Measurement While Drilling (MWD) Tools
MICON-Drilling GmbH
Im Nordfeld 14, 29336 Nienhagen, Germany
www.micon-drilling.de

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Contents

Company Profile ......................... 2
Quality Policy .......................... 4
Measurement While Drilling (MWD) Tools . . . . 6
Technical Data .......................... 7
Notes .................................... 8
Company Profile

The MICON-Drilling GmbH is a worldwide operating service company, specialized in sales and rental of drilling equipment. Decades of experience, high quality standards and focused customer orientation are our unique selling points.

We are a member of the MICON Group, established in Nienhagen/Germany, in 1994. The privately owned company specializes in design, production, inspection and repair of drill string components, drill bits, sophisticated directional drilling systems and additional equipment. Our main focus lies on the technical service for drilling applications in the mining, oil & gas, tunneling and geothermal industries.

An innovative engineering department ensures continuous optimization of all MICON products. Additionally, we are in close contact with a network of several German universities to foster research and development activities.

The MICON Group manufactures drilling equipment in two independent facilities on state-of-the-art CNC milling, turning and welding machines. Latest technology and implementation of German engineering guarantee the highest degree of efficiency and quality.

Visit our homepage www.micon-drilling.de for additional information and recent updates.
MICON Buildings “Im Nordfeld”, Nienhagen/Germany

MICON Buildings “Breite Horst”, Nienhagen/Germany
Quality Policy

MICON stands for high quality products Made in Germany. A superior quality standard is the basis for our success and an integral part of the company policy. We consider this as an important factor of the long-term and trustful cooperation with our customers.

In order to support our high quality goals, the MICON manufacturing companies are working according to the latest quality management standards and hold individual certifications. The most important are ISO 9001 (MICON Downhole-Tools: KLN 4002151, MICON GmbH & Co.KG: KLN 4002425) and API Spec. 7-1 certification (MICON Downhole-Tools: 7-1-1271).

Our global quality objectives are reflected in specific targets, which are drawn up by the management in cooperation with the quality manager. The fulfillment of these targets is audited by regularly scheduled management reviews. Our ambition is product reliability and quality that meets or exceeds your requirements. The MICON delivery standard is Zero Defects. Rigorous acceptance criteria ensure a consistent high quality level of each product.
ZERO Defect Goal

Material Quality Checks
- Ultrasonic / X-Ray
- Magnetic Particle
- Dye Penetrant Test

Dimensional Checks
- State-of-the-Art Tools
- DAKKS Standard
- Continuous Monitoring

CAD – CAM Manufacturing
- Efficient Work flow
- Flexible Designs
- Clean Data Transfer

High Raw Material Standards
- German / European Origin
- Material Certificates
- ISO Certified Suppliers

High Documentation Standards
- Product Traceability
- Quality Reports
- Process Documentation

Quality Management System
- Process Evaluation
- Quality Control
- Four-Eye Principle
Measurement While Drilling (MWD) Tools

Our MWD tools are the best choice for real-time directional borehole survey applications. In combination with a downhole motor, the MWD tool enables precise and reliable directional drilling operations.

The tool uses accelerometers and magnetometers to measure the inclination and direction of the well bore. All generated data is directly transmitted to the surface by applying the positive mud pulse technology. These measurements allow a real-time determination of the well bore path and position in the three-dimensional space.

The MICON MWD tool is equipped with a generator turbine that supplies the tool with energy. A battery backup prevents data loss in case of any mud flow interruption. Due to the combination of these two energy sources, very long in-hole operation times can be performed.

All electronic components are protected by a pressure resistant case made of ultra high strength alloy steel. Additionally, a special resin embedding material protects against shock and vibration influences.

The tools are available with two temperature ratings. The standard version covers up to 70°C. 150°C can be reached with the lithium power backup.

We supply our MWD system in five sizes (2⅞", 3½", 4¾", 6½" and 9¾"), covering most common borehole diameters.
## Technical Data

### Measurement While Drilling (MWD) Tools

<table>
<thead>
<tr>
<th>Parameter</th>
<th>MWD 2¾&quot;</th>
<th>MWD 3¾&quot;</th>
<th>MWD 4½&quot;</th>
<th>MWD 6¼&quot;</th>
<th>MWD 9½&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool OD</td>
<td>Metric</td>
<td>Imperial</td>
<td>Metric</td>
<td>Imperial</td>
<td>Metric</td>
</tr>
<tr>
<td></td>
<td>73.0 mm</td>
<td>2¾&quot;</td>
<td>95.2 mm</td>
<td>3¾&quot;</td>
<td>120.6 mm</td>
</tr>
<tr>
<td>Tool Length</td>
<td>Metric</td>
<td>Imperial</td>
<td>Metric</td>
<td>Imperial</td>
<td>Metric</td>
</tr>
<tr>
<td></td>
<td>2 m</td>
<td>6.6 ft</td>
<td>2 m</td>
<td>6.6 ft</td>
<td>2.3 m</td>
</tr>
</tbody>
</table>

- Inclination: +/- 0.2°
- Azimuth: +/- 1.0° (Inc.>20°; Dip.<70°)
- Tool Face: +/- 0.5°
- Gamma (opt.): 65 μT (±0.65 G), 0 - 511 API counts/second (30 second intervals), +/- 5% accuracy
- Sensors: 3 Axis Magnetic and Inclination Sensors, Natural Gamma (optional)
- Data: Inclination, Azimuth, Tool Face, Temperature, Generator Voltage, Natural Gamma (optional)
- Data Transm.: Positive Mud Pulse
- Power Source: Turbine Driven Generator with Memory Backup

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Metric</th>
<th>Imperial</th>
</tr>
</thead>
<tbody>
<tr>
<td>Min. Flow</td>
<td>150 l/min</td>
<td>33 gpm</td>
</tr>
<tr>
<td>Max. Flow</td>
<td>450 l/min</td>
<td>99 gpm</td>
</tr>
<tr>
<td>Pressure</td>
<td>STD: 300 bar / 4,350 psi, HP: 800 bar / 11603 psi</td>
<td></td>
</tr>
<tr>
<td>Temp.</td>
<td>0-150 °C / 32-182 °F (STD: 70 °C, HP: 150 °C)</td>
<td></td>
</tr>
<tr>
<td>Shock</td>
<td>1000 g</td>
<td></td>
</tr>
<tr>
<td>Vibration</td>
<td>25 g</td>
<td></td>
</tr>
<tr>
<td>Top Conn.</td>
<td>2¾&quot; CDP Box</td>
<td>2¾&quot; IF (NC 26) Box</td>
</tr>
<tr>
<td>Bottom Conn.</td>
<td>2¾&quot; CDP Pin</td>
<td>3½&quot; IF (NC 38) Box</td>
</tr>
<tr>
<td>Case Material</td>
<td>nonmagnetic according to API Spec. 7</td>
<td></td>
</tr>
</tbody>
</table>

* Tool Length without Non-Magnetic Drill Collar (NMDC).
Notes