

## Instruction sheet Experiment Motor

Martin Henschke, 2004-06-18

item no.: 650280

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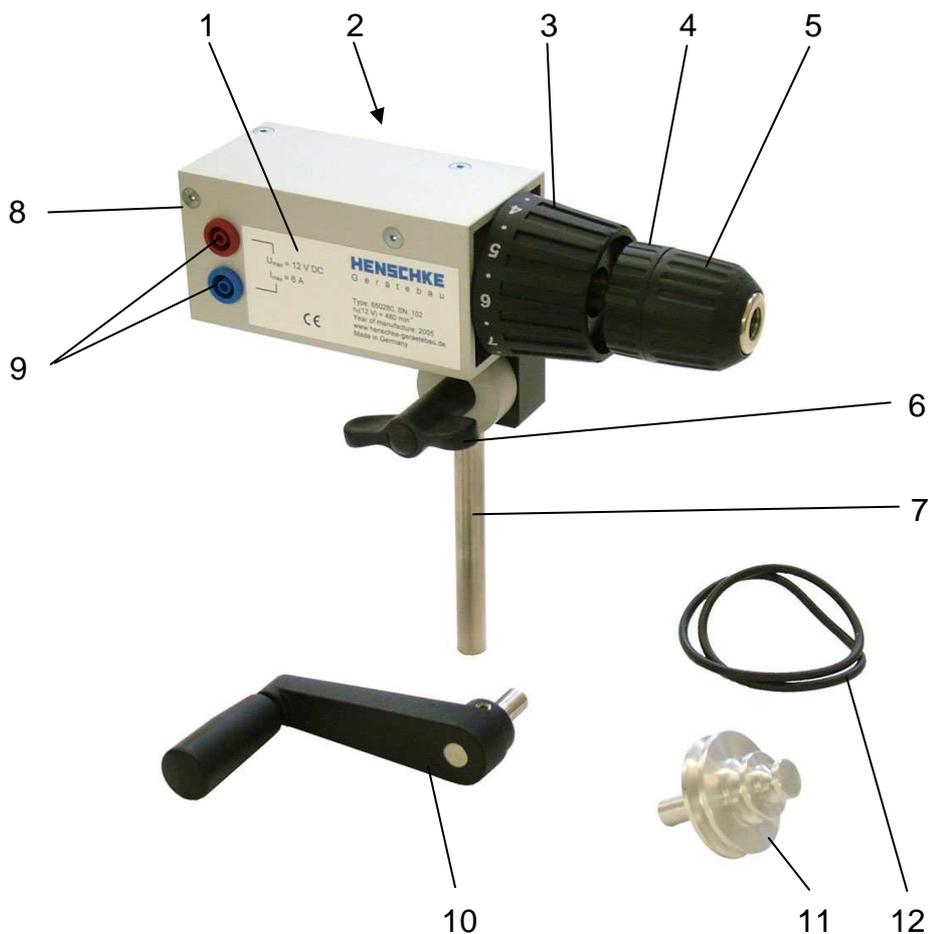


Abb. 1: Komponenten

- |                       |                              |
|-----------------------|------------------------------|
| 1 Specification plate | 2 Safety instructions (back) |
| 3 Torque setting      | 4 Locking ring               |
| 5 Chuck               | 6 Knurled thumb screw        |
| 7 Stand rod           | 8 Housing                    |
| 9 4-mm safety sockets | 10 Crank handle              |
| 11 Belt pulley        | 12 Belt                      |

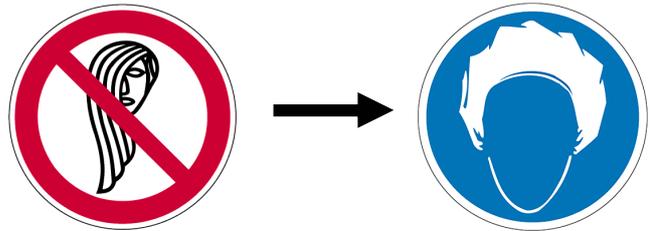
With the experiment motor you can perform experiments on centrifugal force (additional equipment required) and power generation (generator mode)

# 1. Safety instructions

**Risk of injury!** The experiment motor is designed for open experiment setups and, naturally for that reason, cannot be equipped directly with mounted safety mechanisms to protect against flying parts or with shielding for the rotating components. Consequently the following safety instructions must be read thoroughly and strictly obeyed while operating the motor!



1.1 Long hair, loose clothing as well as jewelry could get caught in the rotating parts and result in injury. To avoid this hazard persons with long hair should wear a hair net.



