DWM 2000 Electromagnetic Flowmeter with LCD Indicator
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1 Display data in operating mode
2 Functions of the LCD indicator for the DWM 2000 D

2.1 Programmable parameters

2.1.1 Flow calibration

The \( G_K \) can be modified in menu 2.1.3 in order to obtain the maximum accuracy at operating conditions. A field calibration requires an accurate reference of velocity. The meter recalibration (\( G_K \) modification) is also recommended after an exchange of electronics module. The value of the new calibration constant (\( G_K_{\text{new}} \)) can be calculated as follows:

\[
G_K_{\text{new}} = G_K_{\text{old}} \times \frac{V_a}{V_m}
\]

with:

\( V_a = \) actual velocity

\( V_m = \) measured velocity (reference value)

2.1.2 Current output adjustment

The minimum value (\( i_{0\%} \)) and the maximum value (\( i_{100\%} \)) of the current output at normal operating conditions can be adjusted from menus 2.2.2. and 2.2.3. The actual values of the \( i_{0\%} \) and the \( i_{100\%} \) must be measured with an accurate milliammeter in a 4...20 mA loop.

\( i_{0\%} \) must be in the range 3....12 mA. The factory setting is 4 mA.

\( i_{100\%} \) must be in the range 12....21 mA. The factory setting is 20 mA.

2.1.3 Time constant

The time constant value can be set in menu 2.2.4. This value represents the time needed to detect 63% of a simulated flow rate instantaneously raised from 0 to 100%. Time constant range : 5, 10, 15, 20, 25, 30, 50 m.
2.2 Electronics module checks

Various parameters from the electronics module can be viewed directly for troubleshooting purposes. The DWM 2000 switches to alarm mode when the current output is permanently below 3 mA. In this case the current output value indicates the type of error that occurs:

Obey the instructions that follow to find faults and the corrective actions to be undertaken.

Call up the error messages (menu 1.2.2.) and note the last one. Refer to the error message list. Replace the electronics module in case of fatal error, deactivate the alarm mode in menu 1.2.1. or the alarm count in menu 1.2.4 (in case of minor error).

CAUTION
Make sure that the instrument is correctly grounded.
Install the instrument in the sequence given in the installation manual.
A bad mechanical or electrical connection will cause the DWM 2000 to operate incorrectly.

2.3 Programming structure (Software n° 1.02)

2.3.1 User interface buttons
2.3.2 Menu navigation

Go through the steps given in the illustrations that follow to get to the required menu.
### 2.3.3 Summary of programming menus

