Declaration of Conformity

Konformitetserklæring
Vi, MJK Automation A/S, DK-2850 Nærum, påtager os det fulde ansvar for at produktet

Electromagnetic Flowmeter

Declaration of Conformity
We, MJK Automation A/S, DK-2850 Nærum, declare under our sole responsibility that the product

Konformitätserklärung
Wir, MJK Automation A/S, DK-2850 Nærum, erklären in alleiniger Verantwortung, dass das Produkt

EN61000-6-3/-4:2001, EN61000-6-1/-2:1999

following the provisions of Directive

Gemäß den Bestimmungen der Richtlinie

89/336/EEC; 92/31/EEC

Declaración de Conformidad
Nosotros, MJK Automation A/S, DK-2850 Nærum, declaramos bajo nuestra única responsabilidad que el producto

EN61000-6-3/-4:2001, EN61000-6-1/-2:1999

Conformemente alla disposizioni della Direzione

según las disposiciones de la(s) directiva(s)

89/336/EEC; 92/31/EEC

EN 3.05 MagFlux Manual 1212 2
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1. Introduction

Thank you for choosing the MJK *MagFlux*® electromagnetic flow meter. We have done our utmost to design and manufacture a flow meter that satisfies your requirements.

The *MagFlux*® is suitable for flow measurement in all kinds of conductive fluids, and it is especially suited for flow measurement of water, waste water, sludge and other fluids containing particles.

The flow meter is easy to install and put into service. However, read this manual first to learn about the *MagFlux*® electromagnetic flow meter and all its features.

You can always contact your local representative or the MJK hot lines for advice and guidance:

- **Europe** Tel.: +45 45 56 06 56 E-mail: mjk@mjk.com
- **Denmark** Tel.: +45 45 56 06 56 E-mail: mjk@mjk.dk
- **Norway** Tel.: +47 69 20 60 70 E-mail: mjk@mjk.no
- **Sweden** Tel.: +46 53 31 77 50 E-mail: kontoret@mjk.se
- **Holland** Tel.: +31 251 672171 E-mail: mjknl@mjk.com
- **USA** Tel.: +1 847 482 8655 E-mail: mjkusa@mjk.com
- **Australia** Tel.: +61 3 9758 8533 E-mail: mjkaus@mjk.com

Visit our web sites at [www.magflux.dk](http://www.magflux.dk) and [www.mjk.com](http://www.mjk.com) to learn more about MJK Automation, our other products and the people behind them. 

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*MJK Automation A/S is a Xylem Brand.*
About this Manual
The manual is divided into a table of contents, eight chapters, seven appendices and an index.

1. Introduction
   Contains a presentation of the MJK MagFlux® electromagnetic flow meter, the structure of this manual and the operating principles.

2. Safety, Repair and Product Identification
   Provide answers to issues regarding safety, mounting, repair, restrictions and product identification.

3. Flow Sensor
   Describes the physical specifications and installation guidelines for the flow sensor such as liner and electrode selection, example pipe systems, sizing chart, etc.

4. Flow Converter
   Describes the physical specifications and installation rules for the flow converter such as power supply, in- and outputs, sensor/converter/display configurations, etc.

5. System Configuration Examples
   Illustrates how MagFlux® sensors, converters and display units can be interconnected in real-life scenarios.

6. Startup
   Describes important checks and basic settings to get started including the display and keyboard user interface.

7. MagFlux Menus
   Contains a comprehensive description of the MagFlux® menus, options and utilities.

8. Mechanical Dimensions
   Lists the flange and sensor dimensions and specifications.

* * * * *
Appendix A. Pop-up Events / Error Messages
Lists possible pop-up messages, explains their meaning and offer solutions to error conditions.

Appendix B. MJK-Field Link Software Upgrade
Describes in detail how to utilise the unique and intuitive MJK-Field Link software program to upload new display and converter firmware versions.

Appendix C. FAQs - Frequently Asked Questions
Contains answers to questions that are often asked.

Appendix D. Front Panel Cut-out Drawing
A 1:1 scale drawing of the front panel outline and cut-out area for installation and mounting purposes.

Appendix E. Test Certificate
Shows an example test certificate which is part of MagFlux® shipments.

Appendix F. Log Files
An example log file illustrates the format and explains the entries.

Appendix G. Digital Input/Output Connections
Illustrates how the digital in- and outputs can be interconnected.

* * * * *

Main Menu Overview
Is a continuous presentation of the main menu structure. The size of this manual does not provide sufficient space for showing the complete menu structure in one image.

Converter Setup Menu Overview
Is a continuous presentation of the converter setup menu structure.

Service Menu Overview
Is a continuous presentation of the service menu structure.

Display Setup Menu Overview
Is a continuous presentation of the display setup menu structure.
Operating Principles

The electromagnetic flow meter is an instrument for measuring the flow of conductive fluid using Faraday’s electromagnetic induction law, and consequently the fluid must be electrically conductive.

As illustrated below a magnetic field with density B - perpendicular to the direction of flow - stretches across a fluid flowing within an electrically isolated pipe.

The magnetic flux will induce a voltage difference (E) that can be measured between two electrodes arranged perpendicular to the direction of flow and the magnetic field. The voltage is proportional to the velocity (V) of the fluid.

\[ E = B \times D \times V \times k \] [Volt] where

- E is the voltage that is induced between the two electrodes
- B is the magnetic flux density
- D is the distance between the two electrodes
- V is the fluid velocity
- k is a dimensionless constant

The flow of the fluid Q (m³/s) is given by the following formula:

\[ Q = \pi \times D^2 \times V / 4 \Rightarrow V = 4 / (\pi \times D^2) \] where

- \( \pi \): is the constant pi (= 22/7)
- D: is the internal diameter
- V: is the fluid velocity

The combination of above formulas ① and ② gives the following formula:

\[ E = K \times B \times D \times Q \times 4 / (\pi \times D \times D) = 4K \times B \times Q / (\pi \times D) \]

Evidently the voltage E is proportional to the actual flow.
The MagFlux® Flow Meter

Measurement

Electromagnetic flow meters may have either direct current (DC) or alternating current (AC) excitation. When systems are AC excited, electrostatic and/or electromagnetic noise may influence the measurements. A DC excited system however, is less sensitive to noise produced by electromagnetic induction, simply because the voltage induced over the electrodes will be a DC voltage. The drawbacks are measurement errors due to electro-chemical polarization between the electrodes and the fluid.

The MagFlux® electromagnetic flow meters are excited by a 2.5 Hz square wave and thereby eliminate the drawbacks of both DC and AC systems.

A microprocessor receives and measures the amplitude of the pulse with a 16-bit resolution, and converts and displays the result on the display unit.

Electrode Cleaning

Electrode cleaning is always in service to maintain clean and accurate electrodes. The operating principle is a 55 Hz AC voltage superimposed on the normal 2.5 Hz square wave. This step effectively reduces the risk of a dirt layer build-up on the electrodes that eventually will deteriorate and finally isolate electrical contact to the flow media.
This page intentionally left blank.
2. Safety, Repair and Product Identification

Safety instructions
1. Read this manual carefully.
2. Pay attention to the environment on the installation site.
3. Wear necessary protective equipment and follow all current safety regulations.
4. The MagFlux® can invoke a start signal for dangerous machinery. Always ensure that connected machinery and other equipment are effectively put out of service (that is to remove the main fuses and lock main and security switches in off-position) before commencing configuration, fault finding, servicing, maintenance work, etc.
5. WARNING: There is a risk of lethal, electrical shock from "Mains supply" terminals N and L. Be careful not to touch these terminals while the MagFlux® is being serviced.

Physical Mounting
The MagFlux® flow converter/flow meter must not be mounted in explosion hazardous areas!

Repair
Repair must only be made by MJK or by a service representative approved by MJK.
Product Identification

A delivery will usually consist of a MagFlux® converter and a MagFlux® flow sensor. Check that the item(s) delivered corresponds to the ordered item(s). The part number and the calibration code are printed on an identification label stuck onto the flow converter shipping box and on a label on the flow converter itself. The part number, the serial number, the calibration code and the electrode/lining data for the flow sensor are printed on a green name plate (see example below).

This calibration code (Cal. code) is unique and provides the MagFlux® converter with information about flow sensor number, nominal diameter of the flow sensor and calibration data for the flow sensor.

