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Scope of delivery:
- POWER DIRECT magnetic stirrer
- Bench-top power supply unit
- Anti-skid mat (not pictured)

Figure 1: The POWER DIRECT magnetic stirrer with bench-top power supply unit.
User considerations

Correct use

The extremely powerful direct-controlled magnetic stirrer **POWER DIRECT** is designed to stir liquids for laboratory use.

The magnetic stirrer can be employed for chemical, microbiological, biotechnical, pharmaceutical or medical purposes.

The magnetic stirrer is suited to operation in the following areas:

- On the laboratory bench,
- In cold chambers,
- In laminar flow equipment.

Incorrect use

The magnetic stirrer **POWER DIRECT** must not be operated in hazardous locations.

The magnetic stirrer must not be operated in a water bath.

Do not stir or shake flammable liquids with a low boiling point.

The direct-controlled magnetic stirrer is only limitedly suitable for the use in incubators.

Pictographs

You will find the following pictographs in this operating manual:

- **DANGER**
  This sign refers to dangerous voltages.

- **DANGER**
  This sign refers to hazardous situations.
  Hazards to human life are indicated by "LIFE HAZARD".

- **CAUTION**
  This sign indicates danger to equipment and machinery.

- **INFORMATION**
  This sign indicates easier working practices.
  Indicates an operating step.

- Indicates alternatives.
1 Safety considerations

For your own safety, you should observe the following safety warning signs.
The warning signs indicate potential sources of danger.
They also inform on how correct action can avert danger. You will find these warning signs wherever there is a risk of dangerous situations.

**DANGER**
Defective power cables (10), secondary cables (8), or mains plugs must be replaced only with original parts by the manufacturer or one of its representatives.
Return the defective power supply unit (9) to our customer service for repair.

**DANGER**
The magnetic stirrers must not be immersed in water or cleaning solutions.

**DANGER**
The power supply unit (9) must not be run in humid rooms, or set up in water splash zones.
Permissible ambient conditions:
Cf. Technical specifications.
Avoid extreme temperature changes.

**DANGER**
Magnetism.
Magnetic or metallic parts (e.g. data carriers, pacemakers, watches) can be affected by magnetic fields.
Keep such parts away from the magnetic stirrer (5) and the magnetic stirring bars.

**CAUTION**
The equipment must not be operated in hazardous locations and in a water bath.

**CAUTION**
Do not place hot stirring vessels on top of the magnetic stirrer (5).
Maximum temperature: +56 °C.
| CAUTION | Do not use chlorine-based cleaning agents, cleaning wool, cleaning agents containing metal parts or ammonium when cleaning the equipment. Such agents can damage the surface of the equipment. |
| CAUTION | In case of repair, the equipment must only be opened by an authorized service agent. |
| CAUTION | Do not allow AINiCo5 type magnetic stirring bars to remain in an alternating magnetic field if they cannot rotate freely. Do not subject the magnetic stirring bar to a strong inverse magnetic field. This may cause the bar to become demagnetized. |
2 Equipment description

Figure 1 shows the components together with their position numbers.

The extremely powerful direct-controlled magnetic stirrer **POWER DIRECT** is
designed to stir liquids for laboratory use.

**POWER DIRECT** is equipped with one stirring point (6).

Power for the magnetic stirrer (5) is supplied through the power supply unit (9). The
DC plug of the power supply unit (9) is connected with the jack on the back of the
magnetic stirrer (5).

The drive and electronic control unit are sealed into the housing of the magnetic
stirrer (2). The extremely powerful magnetic drive is very efficiently turning and
moves even viscous liquids (such as oil) without problems.

After a startup time of approximately 15 seconds, the magnetic stirring bar rotates
smoothly at the preselected speed. The soft startup function guarantees a safe
acceleration of the magnetic stirring bar and can be monitored via the digital display
(7). The soft startup function is switched on when a dot appears on the digital display
(7) next to the rotation speed. As soon as the selected rotation speed has been
reached, the dot on the digital display (7) vanishes.

You start and terminate the stirring operation with the ON/OFF key (1).
The rotation speed is set with the ® key (2) and with the \ key (3). The digital
display (7) shows the rotation speed currently set.

You switch to the power display or the rotation speed display via the MODE key (4).
The digital display (7) shows the mode selected last. The desired rotation speed or
power is set with the ® key (2) and with the \ key (3).
The stirring power can be adjusted in four steps (5/10/15/20 W).

After the stirring power has been selected, the digital display (7) changes
automatically to the rotation speed selection after approximately 5 seconds.

An anti-skid mat is included in the scope of delivery. You can place the mat between
magnetic stirrer and stirring vessel, if required. It prevents the vessel from skidding
off the stirring point, while having the simultaneous effect of damping the vibrations.
In addition, you can vary the distance between the magnetic stirrer and the magnetic
stirring bar and thereby optimizing running characteristics. We recommend using the
anti-skid mat for small, thin-bottomed vessels.

