1. General information

1.1 Information on the operating manual

This operating manual contains important information on proper usage of the device. Read this operating manual carefully before installing and starting up the pressure measuring device.

Adhere to the safety notes and operating instructions which are given in the operating manual. Additionally applicable regulations regarding occupational safety, accident prevention as well as national installation standards and engineering rules must be complied with!

This operating manual is part of the device, must be kept nearest its location, always accessible to all employees. The operating manual reflect the version available at the time of publication. It has been issued to our best knowledge.

1.2 Symbols used

- DANGER – danger situation, which may result in death or serious injuries
- WARNING! – potentially dangerous situation, which may result in death or serious injuries
- CAUTION! – potentially dangerous situation, which may result in minor injuries
- NOTE – tips and information to ensure a failure-free operation

1.3 Target group

WARNING! To avoid operator hazards and damages of the device, the following instructions have to be worked out by qualified technical personnel.

1.4 Limitation of liability

By non-observance of the operating manual, inappropriate use, modification or damage, no liability is assumed and warranty claims will be excluded.

1.5 Intended use

- Pressure transmitters DMK 456, DMK 457, DMK 458 and DMP 457 have been designed for typical applications in shipbuilding and offshore constructions. They are suitable for measuring tasks with fluids and gases. Typical applications of DMK 456 and DMK 457 are pressure monitoring for loading and discharge processes as well as level measurement for ballast and product storage tanks. Preferred areas of usage for DMK 457 are gears, compressors, boilers, pneumatic controls, elevators, oxygen applications, and e.g. level measurement into ballast tanks, etc. With mechanical versions G1/2" open port or G1/2" flush DIN 3852 the DMK 457 is especially suited for viscous, pasty or contaminated media due to the easily reachable ceramic diaphragm. Preferred areas of usage for DMP 457 are diesel engines, gears, compressors, pumps, boilers, hydraulic and pneumatic controls as well as elevators. The pressure transmitters DMK 456, DMK 457, DMK 458 and DMP 457 are certified by Det Norske Veritas + Germanischer Lloyd (DNV-GL) as standard. The certificates are available for download on our homepage: http://www.bdsensors.com/products/download/certificates

- It is the operator's responsibility to check and verify the suitability of the device for the intended application. If any doubts remain, please contact our sales department in order to ensure proper usage. BD SENSORS is not liable for any incorrect selections and their effects!

Permissible media are gases or liquids, which are compatible with the media wetted parts described in the data sheet. In addition it has to be ensured, that this medium is compatible with the media wetted parts.

The technical data listed in the current data sheet are engaging. If the data sheet is not available, please order or download it from our homepage: http://www.bdsensors.com

WARNING! Danger through improper usage!

1.6 Package contents

Please verify that all listed parts are undamaged included in the delivery and check for consistency specified in your order:

- pressure transmitter
- mounting instructions

2. Product identification

The device can be identified by its manufacturing label. It provides the most important data. By the ordering code the product can be clearly identified.

3. Mounting and safety instructions oxygen

DANGER! Explosion hazard, with devices for oxygen applications, when used improperly. To ensure a usage without danger, the following points must be adhered to:

- Make sure the device has been ordered and delivered as a special version for oxygen applications. You can check the manufacturing label (see figure 1). If the ordering code ends with “007”, then the device is suitable for oxygen applications.
- At time of delivery the device is packed into a plastic bag in order to prevent it from impurity. Please observe the indication label "Device for oxygen, unpack only directly before assembling". Also, avoid any skin contacts during unpacking and assembly. In order to prevent greasy residues on the device.
- During installation, the respective explosion protection regulations have to be met. Check, if ATEX-approval is necessary for this type (oxygen) device. (the delivered device has no ATEX-approval)
- Note the entire design requirements meet the standard demand of BAM (DIN 19247).
- Transmitters with o-rings of FKM Vi 567: permissible maximum values: 25 bar 150°C (with BAM-approval)
- Transmitters with o-rings of FKM Vi 567: permissible maximum values: 25 bar 150°C (with BAM-approval)

3.1 Mounting and safety instructions

WARNING! Install the device only when depressurized and currentless!

WARNING! This device may only be installed by qualified technical personnel who has read and understood the operating manual!

- Handle this high-sensitivity electronic precision measuring device with care, both in packed and unpacked condition!
- There are no modifications/changes to be made on the device.
- Do not throw the package/device!
3.6 Installation steps for NPT

- Use a suitable seal, corresponding to the medium and the pressure input (e.g. a cooper gasket).
- Tighten it with a wrench (for G1/4": approx. 20 Nm; G1/2": approx. 50 Nm).
- The indicated tightening torques must not be exceeded!