The current converter firmware requires an 8-character input, but it also accepts 6 characters plus two "Ok"s. The example above (dw5uq4) would require that you enter: d w 5 u q 4 "Ok" "Ok", where "Ok" indicates that you press the "Ok" key without selecting any character. Only small letters can be entered from the MagFlux® keypad.

If changes are needed to the unique sensor calibration code following initial setup, this is the calibration code that the "Sensor Calibration Code" menu must contain (see pages 44 and 86).
3. Flow Sensor

The following conditions must be satisfied to get the full benefit of the MagFlux® flow sensor.

**Minimum conductivity**
- The conductivity of the media must be greater than 5 µS/cm.

**Liner selection**
- Use Teflon® lining for chemicals and food industries
- Use hard rubber lining for drinking water and waste water
- Use soft rubber lining for water with abrasive particles

**Electrode selection**
- Steel AISI 316TI-1.4571 for general purpose, sewage, water and district heating systems
- Hastelloy for sea water
- Titanium and platinum for chlorine and other aggressive chemicals

**Mounting location**
- To obtain a stable and accurate flow measurement, it is very important that the flow sensor is mounted correctly in the pipe system
- There must be no flow fluctuations
- Avoid locations where vacuum can occur; especially for flow sensors with Teflon™ linings
- Avoid locations with vibrations from for example pumps
- Avoid locations with extensive temperature changes
- Avoid corrosive environments and locations with a great risk of condensation, or consult factory for special builds for these locations
- Take care that condensate and water cannot enter the connector box on the flow sensor.
- There must be sufficient free space around the flow sensor.
- **IMPORTANT**: Observe that the correct flow direction is set in the MagFlux® "Converter Setup" menu and in the "Service Menu". Default flow direction is "A" (flow direction towards left).
The flow directions A or B are clearly shown on the name plate. Default flow direction is "A".

**Pressure loss**

The pressure loss can easily be determined, if the nominal pipe diameter is greater than the *MagFlux*® flow sensor. See the diagram below:

The diagram illustrates that decreasing the internal diameter from 100 mm (DN) to 80 mm (DO) will cause a pressure loss of 0.003 Bar @3 m/s.
Accuracy

According to the type and size of the flow sensor, the measuring accuracy will be better than 0.25%, provided that the flow sensor has the correct dimension.

\[
\begin{align*}
\text{Min and max flow} & \\
\text{DN} & | \text{Qmin} \ 0.2 \text{ m/s} | \text{Qmax} \ 10 \text{ m/s} & | \text{DN} & | \text{Qmin} \ 0.2 \text{ m/s} | \text{Qmax} \ 10 \text{ m/s} & | \text{DN} & | \text{Qmin} \ 0.2 \text{ m/s} | \text{Qmax} \ 10 \text{ m/s} \\
3 & | 5.09 \ 10 \text{ l/h} | 254 \ 10 \text{ l/h} & | 20 & | 226 \ 10 \text{ l/h} | 1304 \ 10 \text{ l/h} & | 65 & | 2.39 \ 0.2 \text{ m/s} | 119 \ 0.2 \text{ m/s} \\
6 & | 20.4 \ 10 \text{ l/h} | 1018 \ 10 \text{ l/h} & | 25 & | 353 \ 10 \text{ l/h} | 17676 \ 10 \text{ l/h} & | 80 & | 3.62 \ 0.2 \text{ m/s} | 181 \ 0.2 \text{ m/s} \\
8 & | 36.2 \ 10 \text{ l/h} | 1810 \ 10 \text{ l/h} & | 32 & | 579 \ 10 \text{ l/h} | 28944 \ 10 \text{ l/h} & | 100 & | 5.65 \ 0.2 \text{ m/s} | 283 \ 0.2 \text{ m/s} \\
10 & | 56.5 \ 10 \text{ l/h} | 2827 \ 10 \text{ l/h} & | 40 & | 905 \ 10 \text{ l/h} | 45360 \ 10 \text{ l/h} & | 125 & | 8.84 \ 0.2 \text{ m/s} | 442 \ 0.2 \text{ m/s} \\
15 & | 127 \ 10 \text{ l/h} | 6362 \ 10 \text{ l/h} & | 50 & | 1414 \ 10 \text{ l/h} | 70660 \ 10 \text{ l/h} & | 150 & | 12.7 \ 0.2 \text{ m/s} | 636 \ 0.2 \text{ m/s} \\
\end{align*}
\]

Min and max flow

\[
\begin{align*}
\text{DN} & | \text{Qmin} \ 0.2 \text{ m/s} | \text{Qmax} \ 10 \text{ m/s} & | \text{DN} & | \text{Qmin} \ 0.2 \text{ m/s} | \text{Qmax} \ 10 \text{ m/s} & | \text{DN} & | \text{Qmin} \ 0.2 \text{ m/s} | \text{Qmax} \ 10 \text{ m/s} \\
200 & | 22.6 \ 0.2 \text{ m/s} | 1131 \ 0.2 \text{ m/s} & | 450 & | 115 \ 0.2 \text{ m/s} | 5726 \ 0.2 \text{ m/s} & | 900 & | 458 \ 0.2 \text{ m/s} | 22902 \ 0.2 \text{ m/s} \\
250 & | 35.3 \ 0.2 \text{ m/s} | 1767 \ 0.2 \text{ m/s} & | 500 & | 141 \ 0.2 \text{ m/s} | 7069 \ 0.2 \text{ m/s} & | 1000 & | 565 \ 0.2 \text{ m/s} | 28274 \ 0.2 \text{ m/s} \\
300 & | 50.9 \ 0.2 \text{ m/s} | 2545 \ 0.2 \text{ m/s} & | 600 & | 204 \ 0.2 \text{ m/s} | 10179 \ 0.2 \text{ m/s} & | 1200 & | 814 \ 0.2 \text{ m/s} | 40715 \ 0.2 \text{ m/s} \\
350 & | 69.3 \ 0.2 \text{ m/s} | 3464 \ 0.2 \text{ m/s} & | 700 & | 277 \ 0.2 \text{ m/s} | 13854 \ 0.2 \text{ m/s} & | 1500 & | \text{Qmax. is equal to 20 mA factory preset} \\
400 & | 90.5 \ 0.2 \text{ m/s} | 4524 \ 0.2 \text{ m/s} & | 800 & | 362 \ 0.2 \text{ m/s} | 18095 \ 0.2 \text{ m/s} & | & & \\
\end{align*}
\]

Sizing

The flow sensor should be selected so the flow velocity through the sensor will be between 0.2 - 10 m/s.

MJK recommends that flow velocities in tubes are kept between 1 - 3 m/s for reliable and safe operation. See also the dimensioning table below and the dimensioning chart on the following page.
Sizing Chart

Example: A MagFlux with an internal diameter of 100 mm can measure flow rates between approx. 290 m³/h and 5.6 m³/h, and the fluid velocity is 1.5 m/s at a flow rate of approx. 42 m³/h.
Pipe System

1. The flow sensor must be mounted in a location which is free from interfering elements like valves, Ts, bends, pumps, etc. to ensure a laminar flow without turbulence upstream of the flow sensor. For that reason the flow sensor must be mounted in a straight pipe at a distance from interfering elements of minimum 3 x DN upstream and minimum 2 x DN downstream.

\[ \alpha \leq 7.5^\circ \]

**Important:** Valves should always be mounted on the downstream side of the flow sensor!
2. If it becomes necessary to use reducers, the inner angle must not exceed 7.5°.

![Diagram showing angle and dimensions for reducers] 

The minimum length to keep the angle below 7.5° can be checked by means of the formula below:

$$L = (D - d) \times 7.63$$

where "D" is the large diameter and "d" the small diameter of the reducer.

*Example:* If a flow sensor in dimension DN 80 is mounted downstream of a 100 mm pipe, the reducer must then have a length of minimum 152,6 mm in order to keep the inner angle below 7,5 °.

3. Flange connections must be assembled concentrically on both the upstream and the downstream side. Measuring accuracy will be affected by turbulence in the liquid from poorly made connections.