Stirring vessel and magnetic stirring bar do not fall within the scope of delivery.
3 Function

The **POWER DIRECT** magnetic stirrer is used for chemical, microbiological, biotechnical, pharmaceutical and medical purposes, e.g.:

- Growing microorganisms (e.g. aerating and growing bacteria cultures),
- Dissolving nutrient media and solids,
- To prevent the settling of suspended matter,
- Titration.

The powerful **POWER DIRECT** has an especially wide speed range of 100 to 2000 revolutions per minute. It is suitable for stirring large liquid volumes of up to 40 litres. Thanks to the powerful and very efficient stirring performance and the far-reaching magnetic field of the **POWER DIRECT**, it can also accomplish difficult tasks (e.g. uneven or thick vessel bottoms, viscous media, media containing sediments, etc.).

The magnetic stirrer is well suited to the growing of bacteria cultures outside the incubator. If a power setting of 20 W is selected, the plate will heat to 10-20 K above the ambient temperature. Heat will accelerate growth. However, the **POWER DIRECT** magnetic stirrer cannot be used in incubators.

The power settings of the **POWER DIRECT** magnetic stirrer can be adjusted in four steps (5/10/15/20 Watt). Use more power for larger quantities and more viscous liquids and reduced power for long-term operation without heat generation.

You can stir the liquid in various shapes of vessel (e.g. Erlenmeyer flasks, beakers). As the rotation speed can be variably adjusted, the liquid can be both moved gently as well as vigorously mixed.

The stirring vessel contains a magnetic stirring bar. When the stirring vessel is placed on the stirring point (6), a rotating magnetic field will move the magnetic stirring bar.

Selectable speed range: **100 to 2000 rpm** (selectable in increments of 10).

The digital display (7) shows the current speed of the magnetic stirring bar.

The Memory function saves the settings last at switching off the device and when disconnected from mains supply for longer periods of time.
4 Startup procedure

DANGER
The power supply unit (9) must not be run in humid rooms, or set up in water splash zones.
Permissible ambient conditions:
Cf. Technical specifications.
Avoid extreme temperature changes.

DANGER
Magnetism.
Magnetic or metallic parts (e.g. data carriers, pacemakers, watches) can be affected by magnetic fields.
Keep such parts away from the magnetic stirrer (5) and the magnetic stirring bars.

CAUTION
The equipment must not be operated in hazardous locations and in a water bath.

- Connect the DC plug of the secondary cable (8) to the DC jack at the back of the magnetic stirrer (5).
- Connect the mains cable (10) to the power supply unit (9).
- Connect the mains plug (10) into the mains socket.
- If a germ-free environment is required, accommodate the power supply unit (9) outside the sterile area.

The magnetic stirrer (5) is now ready for operation.


5 Stirring operation

5.1 Stirring vessel

You should use stirring vessels that are made of glass, non-magnetic metal or plastic. Flat-bottomed glass vessels (not concave) and smooth surfaces improve the running quality of the magnetic stirring bar.

5.2 Magnetic stirring bars

We strongly recommend the KOMET 50 magnetic stirring bar, because it is ideally suited to the performance profile of the POWER DIRECT.

<table>
<thead>
<tr>
<th>Type</th>
<th>Size (mm)</th>
<th>Material</th>
<th>Order No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>KOMET 30</td>
<td>(Ø × L) 12 × 30</td>
<td>SmCo</td>
<td>50087930</td>
</tr>
<tr>
<td>KOMET 50</td>
<td>(Ø × L) 21 × 50</td>
<td>SmCo</td>
<td>50087909</td>
</tr>
</tbody>
</table>

**THERMO** has developed a new magnetic stirring bar KOMET (Figure 2). It contains a high-quality super-strong Samarium-Cobalt magnet. KOMET shows a strong magnetic force. The stronger attraction to the magnetic alternating field provides the stirring bar with very efficient stirring properties. Even if there are greater distances (e.g. in high measuring cylinders), the stirring force will be maintained. The stability of the stirring bar will not be impaired if the vessel has a curved bottom. Any risk of demagnetization by external magnetic fields is completely eliminated. All KOMET series stirring bars can be readily recognized by their two conical ends.

*Figure 2: Stirring bars of the KOMET series*
The strong magnetic coupling in Samarium-Cobalt magnets will also increase friction. The standard design of the KOMET magnetic stirring bar is therefore unsuitable for stirring liquids containing particulate matter (such as mud) or for stirring in vessels with a rough interior surface. Some of the KOMET stirring bars are specially fitted with a wear-resistant glide ring for use under excruciating circumstances, such as when stirring vessels feature rough plastic or stainless-steel bottoms or if the media to be stirred contain solids (Figure 3).