<table>
<thead>
<tr>
<th>Fct. n°</th>
<th>Text</th>
<th>Description and settings</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1.0.0.</strong></td>
<td><strong>TEST</strong></td>
<td>Main menu 1.0.0.</td>
</tr>
<tr>
<td><strong>1.1.0.</strong></td>
<td><strong>CHECK ALL</strong></td>
<td>Sub menu 1.1.0. for check of electronic components</td>
</tr>
<tr>
<td><strong>1.1.1.</strong></td>
<td>MAG. FEQ.</td>
<td>Frequency of magnetic field&lt;br&gt;10 Hz ≤ frequency ≤ 14.5 Hz, operating mode</td>
</tr>
<tr>
<td><strong>1.1.2.</strong></td>
<td>FULL SCALE</td>
<td>Programmed full scale&lt;br&gt;1 m/s ≤ full scale ≤ 8 m/s</td>
</tr>
<tr>
<td><strong>1.1.3.</strong></td>
<td>U REF</td>
<td>Internal voltage reference&lt;br&gt;U Ref. = 2.5 V</td>
</tr>
<tr>
<td><strong>1.1.4.</strong></td>
<td>AMPLI</td>
<td>Test value of amplifier control loop&lt;br&gt;Value ≥ 40 in test mode</td>
</tr>
<tr>
<td><strong>1.1.5.</strong></td>
<td>EEP CHECKS</td>
<td>Result of data check in EEPROM&lt;br&gt;“XXX”: measured value = test has been successful&lt;br&gt;“XXX + ALARM”: test has failed and alarm mode has been activated (current output value &lt; 4 mA).</td>
</tr>
<tr>
<td><strong>1.1.6.</strong></td>
<td>EP CHECKS</td>
<td>Result of data check in EEPROM&lt;br&gt;Value = 22309</td>
</tr>
<tr>
<td><strong>1.1.7.</strong></td>
<td>ZERO KEY</td>
<td>Result of zero calibration push button test&lt;br&gt;“OK”: test has been successful; “ALARM”: The test has failed and alarm mode has been activated (current output &lt; 4 mA). This is only a test and does not reset the instrument to zero. Refer to the installation manual to use the Zero Cal button on the DWM 2000 electronics block correctly.</td>
</tr>
<tr>
<td><strong>1.2.0.</strong></td>
<td><strong>DIAGNOSTIC</strong></td>
<td>Sub menu 1.2.0. Diagnostic</td>
</tr>
<tr>
<td><strong>1.2.1.</strong></td>
<td>ALARM MODE</td>
<td>Deactivation of the alarm mode (current output &lt; 4 mA) caused by test failure (see menu 1.1.2. to 1.1.7).&lt;br&gt;“YES”: alarm mode is enabled&lt;br&gt;“NO”: alarm mode is disabled</td>
</tr>
<tr>
<td><strong>1.2.2.</strong></td>
<td>REG FAIL.</td>
<td>All the error messages that have occurred since the first power-up are listed. Maximum storage capacity: 32 messages&lt;br&gt;See section “2.5 Error Message List” for the meaning of error messages.</td>
</tr>
<tr>
<td><strong>1.2.3.</strong></td>
<td>TEST MODE</td>
<td>Activation of PRODUCT (factory auto-diagnostic test mode) or CUSTOM (field auto-diagnosis test mode = less severe). Default setting: CUSTOM (field test mode)</td>
</tr>
<tr>
<td><strong>1.2.4.</strong></td>
<td>ALARM COUNT</td>
<td>Reset of the alarms counter</td>
</tr>
<tr>
<td><strong>2.0.0.</strong></td>
<td><strong>SET UP PARAMETER</strong></td>
<td>Main menu 2.0.0.</td>
</tr>
<tr>
<td><strong>2.1.0.</strong></td>
<td><strong>DATA BASE</strong></td>
<td>Sub menu 2.1.0. Base data</td>
</tr>
<tr>
<td><strong>2.1.1.</strong></td>
<td>FULL SCALE</td>
<td>Not available.</td>
</tr>
<tr>
<td><strong>2.1.3.</strong></td>
<td>GR VALUE</td>
<td>Primary head calibration constant 0.8 ≤ Gₚ ≤ 1.300&lt;br&gt;See section “1.1.1. Flow calibration” on how to recalculate Gₚ.</td>
</tr>
<tr>
<td><strong>2.1.4.</strong></td>
<td>CORRECTION</td>
<td>Activation of the low flow linearization for velocity below 3 m/s.&lt;br&gt;Select “YES” or “NO”, default setting: “YES”.</td>
</tr>
<tr>
<td>Fct. n°</td>
<td>Text</td>
<td>Description and settings</td>
</tr>
<tr>
<td>---------</td>
<td>------</td>
<td>--------------------------</td>
</tr>
<tr>
<td>2.2.0.</td>
<td>CURRENT OUT</td>
<td>Sub menu 2.2.0. Current output</td>
</tr>
<tr>
<td>2.2.1.</td>
<td>CURRENT?</td>
<td>Not available</td>
</tr>
<tr>
<td>2.2.2.</td>
<td>I 0%</td>
<td>Calibration of the current output for $i_{0%}$&lt;br&gt;Measure the exact value on a milliammeter and press the &quot;+&quot; or &quot;-&quot; key in order to obtain the wished value for $i_{0%}$&lt;br&gt;$3 \text{ mA} \leq i_{0%} \leq 12 \text{ mA}$</td>
</tr>
<tr>
<td>2.2.3.</td>
<td>I 100%</td>
<td>Calibration of the current output for $i_{100%}$&lt;br&gt;Measure the exact value on a milliammeter and press the &quot;+&quot; or &quot;-&quot; key in order to obtain the wished value for $i_{100%}$&lt;br&gt;$12 \text{ mA} \leq i_{100%} \leq 21 \text{ mA}$</td>
</tr>
<tr>
<td>2.2.4.</td>
<td>TIME CONST.</td>
<td>Time constant for output of the measured values&lt;br&gt;Range: 5, 10, 15, 20, 25, 30, 50 m</td>
</tr>
<tr>
<td>2.4.0.</td>
<td>SPECIAL</td>
<td>Sub menu 2.4.0. Special functions</td>
</tr>
<tr>
<td>2.4.1.</td>
<td>LANGUAGE</td>
<td>Language for display text&lt;br&gt;&quot;GB&quot;: English&lt;br&gt;&quot;F&quot;: French&lt;br&gt;&quot;D&quot;: German</td>
</tr>
<tr>
<td>2.4.2.</td>
<td>PASSWORD</td>
<td>Not available</td>
</tr>
<tr>
<td>2.4.3.</td>
<td>EEPROM</td>
<td>Display of the different parameters memorised in the EEPROM: see section &quot;2.4 Parameters Stored in the EEPROM&quot;. Read only.</td>
</tr>
<tr>
<td>2.4.4.</td>
<td>FILTER</td>
<td>Activation of an electronic filter for noisy applications (foam, solid contents).&lt;br&gt;Select &quot;YES&quot; or &quot;NO&quot;, default setting &quot;YES&quot;.</td>
</tr>
<tr>
<td>2.4.5.</td>
<td>DISPLAY</td>
<td>Display of the actual velocity in m/s. The velocity is displayed after quitting the programming menu.&lt;br&gt;Select &quot;YES&quot; or &quot;NO&quot;. Default setting &quot;NO&quot;.&lt;br&gt;It must be programmed to &quot;NO&quot; before you disconnect the DWM 2000 D.</td>
</tr>
<tr>
<td>2.4.6.</td>
<td>DIAMETER</td>
<td>Diameter of the pipe into which the sensor is inserted. This value is needed for calculating the flow rate. If you enter a value of &quot;0&quot;, this switches off flow rate on the indicator display. Refer also to the CAUTION that follows.&lt;br&gt;Refer to the indicated range: $50 \text{ mm} \leq \text{ diameter} \leq XXXX \text{ mm}$</td>
</tr>
</tbody>
</table>