**Important:** Gaskets and grounding rings must also be mounted concentrically!

![Correct and incorrect concentric flange connections] 

4. The flow sensor should always be filled with liquid. For that reason the flow sensor must not be mounted at the highest point of the pipe system or in free outlets, where gravity could empty or partially empty the pipe.
5. The flow sensor can be mounted vertically or horizontally.
   If the flow sensor is mounted vertically, the flow direction should always be upwards. In that way the effect from possible bubbles in the liquid will be significantly reduced, just as it will ensure that the flow sensor is always filled with liquid.
   In case the liquid is carrying particles, for example when measuring sludge, sewage, etc., the flow sensor must be mounted vertically.

6. When mounting horizontally in pipes with free downstream outlet, the flow sensor should be mounted such that it will always be filled with liquid, for example in a bend situated lower than the height of the outlet.
   In case the liquid is carrying particles, e.g. when measuring sludge, sewage etc. the flow sensor must be mounted vertically.
7. When mounting horizontally the flow sensor can be rotated max. +/- 45° seen from the connection end. If the flow sensor is rotated more than 45°, one of the electrodes may not be in full contact with the liquid.

**Cabinet Mounted on the Flow Sensor**

The cabinet is mounted on the flow sensor with four pcs. 6x12 hex cap screws.
Potential Equalization and Grounding

Type 7100/7200/7600 in Conductive Pipes

NB! The flow sensor must be connected to an effective ground connection, and the wire dimension must be at least 1.5 mm².

Type 7100/7200/7600 in Non-conductive Pipes

NB! The flow sensor must be connected to an effective ground connection, and the wire dimension must be at least 1.5 mm².
**Type 7300/7400 in Conductive Pipes**

NB! The flow sensor must be connected to an effective ground connection, and the wire dimension must be at least 1.5 mm².

**Type 7300/7400 in Non-conductive Pipes**

NB! The flow sensor must be connected to an effective ground connection, and the wire dimension must be at least 1.5 mm².
4. Flow Converter

Electrical Mounting

Warning: The MagFlux® flow converter / flow sensor must not be mounted in explosion hazardous areas!

Loosen the four screws (position indicated by arrows) and remove the display unit to gain access to the terminals.
Power Supply

The flow converter must be supplied from a properly fused mains outlet, a 24 volt AC outlet, or a 10 - 30 V DC power supply/battery.

<table>
<thead>
<tr>
<th>Power Supply</th>
<th>230 V AC, 115 V AC or 24 V AC</th>
<th>Power Supply</th>
<th>10 - 30 V DC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Terminal</td>
<td>Designation</td>
<td>Terminal</td>
<td>Designation</td>
</tr>
<tr>
<td>PE</td>
<td>Protective ground</td>
<td>PE</td>
<td>Protective ground</td>
</tr>
<tr>
<td>N</td>
<td>230 / 115 / 24 V AC neutral</td>
<td>—</td>
<td>DC neutral</td>
</tr>
<tr>
<td>L</td>
<td>230 / 115 / 24 V AC live</td>
<td>+</td>
<td>DC live</td>
</tr>
</tbody>
</table>

The internal fuse ratings are:

<table>
<thead>
<tr>
<th>Voltage</th>
<th>Rating</th>
<th>Order no.</th>
<th>Dimension</th>
</tr>
</thead>
<tbody>
<tr>
<td>230 V AC</td>
<td>0.063 mA T</td>
<td>550030</td>
<td>5 x 20 mm</td>
</tr>
<tr>
<td>115 V AC</td>
<td>0.125 mA T</td>
<td>550035</td>
<td>5 x 20 mm</td>
</tr>
<tr>
<td>24 V AC</td>
<td>0.5 mA T</td>
<td>550049</td>
<td>5 x 20 mm</td>
</tr>
<tr>
<td>10 - 30 V DC</td>
<td>1.0 A T</td>
<td>550051</td>
<td>5 x 20 mm</td>
</tr>
</tbody>
</table>

The technical specifications/requirements for a 10 - 30 V DC power supply/battery are:

<table>
<thead>
<tr>
<th>Technical Specifications for 10 - 30 V DC Power Supply</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power consumption without display</td>
</tr>
<tr>
<td>Power consumption with display</td>
</tr>
<tr>
<td>Peak start current @12 V DC, 1 second</td>
</tr>
<tr>
<td>Peak start current @24 V DC, 1 second</td>
</tr>
</tbody>
</table>
Changing the Power Supply Voltage 230/115 V AC

To change the input mains voltage from 230 VAC to 115 VAC (or vice versa) proceed as follows:

1. Loosen the four screws on the front and lift out the display (see also page 25).
2. Note down the color and position of the wires in the terminal blocks, and then loosen the terminal screws.
3. Unscrew the two screws that hold the metal cover and then remove it.
4. Unscrew the four screws that hold the mother PCB (the printed circuit board with all the electrical components).
5. Remove the mother PCB and look at the back side. This is what you should see (230 V AC configuration):

6. Unsolder and remove the jumper indicated by the arrow.
7. Look at the following picture to see where two new jumpers must be inserted (115 V AC configuration):

![Diagram showing two new jumpers to be inserted.]

8. Insert and solder 2 jumpers (wires) in the positions indicated by the arrows.

9. Turn around the PCB and replace the 63 mAT fuse on the right side with a 125 mAT fuse (or vice versa going from 115 VAC to 230 VAC).

10. Re-insert the PCB and re-assemble the flow meter (see also steps 4, 3, 2 and 1).
**Analogue Output**

The analogue output is an active output with a max. load of 800Ω.

<table>
<thead>
<tr>
<th>Terminal</th>
<th>Designation</th>
</tr>
</thead>
<tbody>
<tr>
<td>AO +</td>
<td>4-20 mA</td>
</tr>
<tr>
<td>AO -</td>
<td>4-20 mA</td>
</tr>
</tbody>
</table>

The analogue output can be programmed for indication of:
- direct flow
- inverse flow
- bidirectional flow
- absolute flow

See details on pages 63 - 66 incl.

**Digital Outputs**

*MagFlux*® has two digital outputs - DO 1 with an opto (light triggered) relay and DO 2 with a mechanical relay.

They can both be programmed for the following functions:
- high and low flow alarms
- pulse output for counters R Totalizer Forward and Reverse
- batch 1 and batch 2 counters
- system error alarm
- empty pipe alarm
- flow direction indication

<table>
<thead>
<tr>
<th>Opto Relay (DO1)</th>
<th>Terminal</th>
<th>Designation</th>
</tr>
</thead>
<tbody>
<tr>
<td>DO 1 Com</td>
<td>Max. 50 V DC /120 mA</td>
<td></td>
</tr>
<tr>
<td>DO 1 NO</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Mechanical Relay (DO2)</th>
<th>Terminal</th>
<th>Designation</th>
</tr>
</thead>
<tbody>
<tr>
<td>DO 2 Com</td>
<td>Max. 50 V DC /1 A</td>
<td></td>
</tr>
<tr>
<td>DO 2 NO</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

DO 1 shares the common terminal (Com) with DI.
Digital Input

*MagFlux*® has one digital input which is activated with a voltage higher than 10 V DC and de-activated with a voltage lower than 5 V DC.

<table>
<thead>
<tr>
<th>Terminal</th>
<th>Designation</th>
</tr>
</thead>
<tbody>
<tr>
<td>DI</td>
<td>Com</td>
</tr>
<tr>
<td>DI</td>
<td>Max. 30 V DC</td>
</tr>
</tbody>
</table>

The digital input (DI) can be programmed for the following functions:
- start and pause batch 1 and batch 2 counters
- reset counters R Totalizer Forward and Reverse
- reset counter R Totalizer Sum

DI shares the common terminal (Com) with DO 1.

Local (compact) Flow Sensor

Connect the compact (local) flow sensor to the flow converter with the wires coming from the flow sensor as shown below.

<table>
<thead>
<tr>
<th>Terminal</th>
<th>Signal</th>
<th>Designation</th>
<th>Colour from sensor</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Liquid GND</td>
<td>Built-in liquid ground electrode</td>
<td>Black/shield</td>
</tr>
<tr>
<td>2</td>
<td>E1</td>
<td>Electrode</td>
<td>Red</td>
</tr>
<tr>
<td>3</td>
<td>E2</td>
<td>Electrode</td>
<td>White</td>
</tr>
<tr>
<td>4</td>
<td>GND</td>
<td>Ground</td>
<td>Black</td>
</tr>
<tr>
<td>5</td>
<td>L1</td>
<td>Coil</td>
<td>Blue</td>
</tr>
<tr>
<td>6</td>
<td>L2</td>
<td>Coil</td>
<td>Brown</td>
</tr>
<tr>
<td>7, 8 and 9</td>
<td></td>
<td>not used</td>
<td></td>
</tr>
</tbody>
</table>
Remote Flow Sensor

Connect the remote flow sensor to the flow converter with the included cable (part number 691080).