Inappropriate clothing or jewelry should be removed.



1.2 When working with the belt pulley (11) and drive belt (12), an additional danger exists, e.g. a finger could get caught between the belt and the pulley.



1.3 The safety instructions attached to the motor must remain visible and should not in any way be visibly obscured by the experiment setup. Should it prove impossible to comply with this requirement, the appropriate warnings must be attached to the experiment stand.

**1.4 Proper use in compliance with directives:** The motor must be mounted on a stable surface (stable bench, solid stand equipment or if necessary a bench clamp). Use as a hand-held drill or power screwdriver is inadmissible due to the grip lacking the appropriate ergonomic form (machine guidelines 98/37/EC). For the sake of operator safety, a protective wall is erected to effectively shield observers from any flying objects which might be unleashed when operating the machine at high speeds. This wall is made of safety glass (e.g. plexiglass, polycarbonate, etc.).

Directly attaching light (approx. 0.5 kg maximum) centrifugal devices into the chuck is allowed, e.g. flattening ring or flywheel regulator if these components are not out-of-balance. Otherwise the driving must be achieved using the belt pulley provided. At any rate the corresponding operating instructions included must be complied with.

The motor can also be operated as a generator. To do this, the device is mounted onto a bench using a bench clamp, for example, and the crank handle is inserted into the chuck. In this operating mode it is prohibited to have a power supply connected to the terminal sockets (9). Instead, an incandescent lamp or a measuring instrument should be connected.

1.5 The power supply used to power the motor must be set up outside the danger zone (for example behind a protective wall). The use of a variable power supply is recommended so that the experiments can always be started at a lower speed setting and then increased. The maximum permissible voltage of **12 V DC** (direct current) may not be exceeded.

1.6 In the case where the motor comes to an unexpected standstill (e.g. power cut), immediately disconnect all supply lines from the mains power supply unit (or the power source being used), in order to avoid any unintended restart.

1.7 The motor is equipped with a torque limiting mechanism (3). Experiments should always be started at the lowest possible setting (setting "1" on the scale, which is designated with an arrow and the letter "M"). If the torque is not sufficient the power supply must be switched off and the next highest setting selected.

1.8 Before starting the experiment please check once again for possible assembly or connection errors (loose screws or chuck, etc.) or visibly defective components.

1.9 During operation the experiment setup is to be constantly observed and immediately switched off should the slightest irregularity arise (change in noise volume, increasing vibration).

## 2. Technical data

- Nominal voltage  $U_0$ : 12 V DC
- No-load current: approx. 2 A
- permissible current: 6 A (maximum 5 min.)
- Rotation direction: clockwise from the motor's perspective when connection of "+" terminal is to red and "-" is to the blue socket.
- No-load speed  $n_0$  at 12 V: see rating
- Chuck: 1 - 10 mm
- Continuous noise level at 1 m distance: 70 dB(A)

In DC motors there is practically a linear relationship between the supply voltage and speed. For that reason the speed for any given voltage can easily be deduced from the data on the rating plate:  $n = n_0 U / U_0$ .

## 3. Operation

Using the stand rod the motor can be secured in place either in a bench clamp, a tripod or a coupling sleeve. Alternatively, it is also possible to mount the motor on plates using a drill hole ( $D = 8 \text{ mm}$ ) as, for example, with the mount (# 650275). Furthermore it can be secured on a lab bench using a bench clamp. In this case the upper side should rest on the table top.

To lock the shaft into the chuck the locking ring (4) is held securely while the ring on the chuck (5) is turned. It is particularly important especially with small diameters to make sure that the shaft is seated firmly in all three jaws of the chuck and is not bent or angled.

The torque setting is set with the ring (3), by turning from one setting to the next. Intermediate settings are not allowed.

The motor is designed for operation in short experiments and not for continuous operation. In particular when operating at higher currents starting around 3 A it is important to check the housing temperature at intervals of every 5 - 10 min. If the temperature of the housing

becomes "uncomfortably" hot – i.e. higher than normal body temperature, than a break should be taken.

**Maintenance:**

The experiment motor is basically maintenancefree. For cleaning purposes it can be wiped off with a damp cloth. Solvents should not be used. Furthermore, under no circumstances should the device be submerged in water.

#### **4. EC conformity declaration**

In accordance with the directives set forth in the EC guidelines 98/37/EG and 89/336/EWG, the company Martin Henschke Gerätebau hereby guarantees that the experimental motor, article no. 650280, complies with essential safety requirements of the above-mentioned guidelines and conforms to the following standards: EN 55014-1 and EN 55014-2.

Erfstadt, 09. Feb. 2004



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