**CAUTION**<br>Do not use menu 2.4.6 to read the setting for the pipe diameter. This will reset the value to default "0" and switch off the flow rate line on the indicator display. Use menu 2.4.3 to read EEPROM settings (this includes DIAMETER). If the value is reset to "0", you must re-enter the pipe diameter in menu 2.4.6.
## 2.4 Parameters stored in the EEPROM (menu 2.4.3)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Comment</th>
<th>Typical value</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHECKS 1</td>
<td>Check EEPROM n°1</td>
<td>-</td>
</tr>
<tr>
<td>CHECKS 2</td>
<td>Check EEPROM n°2</td>
<td>-</td>
</tr>
<tr>
<td>CHECKS BYTE 1</td>
<td>Check EEPROM</td>
<td>-</td>
</tr>
<tr>
<td>CHECKS BYTE 2</td>
<td>Check EEPROM</td>
<td>-</td>
</tr>
<tr>
<td>CPT ALARM.</td>
<td>Counting of all the error messages since the first power-up.</td>
<td>-</td>
</tr>
<tr>
<td>CPT ALARM.2</td>
<td>Counting of all the error messages since the last reset.</td>
<td>-</td>
</tr>
<tr>
<td>TEST</td>
<td>Indication of auto diagnostic test level</td>
<td>CUSTOM</td>
</tr>
<tr>
<td>CORRECTION</td>
<td>Indication of activation of low velocity linearization.</td>
<td>YES</td>
</tr>
<tr>
<td>YES/NO</td>
<td></td>
<td></td>
</tr>
<tr>
<td>EP CHECKS</td>
<td>Result of the data check in EPROM (see menu 1.1.6.)</td>
<td>Value = 22309</td>
</tr>
<tr>
<td></td>
<td></td>
<td>With soft V1.02</td>
</tr>
<tr>
<td>FS</td>
<td>Display of the programmed full scale values (see menu 1.1.2.)</td>
<td>1 m/s ... 8 m/s</td>
</tr>
<tr>
<td>GK</td>
<td>Primary head calibration constant (see menu 2.1.3.)</td>
<td>0.8 ... 1.3</td>
</tr>
<tr>
<td>U REF</td>
<td>Internal voltage reference (see menu 1.1.3.)</td>
<td>2.4 ... 2.6.</td>
</tr>
<tr>
<td>T CST</td>
<td>Time constant (see menu 2.2.4.)</td>
<td>5 s</td>
</tr>
<tr>
<td>TEST AMP</td>
<td>Test value of the amplifier control loop (see menu 1.1.4.)</td>
<td>75 ... 95</td>
</tr>
<tr>
<td>FM</td>
<td>Frequency of the magnetic field (see menu 1.1.1.)</td>
<td>10 ... 14.5 Hz</td>
</tr>
<tr>
<td>DIAMETER</td>
<td>Diameter of pipeline (see menu 2.4.6)</td>
<td>≥ 50 mm</td>
</tr>
</tbody>
</table>
### 2.5 Error message list