**Important**: Do not use other cable types!

**Important**: Terminals 1 and 4 must be shunted!

The extension cable length between converter and sensor must under normal circumstances not exceed 50 meters. Power lines running in parallel and noisy environments may reduce the max. length to less than 50 meters. Consult MJK personnel for advice and guidance.

<table>
<thead>
<tr>
<th>Remote Flow Sensor</th>
<th>691080</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Terminal</strong></td>
<td><strong>Signal</strong></td>
</tr>
<tr>
<td>1</td>
<td>Liquid GND</td>
</tr>
<tr>
<td>2</td>
<td>E1</td>
</tr>
<tr>
<td>3</td>
<td>E2</td>
</tr>
<tr>
<td>4</td>
<td>GND</td>
</tr>
<tr>
<td>5</td>
<td>L1</td>
</tr>
<tr>
<td>6</td>
<td>L2</td>
</tr>
<tr>
<td>7, 8 and 9</td>
<td>not used</td>
</tr>
</tbody>
</table>

**Converter Connection Board - Local**
691080 cable before March 2011

691080 cable from March 2011
5. System Configuration Examples

Compact Converter and Display Unit on Flow Sensor

Configuration: The MagFlux® Converter and Display Unit is mounted directly on the MagFlux® Flow Sensor.

Order numbers for this configuration:

207xxx MagFlux® Flow Sensor

207920 MagFlux® Converter with Display Unit for sensor mounting

207920 consists of:

- 207940 Display Unit
- 807000 Converter PCB
- 800070 Field Cabinet
  bottom part for sensor mounting
Remote Converter with Connection Box on Flow Sensor

Configuration: The MagFlux® Converter and Display Unit is remote mounted for example when the sensor is to be buried or submerged.

Order numbers for this configuration:

- 207xxx MagFlux® Flow Sensor
- 207925 MagFlux® Converter with Display Unit for wall mounting
- 691080 MagFlux® Sensor cable
- 579035 MagFlux® Gel Potting Kit IP68

207925 consists of:

- 207940 Display Unit
- 207020 MagFlux connection PCB (see picture below)
- 820050 Blind Lid
- 800070 Cabinet bottom part for sensor mounting
- 800075 Cabinet bottom part for wall mounting

Converter connection PCB
Wiring Schematic #1

for "Remote Converter with Connection Box on Flow Sensor" on the opposite page (page 34).

**Flow Sensor**

Connect one end of the MJK cable to the flow sensor as described in the table below. All 3 shields are twisted and connected in slot 1. The white lead in pair no. 3 is not used.

<table>
<thead>
<tr>
<th>Terminal</th>
<th>Signal</th>
<th>Wire</th>
<th>Colour before March 2001</th>
<th>Colour from March 2011</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>GND</td>
<td>Shield</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>2</td>
<td>E1</td>
<td>Pair no. 1</td>
<td>Red</td>
<td>Red</td>
</tr>
<tr>
<td>3</td>
<td>E2</td>
<td>Pair no. 1</td>
<td>White</td>
<td>White</td>
</tr>
<tr>
<td>4</td>
<td>GND</td>
<td>Pair no. 3</td>
<td>Black</td>
<td>Black</td>
</tr>
<tr>
<td>-</td>
<td>-</td>
<td>Pair no. 3</td>
<td>White</td>
<td>-</td>
</tr>
<tr>
<td>5</td>
<td>L1</td>
<td>Pair no. 2</td>
<td>Green</td>
<td>Blue</td>
</tr>
<tr>
<td>6</td>
<td>L2</td>
<td>Pair no. 2</td>
<td>White</td>
<td>Brown</td>
</tr>
<tr>
<td>7, 8, 9</td>
<td></td>
<td></td>
<td>not used</td>
<td></td>
</tr>
</tbody>
</table>

**Remote Converter (and Display Unit)**

Connect the other end of the MJK cable to the remote converter as shown to the right. The "1 Shield" lead goes into "Ground from flow pipe", the "2 Red" lead goes into "E1 Red", the "3 White" lead into "E2 White", and so on.
Remote Display and Multiple Converters Wiring

Configuration: Two locally mounted MagFlux® Flow Sensors and converters with blind lid and one remote mounted Display Unit.

The communication between the sensors and the Display Unit is executed on shielded twisted 2- and 4-wire cables using the Modbus® communication protocol on RS-485.

Order numbers for this configuration:

- 207xxx MagFlux® Flow Sensor (2 pcs.)
- 207925 MagFlux® Converter with Display Unit for wall mounting

207925 consists of:

- 207940 Display Unit
- 207020 MagFlux connection PCB
- 820050 Blind lid
- 800070 Cabinet bottom part for sensor mounting
- 800075 Cabinet bottom part for wall mounting

Note: The total maximum cable length for the 2- and 4-wire shielded twisted cables is 1000 meters.
Wiring Schematic #2

for the "Remote Display and Multiple Converters Wiring" example on the opposite page (page 36).

Local flow sensor 1
2-wire twisted shield cable:
Connect lead "1" to slot "A", lead "2" to slot "B" and the twisted shield to slot ".-".

Local flow sensor 2
2-wire twisted shield cable:
Connect lead "1" to slot "A", lead "2" to slot "B" and twisted shield to slot ".-".
4-wire twisted shield cable:
Connect lead "1" to slot "A", lead "2" to slot "B", lead "3" to slot "+" and lead "4" and twisted shield to slot ".-".

Remote display unit
4-wire twisted shield cable:
Connect lead "1" to slot "A", lead "2" to slot "B", lead "3" to slot "+" and lead "4" and twisted shield to slot ".-".
This page intentionally left blank.
6. Startup

Initial Checks
Before switching on power the following steps must be checked.
1. The local mains power supply voltage corresponds to the voltage printed on the identification label of the flow converter.
2. All electrical connections are made in accordance with the electrical connection diagram shown on page 32.
3. All terminal screws are tightened.
4. All cable glands are tightly secured.
5. All grounding connections are made in accordance with the instructions in this manual (see page 23).

Initial Flow Measurement
1. Make sure that the flow sensor is completely filled with liquid.
2. Turn on power to the flow converter and wait one minute.
3. Verify or enter the calibration code of the flow sensor in the "Converter Setup/Service Menu/Sensor Calibration Code" menu (see also page 86).
   If the entered calibration code is incorrect, and for example indicates a wrong internal diameter, read the correct calibration code on the converter as explained on page 14.

Flow Direction Check
1. Allow free flow through the sensor.
2. Check on the display unit screen that the flow value increases. If the value goes negative, check that the "Flow direction" option is set correctly and/or check the electrical connections on the flow sensor.

Language Selection
1. The default display language is English. If another language is required, proceed with step 2.
2. Select "Display Setup" from the Main Menu.
3. Select "Language" from the Display Setup menu and chose the required language (see page 96).
Display Read-out, one connected unit

All MagFlux® display read-outs are illustrated and described in this manual. Chapter 6. MagFlux Menus (on page 47) gives a detailed description of the displays shown during setup, configuration and normal operation.

A 5-line LCD screen displays symbols and the actual status during setup, configuration, servicing and normal operation (see also page 48).

The display shown above will in the remaining part of this manual be stylized to appear like this:

```
MagFlux

Flow  4.1 m³/h
FTot  18.77 m³

Select  Setup
```
Display Read-out, several connected units

When several MJK units are interconnected, for example an Oxix® dissolved oxygen transmitter and MagFlux® flow meter with different names and Modbus ID numbers, a "Display Overview Menu" is available at top level (press "Back" repeatedly):

```
 MagFlux   4.1 m³/h
 Oxix1   91.9 %

 Back   Select   Setup
```

All connected units are displayed and sorted by their ID numbers, and consequently each unit can be selected and set up as required:

```
 MagFlux
 Flow                 4.1 m³/h
 FTot                       18.77 m³
 Select   Setup

 Oxix1
 Oxygen sat.     91.9 %
 Select   Setup
```

or

```
 MagFlux
 Flow                 4.1 m³/h
 FTot                       18.77 m³
 Select   Setup

 Oxix1
 Oxygen sat.     91.9 %
 Select   Setup
```

Important:

*More connected units can only be managed as described above, if each unit have been assigned a unique name and Modbus ID number. See page 98 for details.*

Display Keys

The keys and the soft keys (variable key functions determined by the display firmware) are used for initial programming and normal operation of the flow meter.