3.7 Installation steps for EN 837

- Tighten it with a wrench (for G1/4": approx. 20 Nm; for G1/2": approx. 50 Nm).

4. Electrical installation

4.1 WARNING! Install the device in currentless environments only!

Establish the electrical connection of the device according to the technical data and the manufacturing label, the following table and the wiring diagram.

Pin configuration:

<table>
<thead>
<tr>
<th>Electrical connection</th>
<th>ISO 4400</th>
<th>M12x1 (4-pin)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply +</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Supply -</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Shield</td>
<td>ground pin</td>
<td>4</td>
</tr>
</tbody>
</table>

Electrical connection field housing cable colours (DIN 47100)

Supply + Supply - Shield
IN + IN - grey (yellow / green)
wh (white) bn (brown)

Wiring diagram:

- For devices with cable gland as well as cable socket, you have to make sure that the external diameter of the used cable is within the allowed clamping range. Moreover you have to ensure that it lies in the cable gland firmly and electrically!
- For the installation of a device with a cable outlet following bending radii have to be complied with:
  - cable without ventilation tube: check to 5-fold cable diameter dynamic application: 10-fold cable diameter cable with ventilation tube: static installation: 10-fold cable diameter dynamic application: 20-fold cable diameter
- Please note for devices with ISO 4400 plug and cable socket, that the socket has to be mounted properly to ensure the ingress protection mentioned in the data sheet. Please check if the delivered seal is placed between plug and cable socket. After connecting the cable fasten the cable socket on the device by using the screw.
- For the electrical connection a shielded twisted multicore cable has to be used.
- Devices with TPE-cable:
  - application in water with a temperature >70°C destroys the cable
  - applications at media temperatures >70°C have to be clarified with BDSENSORS in advance

5. Initial start-up

5.1 Notice before start-up, the user has to check for proper installation and for any visible defects.

5.2 WARNING! Depending on the medium, it may cause danger for the user. Comply therefore with adequate precautions for purification.

- Place the protective cap on the pressure port again immediately after disassembling.

6. Placing out of service

- WARNING! When dismantling the device, it must always be done in the depressurized and currentless condition! Check also if the medium has to be drained off before dismantling!

- WARNING! Depending on the medium, it may cause danger for the user. Comply therefore with adequate precautions for purification.

7. Maintenance

In principle, this device is maintenance-free. If desired, the housing of the device can be cleaned when switched off using a damp cloth and non-aggressive cleaning solutions.

8. Error handling

<table>
<thead>
<tr>
<th>Malfunction</th>
<th>Possible cause</th>
<th>Error detection / corrective</th>
</tr>
</thead>
<tbody>
<tr>
<td>no output signal</td>
<td>wrong connected</td>
<td>inspect the connection</td>
</tr>
<tr>
<td></td>
<td>line break</td>
<td>inspect all line connections necessary to supply the device (including the connector plugs)</td>
</tr>
<tr>
<td></td>
<td>defective ampermeter (signal input)</td>
<td>inspect the ampermeter (fine-wire fuse) or the analogue input of the PLE</td>
</tr>
<tr>
<td></td>
<td>load resistance too high</td>
<td>verify the value of the load resistance</td>
</tr>
<tr>
<td></td>
<td>supply voltage too low</td>
<td>verify the output voltage of the power supply</td>
</tr>
<tr>
<td></td>
<td>defective energy supply</td>
<td>inspect the power supply and the applied supply voltage at the device</td>
</tr>
<tr>
<td></td>
<td>diaphragm is highly contaminated</td>
<td>check if the diaphragm is damaged (caused by overpressure or manually)</td>
</tr>
<tr>
<td></td>
<td>diaphragm is replaced or damaged</td>
<td>check the diaphragm; if it is damaged, please send the device to BDSENSORS for repair</td>
</tr>
<tr>
<td></td>
<td>wrong or no output signal</td>
<td>manually, thermostatically or chemically damaged cable</td>
</tr>
</tbody>
</table>

If you detect an error, please try to eliminate it by using this table or send the device to our service address for repair.

9. Service / Repair

Information on service / repair:
- www.bdensors.com
- info@bdensors.de
- Service phone: +49 (0) 92 35 / 98 11 0

9.1 Recallibration

During the life-time of a transmitter, the value of offset and span may shift. As a consequence, a deviating signal value in reference to the nominal pressure range starting point or end point may be transmitted. If one of these two phenomena occurs after prolonged use, a recalibration is recom-