Listed below are the messages which can appear in menu 1.2.2. This function stores all the faults that have occurred since the first connection to power.

<table>
<thead>
<tr>
<th>Error messages</th>
<th>Comment</th>
<th>Actions</th>
</tr>
</thead>
<tbody>
<tr>
<td>MAG. FREQ</td>
<td>No magnetic field frequency out of range 10 Hz ≤ frequency ≤ 14.5 Hz</td>
<td>Replace the electronics module</td>
</tr>
<tr>
<td>AMPLI</td>
<td>Dysfunction of the amplifier loop</td>
<td>Replace the electronics module</td>
</tr>
<tr>
<td>F.S.</td>
<td>Programmed full scale out of range (&gt;8 m/s or &lt;1 m/s).</td>
<td>Replace the electronics module</td>
</tr>
<tr>
<td>ZERO KEY</td>
<td>Dysfunction of ZERO key (short circuit)</td>
<td>Replace the electronics module</td>
</tr>
<tr>
<td>EP CHECK</td>
<td>Data loss in EPROM (software)</td>
<td>Replace the electronics module</td>
</tr>
<tr>
<td>EEPROM CHECK</td>
<td>Data loss in EEPROM (calibration and calculation data)</td>
<td>Replace the electronics module</td>
</tr>
<tr>
<td>U REF</td>
<td>Amplifier voltage reference is damaged</td>
<td>Replace the electronics module</td>
</tr>
<tr>
<td>CURR. OUT</td>
<td>Incorrect position of the internal current output switch</td>
<td>Replace the electronics module</td>
</tr>
<tr>
<td>FS SWIT EEPROM</td>
<td>Modification of the full scale power on</td>
<td>Program the full scale power off</td>
</tr>
<tr>
<td>ZERO</td>
<td>Velocity measurement during the zero adjustment is more than 0.2 m/s.</td>
<td>Deactivate the alarm mode and adjust the zero again</td>
</tr>
</tbody>
</table>
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