The function(s) of the four available keys is displayed at the bottom of the display. The symbols and actual functions are described in detail in the sections that describe the individual menus.
Contrast Adjustment

Adjust the display contrast by pressing the two outmost keys simultaneously (indicated by the keys) and press the up/down keys as required.

Save the new setting by pressing the two outmost keys simultaneously.

System Reset

You can reset and refresh all system displays and key combinations by pressing all four keys simultaneously.

This feature is especially useful during for example a service call, where the display language (Dutch, Danish, etc.) cannot be understood by the service person. A system reset immediately sets the display language to (GB) English.

The system reset must not be confused with the ultimate "Recover factory settings" (see page 100) which deletes all local configurations/settings and replaces them with default factory settings.
Initial Setup

Initial setup is normally performed by MJK personnel and is required to get started with the *MagFlux®* flow meter.

A unique sensor calibration code provides the *MagFlux®* flow converter with information about flow sensor number, nominal diameter and calibration data.

If changes to the unique sensor calibration code are needed following physical installation and initial setup, the "Sensor Calibration Code" menu must be addressed.

A password is not required to enter or change the sensor calibration code. Toggle through the displayed digits with the right-arrow key when prompted for a password and press OK.

1. Press the "Setup" key on the LCD display (see below) to enter the *MagFlux®* Main Menu.

```
MagFlux
Flow  4.1 m³/h
FTot  18.77 m³
Select Setup
```

2. Press the up/down keys to highlight the required menu line (here: "Converter Setup") and then press OK to select it.

```
Specify Main Screen
Factory Settings
Data Logger
Password
Set Sensor Name
Converter Setup
Display Setup
Back Select OK
```
3. Then select "Service Menu" and "Sensor Calibration Code".

4. Enter the calibration code read from the converter label (or pass through or change the displayed calibration code) and then press OK. See also details regarding the calibration code on page 14.

5. Select the correct flow direction in the "Set Flow Direction" menu and press OK.
6. Pass through the "DN" menu and press OK.

The MagFlux® is now configured with default settings and is ready for use.

Note: If the sensor has not been pre-configured from the factory with a sensor calibration code, the calibration code procedure is somewhat different form the just mentioned.

See the steps on the following page to configure a non-configured sensor with a calibration code.
1. Apply power to the sensor.
2. When the "Sensor Calibration Code" menu appears (see below), enter the calibration code read from the converter label and press OK.

3. Select the correct flow direction from the "Set Flow Direction" menu and press OK.
4. Sensor calibration code configuration is now finished, and you are returned to the Main Menu.
7. MagFlux Menus

All the MagFlux® menus and sub menus are shown and described in the following sections.

Continuous overviews of the menu and sub-menu structures are presented on the gatefolds at the end of this manual:

- **Main Menu Overview** (page Gf-1)
- **Converter Setup Menu Overview** (page Gf-2)
- **Service Menu Overview** (page Gf-3)
- **Display Setup Menu Overview** (page Gf-4)

**Main Menu**

1. Press the "Setup" key on the MagFlux® display (see below) to enter the MagFlux® Main Menu.

   ![MagFlux Main Menu](image)

   The MagFlux® Main Menu contains a number of sub menus (see figure below).

   ![Specify Main Screen](image)

   2. Press the up/down keys to highlight the required menu line (here: Specify Main Menu) and then press OK to select it.
Specify Main Screen

The "Specify Main Screen" menu allows you to customize the MagFlux® display to suit your requirements. You can add and remove the five available display lines and configure them individually.

1. Press the up/down keys to highlight the required menu line and then press OK to select it.
2. Press the up/down keys to highlight the required option and press OK.
The available options are:

**Not in use**

The line will not be used. The set free space will be used by the other lines.

**Sensor Name**

The actual sensor name like a number, a location, a name or a function will be displayed.

Note: The actual sensor name is defined later on in the "Set Sensor Name" menu on page 59.

**Flow**

Actual flow rate (in units chosen in the menu for primary units).

**RFTot**

Resettable **Forward Totalizer** counter

32bit (unit L) 4 294 967 295 L

**RRTot**

Resettable **Reverse Totalizer** counter

32bit (unit L) 4 294 967 295 L

**RTTot**

Resettable **Total Totalizer** counter

32bit (unit L) 2 147 483 647 L (+/- half of Tot)

**FTot**

**Forward Totalizer** counter

64bit (unit mm³) 18 446 744 073 709 551 615 mm³

**RTot**

**Reverse Totalizer** counter

64bit (unit mm³) 18 446 744 073 709 551 615 mm³

**Cnt**

Totalizer sum **Counter**

64bit (unit mm³) 9 223 372 036 854 775 807 mm³ (+/- half of Tot)

**Flow Direction**

Flow direction "A" or "B" will be displayed.
Batch 1
  Timer for batch volume 1

Batch 2
  Timer for batch volume 2

Batch 1 DN
  Displays the missing amount of Batch volume 1 (DN = down)

Batch 2 DN
  Displays the missing amount of Batch volume 2 (DN = down)

Batch 1 Cnt
  Batch 1 Counts (number of batches)

Batch 2 Cnt
  Batch 2 Counts (number of batches)

Batch 1 Vol
  Batch 1 Volume

Batch 2 Vol
  Batch 2 Volume

Clock
  Time and date

The size of the display lines will automatically increase or decrease as the number of display lines is removed or added to maximize the field of view for the measured values.
Factory Settings
The "Factory Settings" menu resets the display to default settings, to metric settings or to US settings.

**Note:** The converter settings are not changed from this menu. Converter settings are covered in "Converter Setup" on page 61.

1. Press the up/down keys to highlight the required menu line (here: Factory Settings) and then press OK to select it.

2. Press the up/down keys to highlight the required option and then press OK to select it.

The available options are:

**Cancel**
Exit the menu without changes.
Default

When "Default" is selected, the following settings **are not** affected and remain as chosen by the user:

- Sensor Name
- Device ID
- Flow Direction
- DN, size
- Calibration
- Calibration Code

The in- and outputs are **not** activated from the factory. Activate the in- and outputs by configuring the functions with for example the default values shown in the following tables:

- MagFlux Default DI/DO Settings
- MagFlux Default 20 mA Settings

<table>
<thead>
<tr>
<th>MagFlux Default DI/DO Settings</th>
<th>Digital Output 1 (opto) - DO1</th>
<th>Digital Output 2 (mech.) - DO2</th>
<th>Digital Input - DI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Counter R Totalizer Forward</td>
<td>Counter R Totalizer Forward</td>
<td>Counter R Totalizer Forward</td>
<td>RESET R Totalizer Forward</td>
</tr>
<tr>
<td>Counter R Totalizer Reverse</td>
<td>Counter R Totalizer Reverse</td>
<td>Counter R Totalizer Reverse</td>
<td>RESET R Totalizer Reverse</td>
</tr>
<tr>
<td>Batch Counter 1</td>
<td>Batch Counter 1</td>
<td>Batch Counter 1</td>
<td>RESET R Totalizer Sum</td>
</tr>
<tr>
<td>Batch Counter 2</td>
<td>Batch Counter 2</td>
<td>Batch Counter 2</td>
<td>Start / Pause Batch counter 1</td>
</tr>
<tr>
<td>Low Flow</td>
<td>Low Flow</td>
<td>Low Flow</td>
<td>Start / Pause Batch counter 2</td>
</tr>
<tr>
<td>High Flow</td>
<td>High Flow</td>
<td>High Flow</td>
<td></td>
</tr>
<tr>
<td>Flow Direction</td>
<td>Flow Direction</td>
<td>Flow Direction</td>
<td></td>
</tr>
<tr>
<td>Empty Pipe</td>
<td>Empty Pipe</td>
<td>Empty Pipe</td>
<td></td>
</tr>
</tbody>
</table>