![Glide ring](image)

**Figure 3:**  *KOMET stirring bar with glide ring*

**KOMET glide ring 30:**  Order No.: 50093334

**KOMET glide ring 50:**  Order No.: 50093335
5.3 Recommended rotation speed ranges

The powerful **POWER DIRECT** has an especially wide speed range of 100 to 2000 revolutions per minute. Thanks to its powerful and very efficient stirring performance, it can accomplish even difficult tasks, such as:

- Input of ambient air or oxygen into the media,
- Intense aeration of bacteria cultures,
- Mixing of viscous media (e.g. oil),
- Mixing of media containing sediments without sedimentation of suspended matter.

High speed between 1500 and 2000 rpm is required for these applications.

5.4 Stirring

**CAUTION**

Do not place hot stirring vessels on top of the magnetic stirrer (5). Maximum temperature: +56 °C.

- Fill stirring vessels no more than half full (upper rotation speed range) or three-quarters full (lower rotation speed range).
- Insert a stirring bar into the stirring vessel.
- Centre the stirring vessel onto the stirring point (6).
  - If necessary, place the anti-skid mat between stirring vessel and stirring point (6).
- Press the ON/OFF key (1).

The magnetic stirrer has a soft-start feature that first centres the magnetic stirring bars within the vessels and then slowly accelerates them to the desired speed.

- **Stirring power:**
  
  With the **POWER DIRECT** you have a choice of four different stirring power settings (5/10/15/20 watts).

  Select a high stirring power for large stirring volumes, viscous media, or when heating of the plate is desired (bacteria cultures).

  Select a low stirring power for small stirring volumes and for heat-free permanent operation.

  - Press the MODE key (4).

  The digital display (7) shows the set power (e.g. P 20 => 20 watt).

  - Set the desired power with the key (2) and with the key (3).

  After the stirring power has been selected, the digital display (7) changes automatically to the rotation speed selection after approximately 5 seconds.
5 Stirring operation

- **RPM:**
  - Set the desired rotation speed with the key (2) and with the key (3).

To increase or decrease the speed about 10 rpm, press the key (2) or the key (3) once. For Fast Forward, press and hold the appropriate key.

The digital display (7) shows the currently set rotation speed.

Selectable speed range: 100 to 2000 rpm (in increments of 10).

- **End stirring operation:**
  - Press the ON/OFF key (1).

The magnetic stirrer switches to standby. The digital display (7) expires and the magnetic stirring bar is stopped. However, the device is still live.

---

**INFORMATION**

If you are not using the magnetic stirrer for a longer period of time, disconnect the power supply unit (9) from mains supply. Only then the stirrer is completely switched off.

---

5.4.1 Tips on stirring

- **If rotation of the magnetic stirring bar is uneven or jerky:**
  - Reaction between the alternating magnetic field and the magnetic stirring bar is too strong.
  - Reduce the stirring power (see Chapter 5.4), or
  - Place the anti-skid mat between magnetic stirrer and vessel, or
  - Use a smaller magnetic stirring bar.

- **If the magnetic stirring bar starts to rotate in intervals again:**
  - The magnetic stirrer has automatically restarted.
  - Reduce the stirring power and the speed (see Chapter 5.4), or
  - Place the anti-skid mat between magnetic stirrer and vessel, or
  - Use a smaller magnetic stirring bar.

- **If the stirring action is too weak:**
  - Increase stirring power, or
  - Use the magnetic stirring bar KOMET 50.
6 Maintenance and cleaning

DANGER
The magnetic stirrers must not be immersed in water or cleaning solutions.

CAUTION
Do not use chlorine-based cleaning agents, cleaning wool, cleaning agents containing metal parts or ammonium when cleaning the equipment. Such agents can damage the surface of the equipment.

The magnetic stirrer (5) is maintenance-free. The standing surface is coated with a protective film. You may leave this on the magnetic stirrer (5), or strip it off.

Clean the surfaces of the magnetic stirrer (5) with a moistened cloth at regular intervals.

For this purpose you can use:
- water containing a surfactant detergent additive,
- isopropanol.

♦ Switch the magnetic stirrer (5) to standby using the ON/OFF key (1). The digital display (7) disappears.
♦ Disconnect the secondary power cable (8) from the magnetic stirrer (5).
♦ Clean the surfaces of the magnetic stirrer (5).

DANGER
Defective power cables (10), secondary cables (8), or mains plugs must be replaced only with original parts by the manufacturer or one of its representatives.
Return the defective power supply unit (9) to our customer service for repair.

CAUTION
In case of repair, the equipment must only be opened by an authorized service agent.
6 Maintenance and cleaning

In case of necessity to repair the equipment, it should be returned to an authorized servicing agent. The equipment must be clean and free from harmful substances.

