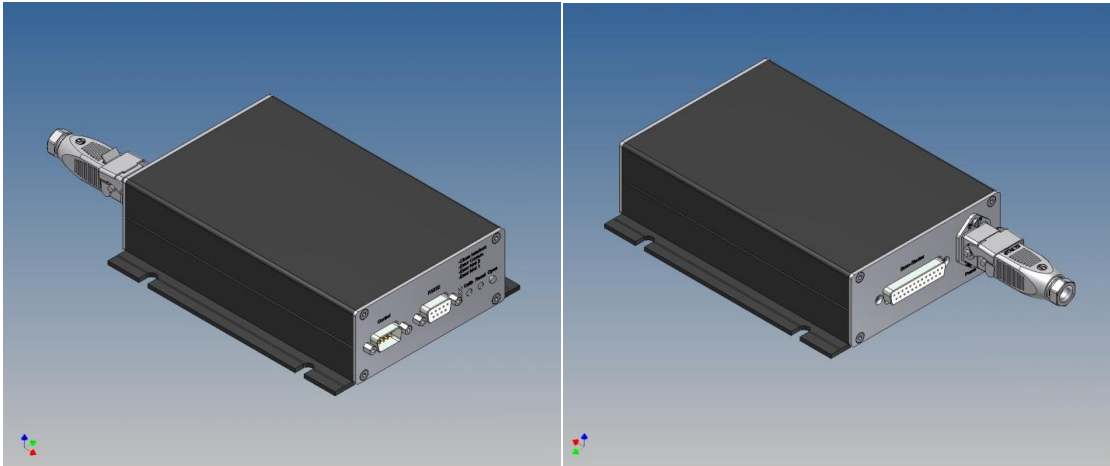




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Shutter control unit



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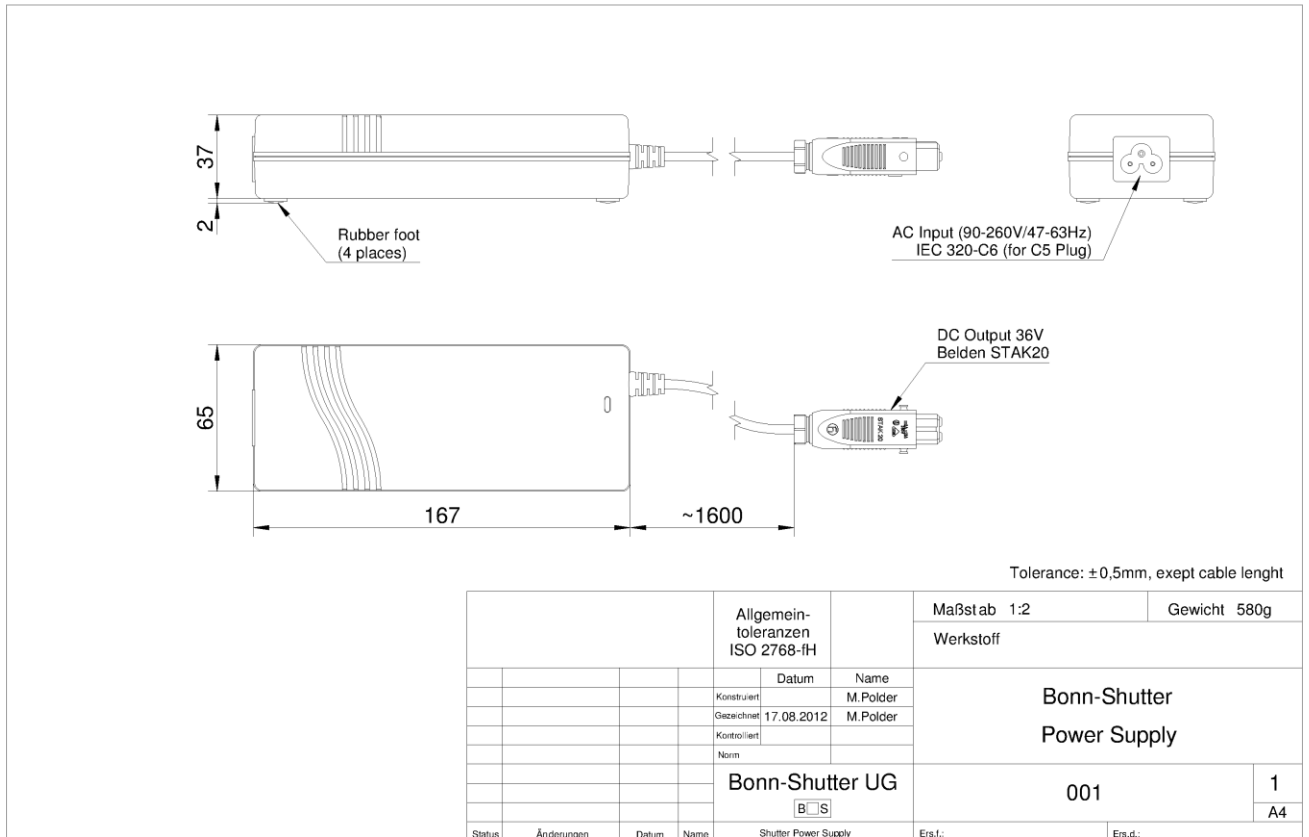
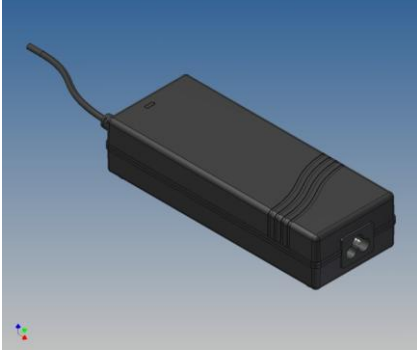
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Power Supply



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