Note: The same function cannot be assigned to both relays.
<table>
<thead>
<tr>
<th>Metric DN [mm]</th>
<th>Flow [m³/h]</th>
<th>US Size</th>
<th>Flow [GPM]</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>0,25</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>1</td>
<td>1/4¼&quot;</td>
<td>10</td>
</tr>
<tr>
<td>8</td>
<td>2</td>
<td>1&quot;</td>
<td>75</td>
</tr>
<tr>
<td>10</td>
<td>5</td>
<td>3/8&quot;</td>
<td>10</td>
</tr>
<tr>
<td>15</td>
<td>5</td>
<td>½&quot;</td>
<td>30</td>
</tr>
<tr>
<td>20</td>
<td>10</td>
<td>3/4&quot;</td>
<td>50</td>
</tr>
<tr>
<td>25</td>
<td>20</td>
<td>1&quot;</td>
<td>75</td>
</tr>
<tr>
<td>32</td>
<td>30</td>
<td>1¼&quot;</td>
<td>100</td>
</tr>
<tr>
<td>40</td>
<td>50</td>
<td>1½&quot;</td>
<td>200</td>
</tr>
<tr>
<td>50</td>
<td>75</td>
<td>2&quot;</td>
<td>300</td>
</tr>
<tr>
<td>65</td>
<td>100</td>
<td>2½&quot;</td>
<td>500</td>
</tr>
<tr>
<td>80</td>
<td>200</td>
<td>3&quot;</td>
<td>800</td>
</tr>
<tr>
<td>100</td>
<td>300</td>
<td>4&quot;</td>
<td>1000</td>
</tr>
<tr>
<td>125</td>
<td>400</td>
<td>5&quot;</td>
<td>2000</td>
</tr>
<tr>
<td>150</td>
<td>600</td>
<td>6&quot;</td>
<td>3000</td>
</tr>
<tr>
<td>200</td>
<td>1000</td>
<td>8&quot;</td>
<td>5000</td>
</tr>
<tr>
<td>250</td>
<td>2000</td>
<td>10&quot;</td>
<td>7700</td>
</tr>
<tr>
<td>300</td>
<td>2500</td>
<td>12&quot;</td>
<td>10000</td>
</tr>
<tr>
<td>350</td>
<td>3000</td>
<td>14&quot;</td>
<td>10000</td>
</tr>
<tr>
<td>400</td>
<td>4500</td>
<td>16&quot;</td>
<td>20000</td>
</tr>
<tr>
<td>450</td>
<td>6000</td>
<td>18&quot;</td>
<td>25000</td>
</tr>
<tr>
<td>500</td>
<td>7000</td>
<td>20&quot;</td>
<td>30000</td>
</tr>
<tr>
<td>600</td>
<td>10000</td>
<td>24&quot;</td>
<td>40000</td>
</tr>
<tr>
<td>700</td>
<td>15000</td>
<td>28&quot;</td>
<td>60000</td>
</tr>
<tr>
<td>800</td>
<td>20000</td>
<td>32&quot;</td>
<td>80000</td>
</tr>
<tr>
<td>900</td>
<td>25000</td>
<td>36&quot;</td>
<td>100000</td>
</tr>
<tr>
<td>1000</td>
<td>30000</td>
<td>40&quot;</td>
<td>100000</td>
</tr>
<tr>
<td>1200</td>
<td>40000</td>
<td>48&quot;</td>
<td>200000</td>
</tr>
</tbody>
</table>
MagFlux® Electromagnetic Flow Meter

Set to metric

All converter-related units can be set to the following units (default values in bold italics):

<table>
<thead>
<tr>
<th>Flow Unit</th>
<th>Totalizers</th>
</tr>
</thead>
<tbody>
<tr>
<td>m³/sec</td>
<td>RFTot</td>
</tr>
<tr>
<td>l/sec</td>
<td>RRTot</td>
</tr>
<tr>
<td>l/min</td>
<td>RSTot</td>
</tr>
<tr>
<td>l/h</td>
<td>FTot</td>
</tr>
<tr>
<td>m³/h</td>
<td>RTot</td>
</tr>
<tr>
<td></td>
<td>Cnt</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Flow Unit</th>
<th>Totalizers</th>
</tr>
</thead>
<tbody>
<tr>
<td>ft³/h</td>
<td>RFTot</td>
</tr>
<tr>
<td>MGD</td>
<td>RRTot</td>
</tr>
<tr>
<td>GPM</td>
<td>RSTot</td>
</tr>
<tr>
<td></td>
<td>FTot</td>
</tr>
<tr>
<td></td>
<td>RTot</td>
</tr>
<tr>
<td></td>
<td>Cnt</td>
</tr>
</tbody>
</table>

Set to US

All converter-related units can be set to the following units (default values in bold italics):

<table>
<thead>
<tr>
<th>Flow Unit</th>
<th>Totalizers</th>
</tr>
</thead>
<tbody>
<tr>
<td>ft³/h</td>
<td>RFTot</td>
</tr>
<tr>
<td>MGD</td>
<td>RRTot</td>
</tr>
<tr>
<td>GPM</td>
<td>RSTot</td>
</tr>
<tr>
<td></td>
<td>FTot</td>
</tr>
<tr>
<td></td>
<td>RTot</td>
</tr>
<tr>
<td></td>
<td>Cnt</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Flow Unit</th>
<th>Totalizers</th>
</tr>
</thead>
<tbody>
<tr>
<td>ft³/h</td>
<td>RFTot</td>
</tr>
<tr>
<td>MGD</td>
<td>RRTot</td>
</tr>
<tr>
<td>GPM</td>
<td>RSTot</td>
</tr>
<tr>
<td></td>
<td>FTot</td>
</tr>
<tr>
<td></td>
<td>RTot</td>
</tr>
<tr>
<td></td>
<td>Cnt</td>
</tr>
</tbody>
</table>
Data Logger

**Magflux®** provides a data logger with a capacity of approx. 20,000 entry points. See Appendix E on page 120 for examples and descriptions of log files.

The data logger operates after the FIFO principle (First In, First Out). If the data logger is full and new data are coming in, the oldest data are discarded.

1. Press the up/down keys to highlight the required menu line (here: Data Logger) and then press OK to select it.

<table>
<thead>
<tr>
<th>Specify Main Screen</th>
</tr>
</thead>
<tbody>
<tr>
<td>Factory Settings</td>
</tr>
<tr>
<td><strong>Data Logger</strong></td>
</tr>
<tr>
<td>Password</td>
</tr>
<tr>
<td>Set Sensor Name</td>
</tr>
<tr>
<td>Converter Setup</td>
</tr>
<tr>
<td>Display Setup</td>
</tr>
</tbody>
</table>

2. Press the up/down keys to change the highlighted digit, and then press the right-key (>) to proceed to the next digit.

3. Continue until all digits have been set and press OK.

The log interval can be set in intervals from 10 sec. up to 9999 sec.
The data log contains:
- Date
- Time
- Flow values

In case of a power failure, the data logger continues when power returns. If more converters are connected to one Display Unit, each converter has its own individual log interval and can be sorted. All converters share the same memory of 160,000 entry points.

The log data can be shown on the Display Unit or be stored in an external CSV file. MJK-Field Link software is needed for transfer of data into CSV file format via the USB port in the display unit. The format can be read in for example Microsoft® Excel® (see Appendix B on page 120 for details).

An example of the log capacity of one sensor versus the time interval is shown in the following table.

<table>
<thead>
<tr>
<th>Log interval</th>
<th>Log capacity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seconds</td>
<td>Minutes</td>
</tr>
<tr>
<td>10</td>
<td>-</td>
</tr>
<tr>
<td>30</td>
<td>-</td>
</tr>
<tr>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>-</td>
<td>5</td>
</tr>
<tr>
<td>-</td>
<td>10</td>
</tr>
<tr>
<td>-</td>
<td>30</td>
</tr>
<tr>
<td>-</td>
<td>60</td>
</tr>
</tbody>
</table>
Graph Display

The content of the Data Logger can displayed on the Display Unit by pressing the up/down keys simultaneously (esc), highlighting "Flow" and selecting "Graph".

The Display Unit then shows the Graph screen. To return to the Main Menu display screen, select "esc" by pressing the up/down keys simultaneously.