To avoid transport damages during the shipment, please send the equipment correctly packed in the original packing.

Please always enclose the filled out return delivery note.

If necessary ask for the return delivery note at Thermo (address: see inside of the cover sheet).

When ordering spares, please state equipment type and serial number.

You can obtain further technical documents (e.g. circuit diagrams, board data) for your engineers by contacting the address on the inside of the cover sheet.
7 Troubleshooting

- **Rotation of the magnetic stirring bar is always uneven:**
  It is unavoidable that magnetic stirring bars (type AlNiCo5 only) will age with time, for example through sterilization, use at excessive temperatures, or mechanical stress (such as when you drop it). This may adversely affect the magnetic properties of the stirring bar.

  CAUTION

  Do not allow AlNiCo5 type magnetic stirring bars to remain in an alternating magnetic field if they cannot rotate freely. Do not subject the magnetic stirring bar to a strong inverse magnetic field. This may cause the bar to become demagnetized.

  - Remove and replace the magnetic stirring bar with a new one.
  Or:
  - Use a **KOMET 50** magnetic stirring bar offered by THERMO (see Chapter 5.2). They are made from high-performance Samarium-Cobalt magnets. Any risk of demagnetization by external magnetic fields is completely eliminated.

- **The magnetic stirrer (5) fails to operate:**
  - Reduce the speed and restart stirring with a smaller speed. Check the rotation movement.
  - Increase the power. Check the rotation movement.
  - Check to see whether the power supply unit (9) is delivering voltage.

  The power supply unit (9) is fitted with a temperature-controlled safety system that will switch off the power supply unit (9) permanently in an overload situation.

  If this does not clear the fault, return the unit to an authorized service agent.
## 8 Technical specifications

<table>
<thead>
<tr>
<th>Type</th>
<th>POWER DIRECT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Order No. (incl. power supply unit)</td>
<td>50098760</td>
</tr>
<tr>
<td>Order No. stirring drive</td>
<td>50098759</td>
</tr>
<tr>
<td>Stirring points</td>
<td>1</td>
</tr>
<tr>
<td>Stirring volume</td>
<td>ml 100 – 40,000</td>
</tr>
<tr>
<td>Stirring power</td>
<td>W 5/10/15/20</td>
</tr>
<tr>
<td>Rotation speed range</td>
<td>rpm 100 – 2,000</td>
</tr>
<tr>
<td>Speed regulation for alternating loads</td>
<td>% ±1</td>
</tr>
<tr>
<td>Dimensions (W × D × H)</td>
<td>mm 180 × 215 × 35</td>
</tr>
<tr>
<td>Weight</td>
<td>kg 2.4</td>
</tr>
<tr>
<td>Housing</td>
<td>Stainless steel</td>
</tr>
<tr>
<td>Permissible operating conditions</td>
<td>-10 °C to +40 °C at 95% relative humidity</td>
</tr>
<tr>
<td>Permissible storage conditions</td>
<td>-40 °C to +70 °C at 10% to 95% relative humidity 500 to 1,060 hPa barometric pressure</td>
</tr>
<tr>
<td>Operating voltage</td>
<td>VDC 24</td>
</tr>
<tr>
<td>Protective system (EN 60529)</td>
<td>IP 22</td>
</tr>
<tr>
<td>Equipment construction</td>
<td>according to IEC 1010</td>
</tr>
</tbody>
</table>

### Bench-top power supply unit

| Order No.                                | 50093506                                                                     |
| Supply voltage / frequency               | VAC/Hz VDC 100 – 240 / 50 – 60 24                                             |
| Operating voltage                        | Primary and secondary cable, approx. 2 m CE, cETL, UL IP 20                  |
| Length of cable                          |                                                                              |
| Mark of conformity                       |                                                                              |
| Protection (EN 60529)                    |                                                                              |
| Permissible operating conditions         | +10 °C to +40 °C at 30% to 80% relative humidity 700 to 1,060 hPa barometric pressure |
| Permissible storage conditions           | -40 °C to +70 °C at 10% to 95% relative humidity 500 to 1,060 hPa barometric pressure |

### Anti-skid mat

| Dimensions, diameter × thickness | mm | Ø 185 × 3 |
| Material                        |    | clear PVC |

Subject to technical alterations
9 Warranty

VARIOMAG magnetic stirrers have a modular construction and offer the greatest possible degree of trouble-free operation, thanks to their maintenance-free stirring and magnetic drives.

If despite our strict quality controls a system component should ever fail to work perfectly, it can be repaired or replaced by our after-sales service without difficulty. Please retain your invoice, which will be needed when presenting any warranty claims.

Two years full warranty on all system components!