The Y axis is automatically scaled according to the $Q_{\text{max}}$ of the mA output. Double-arrow keys jump forward and backward one screen frame at a time. Single-arrow keys move the cursor forward and backward on the screen.

The actual values at the cursor position is shown at the bottom of the screen.
Password

A password provides (and prevents) access to all the settings in the Display and Converter unit. The code consists of a numeric 5-digit code between 0 and 65535. If your current password is lost or forgotten, the password protection can be overruled with the code "01750".

1. Press the up/down keys to highlight the required menu line (here: Password) and then press OK to select it.

2. Press the up/down keys to highlight the required option and then press OK to select it.
The available options are:

**Login**
Use the up/down keys to set the digits one by one. Continue with > until all digits have been set and then press OK.

**Activate/Deactivate**
Write protection. Selecting "Activate" means that a password must be entered to change vital settings. "Deactivate" disables password protection. If your current password is lost or forgotten, the password protection can be overruled with the code "01750".

**Change Password**
The present 5-digit password can be changed as required.

**Set Sensor Name**
A unique name and/or number, a function or a location can be assigned for a sensor (here: "MagFlux1"). It is consequently shown on the main display with up to 4 display lines.

1. Press the up/down keys to highlight the required menu line (here: Set Sensor Name) and then press OK to select it.
2. To change the default sensor name (MagFlux1), press the left/right keys to highlight the wanted character.

3. Press the up/down keys to change the highlighted character and then press > to proceed to the next character.

4. Continue with > until all numeric and alphabetical characters have been set to for example "Inlet flow" (see below).

5. Press OK.

The available characters depend on the chosen language. English, for example, provides the following character set:

```
abcdefghijklmnopqrstuvwxyzABCDEFGHIJKLMNOPQRSTUVWXYZ
```

<space> 1 2 3 4 5 6 7 8 9 and 0.
Converter Setup

"Converter Setup" provides configuration options for volumes, batches, units, etc. See detailed descriptions in the following sections and in the overview pages at the end of this manual.

1. Press the up/down keys to highlight the required menu line (here: Converter Setup) and then press OK to select it.

2. Press the up/down keys to highlight the required option and then press OK to select it.

The available options are described in detail in the following sections.
Minimum Flow
The "Minimum Flow" option sets the minimum flow rate. *Magflux* flow meters are default set to the values shown on page 17. The unit for the flow rate can be set from the "Units" option (see page 64).

1. Select the digits one by one with the left/right keys and set the value with the up/down keys.
2. Press OK to save the final setting.

Averaging
The "Averaging" option sets the time period within which the measurements are smoothed and averaged.

1. Select the digits one by one with the left/right keys and set the value with the up/down keys.
2. Press OK to save the final setting.
Units
The "Units" option sets the unit for the flow rate. The available units are shown below.

1. Press the up/down keys to highlight the required unit and then press OK to select it.

mA Output
When a MagFlux® is connected to a power supply for the first time, the mA output is automatically set to provide 4 mA at zero flow and 20 mA at a flow corresponding to the theoretical Q_{max} of the flow sensor.

Changes in the mA setting will not affect the relay output settings.

Note: Both values can be set in the range 10 % to 120 %, making it possible to increase or decrease the mA signal.

The "mA Output" parameters can be configured in four different ways. Each option is described in the following sections.
Using the factory setup MagFlux® returns to default mA settings corresponding to the chosen MagFlux® flow sensors $Q_{min}$ and $Q_{max}$.

The mA output is an active output, and the maximum load is 800 Ohm.

The upper limit for the mA output is 20,5 mA
- 3,75 mA indicates the mA output is not in use
- 3,5 mA indicates flow under 4 mA level
- 20,5 mA indicates flow higher than 20 mA level.

The 20 mA maximum output is rounded up to the nearest round figure.

**Example:** The maximum flow of 17.676 m³/h for a DN25 is rounded up to 20.000 m³/h.

**Flow Forward**

The mA signal provides 4 mA at zero flow and 20 mA at $Q_{max}$ in the forward direction.

![Graph showing mA output vs. flow percentage](image)
Flow Reverse
The mA signal provides 4 mA at zero flow and 20 mA at Q\textsubscript{max} in the reverse direction.

\begin{center}
\begin{tabular}{|c|c|}
\hline
mA Output & \\
\hline
20 mA = & 1.000 m\textsuperscript{3}/h \\
\hline
\end{tabular}
\end{center}

Forward & Rev. (12mA=0)
The mA signal provides 4 to 20 mA reverse to forward direction with 12 mA at zero flow.

\begin{center}
\begin{tabular}{|c|c|}
\hline
mA Output & \\
\hline
4 mA = & 0.00 m\textsuperscript{3}/h \\
20 mA = & 1.000 m\textsuperscript{3}/h \\
\hline
\end{tabular}
\end{center}
**Forward & rev. (4mA=0)**

ThemA signal provides 4 to 20 mA for forward and reverse flow with 4 mA at zero flow.

<table>
<thead>
<tr>
<th>mA Output</th>
<th>4 mA</th>
<th>0.00 m³/h</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>20 mA</td>
<td>1.000 m³/h</td>
</tr>
</tbody>
</table>

Not in use

The "mA Output" option is not being used.
Totalizers

The MagFlux® provides six totalizers, each with two or three output options. Up to two totalizers can be assigned to one digital output.

The totalizers are:

- **RFTot**  Resetable Forward Totalizer
- **RRTot**  Resetable Reverse Totalizer
- **RSTot**  Resetable Sum Totalizer

and

- **NR FTot**  Non-Resettable Forward Totalizer
- **NR RTot**  Non-Resettable Reverse Totalizer
- **NR Cnt**  Non-Resettable (Counter) Sum Totalizer

The available output options for the **resettable totalizers** are:

- Mechanical Relay (DO2)
- Opto Relay (DO1) (light-triggered electronic relay)
- Display only (on the Display Unit)

The available output option for the **non-resettable totalizers** is:

- Display only (on the Display Unit)

If a chosen output is not available (dedicated to another function), a "Device Exception" pop-up message will inform the operator.

**Settings and Limits for Resettable Totalizers**

**Totalizer Forward Unit**

Available units are l, hl, kl, m³, ft³, gal and MG.

**Reset with Digital Input**

Reset the totalizer via the digital input (DI)

**On-time**

The pulse length of the opto digital output (DO 1) is adjustable from 1 ms to 10 secs.

The pulse length of the mechanical digital relay (DO 2) is adjustable from 100 ms to 10 secs.
**Volume between Pulses**

Select a volume between pulses in steps of: 0,001, 0,01, 0,1, 1, 10, 100 and 1000.

<table>
<thead>
<tr>
<th>DN [mm]</th>
<th>Optical DO 1 @100 mSec.</th>
<th></th>
<th>Mechanical DO 2 @100 mSec.</th>
<th></th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>0,0001</td>
<td>0,1</td>
<td>0,01</td>
<td>0,1</td>
<td>m3</td>
</tr>
<tr>
<td>6</td>
<td>0,0001</td>
<td>1</td>
<td>0,01</td>
<td>1</td>
<td>m3</td>
</tr>
<tr>
<td>8</td>
<td>0,001</td>
<td>1</td>
<td>0,1</td>
<td>1</td>
<td>m3</td>
</tr>
<tr>
<td>10</td>
<td>0,001</td>
<td>1</td>
<td>0,1</td>
<td>1</td>
<td>m3</td>
</tr>
<tr>
<td>15</td>
<td>0,001</td>
<td>1</td>
<td>0,1</td>
<td>1</td>
<td>m3</td>
</tr>
<tr>
<td>20</td>
<td>0,001</td>
<td>1</td>
<td>0,1</td>
<td>1</td>
<td>m3</td>
</tr>
<tr>
<td>25</td>
<td>0,01</td>
<td>10</td>
<td>1</td>
<td>10</td>
<td>m3</td>
</tr>
<tr>
<td>32</td>
<td>0,01</td>
<td>10</td>
<td>1</td>
<td>10</td>
<td>m3</td>
</tr>
<tr>
<td>40</td>
<td>0,01</td>
<td>10</td>
<td>1</td>
<td>10</td>
<td>m3</td>
</tr>
<tr>
<td>50</td>
<td>0,01</td>
<td>10</td>
<td>1</td>
<td>10</td>
<td>m3</td>
</tr>
<tr>
<td>65</td>
<td>0,01</td>
<td>100</td>
<td>1</td>
<td>100</td>
<td>m3</td>
</tr>
<tr>
<td>80</td>
<td>0,1</td>
<td>100</td>
<td>10</td>
<td>100</td>
<td>m3</td>
</tr>
<tr>
<td>100</td>
<td>0,1</td>
<td>100</td>
<td>10</td>
<td>100</td>
<td>m3</td>
</tr>
<tr>
<td>125</td>
<td>0,1</td>
<td>100</td>
<td>10</td>
<td>100</td>
<td>m3</td>
</tr>
<tr>
<td>150</td>
<td>0,1</td>
<td>100</td>
<td>10</td>
<td>100</td>
<td>m3</td>
</tr>
<tr>
<td>200</td>
<td>0,1</td>
<td>1000</td>
<td>10</td>
<td>1000</td>
<td>m3</td>
</tr>
<tr>
<td>250</td>
<td>1</td>
<td>1000</td>
<td>100</td>
<td>1000</td>
<td>m3</td>
</tr>
<tr>
<td>300</td>
<td>1</td>
<td>1000</td>
<td>100</td>
<td>1000</td>
<td>m3</td>
</tr>
<tr>
<td>350</td>
<td>1</td>
<td>1000</td>
<td>100</td>
<td>1000</td>
<td>m3</td>
</tr>
<tr>
<td>400</td>
<td>1</td>
<td>1000</td>
<td>100</td>
<td>1000</td>
<td>m3</td>
</tr>
<tr>
<td>450</td>
<td>1</td>
<td>1000</td>
<td>100</td>
<td>1000</td>
<td>m3</td>
</tr>
<tr>
<td>500</td>
<td>1</td>
<td>1000</td>
<td>100</td>
<td>1000</td>
<td>m3</td>
</tr>
<tr>
<td>600</td>
<td>1</td>
<td>10000</td>
<td>100</td>
<td>10000</td>
<td>m3</td>
</tr>
<tr>
<td>700</td>
<td>1</td>
<td>10000</td>
<td>100</td>
<td>10000</td>
<td>m3</td>
</tr>
<tr>
<td>800</td>
<td>10</td>
<td>10000</td>
<td>1000</td>
<td>10000</td>
<td>m3</td>
</tr>
<tr>
<td>900</td>
<td>10</td>
<td>10000</td>
<td>1000</td>
<td>10000</td>
<td>m3</td>
</tr>
<tr>
<td>1000</td>
<td>10</td>
<td>10000</td>
<td>1000</td>
<td>10000</td>
<td>m3</td>
</tr>
<tr>
<td>1200</td>
<td>10</td>
<td>10000</td>
<td>1000</td>
<td>10000</td>
<td>m3</td>
</tr>
</tbody>
</table>
If a required volume between pulses is not contained in the above steps, for example for a pre-set to a sampler, use the batch counter option. The relays are limited to a minimum and a maximum of pulses per hour depending on the 20 mA scale and the on-time of the relay in milliseconds.

**DO 1 (Opto Relay)**

The maximum limit is 500 pulses per second at 1 ms pulse length.

The formula for the minimum flow unit per pulses is:

\[
\text{(flow at 20mA) x (pulse delay in mSec) / 1800000}
\]

**Example: Min. flow unit/pulses for DN 100 max. flow 300 m}^3/h ?**

Minimum flow unit per pulses = 300 m}^3 x 100 mSec / 1800000 = 0.016 m}^3 which is rounded to 0.1 m}^3 by the MagFlux.

The formula for the maximum flow unit per pulses is:

\[
\text{(flow at 20mA)}
\]

**Example: DN 100 max. flow 300 m}^3/h ?**

Maximum flow unit per pulses = 300 m}^3

**DO 2 (Mechanical Relay)**

The maximum limit is 120 pulses per hour.

The formula for minimum flow unit per pulses is:

\[
\text{(flow at 20mA) / 120}
\]

**Example: DN 100 max. flow 300 m}^3/h ?**

Minimum flow unit per pulses = 300 / 120 = 2.5 m}^3 which is rounded to 10 m}^3 by the MagFlux.

The formula for maximum flow unit per pulses is:

\[
\text{(flow at 20mA)}
\]

**Example: DN 100 max. flow 300 m}^3/h ?**

Maximum flow unit per pulses = 300 m}^3
Resettable Totalizers

Totalizers can be reset from the Main display (see page 71) and via the digital input DI (see page 30).
**Resettable Forward Totalizer**

**RFTot**

The Totalizer counts the forward flow volume according to the primary flow direction selected at startup.

The Totalizer counts in selected units and is resettable.

The counter can be connected to the relays or to the display only.

To reset the counter, the totalizer must be present in the Main display and be selected by the up/down keys followed by a click on Reset. Alternatively it can be reset via the digital input DI.

**Resettable Reverse Totalizer**

**RRTot**

The Totalizer counts the reverse flow volume according to the primary flow direction selected at startup.

The Totalizer counts in selected units and is resettable.

The counter can be connected to the relays or to the display only.

To reset the counter, the totalizer must be present in the Main display and be selected by the up/down keys followed by a click on Reset. Alternatively it can be reset via the digital input DI.

**Resettable Sum Totalizer**

**RSTot**

The Totalizer counts the sum of forward flow volume minus the reverse flow volume according to the primary flow direction selected at startup.

The Totalizer counts in selected units and is resettable.

The counter can be connected to the relays or to the display only.

To reset the counter, the totalizer must be present in the Main display and be selected by the up/down keys followed by a click on Reset. Alternatively it can be reset via the digital input DI.
Non-Resettable Totalizers

<table>
<thead>
<tr>
<th>NR Totalizer</th>
<th>NR Totalizer</th>
<th>NR Totalizer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Forward</td>
<td>Reverse</td>
<td>Sum</td>
</tr>
<tr>
<td>Totalizer Forward</td>
<td>Totalizer Reverse</td>
<td>Totalizer total</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Unit</td>
</tr>
<tr>
<td>Totalizer Forward Unit</td>
<td>Totalizer Reverse Unit</td>
<td>Totalizer total Unit</td>
</tr>
<tr>
<td>l</td>
<td>l</td>
<td>l</td>
</tr>
<tr>
<td>hl</td>
<td>hl</td>
<td>hl</td>
</tr>
<tr>
<td>kl</td>
<td>kl</td>
<td>kl</td>
</tr>
<tr>
<td>m³</td>
<td>m³</td>
<td>m³</td>
</tr>
<tr>
<td>ft³</td>
<td>ft³</td>
<td>ft³</td>
</tr>
<tr>
<td>gal</td>
<td>gal</td>
<td>gal</td>
</tr>
<tr>
<td>MG</td>
<td>MG</td>
<td>MG</td>
</tr>
<tr>
<td>Back</td>
<td>Select</td>
<td>OK</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

NR Forward Totalizer

NR FTot

The Totalizer counts the forward flow volume according to the primary flow direction selected at start up.

The Totalizer counts in selected units and cannot be reset.

The counter can only be selected from the Main display.

NR Reverse Totalizer

NR RTot

The Totalizer counts the reverse flow volume according to the primary flow direction selected at start up.

The Totalizer counts in selected units and cannot be reset.

The counter can only be selected from the Main display.

NR Sum Totalizer

NR Cnt

The Totalizer counts the sum of forward flow volume minus the reverse flow volume according to the primary flow direction selected at startup.

The Totalizer counts in selected units and cannot be reset.

The counter can only be selected from the Main display.
Batch Counters 1 & 2

The batch counters can operate in three different ways: automatically, manually or adaptively, and they deduct a reverse flow from the forward flow.
Batch Counter Option Chart (cont'd)

In the following descriptions of the batch counters, the function or digital status is illustrated as follows:

- Function or DO activated
- Function or DO deactivated
Automatic Batch Counter

The automatic batch counter issues a signal, when a preset volume is reached.

On-time

The period of time in which the relay is activated (in on-state)

Number of preselected (units)

The preset batch volume.
Manual Batch Counter

The counter issues signals as determined by manual start, stop and pause commands. A manual stop is equivalent to a reset command.

Number of preSelected (Units)

The preset batch volume.
Adaptive Batch Counter

The counter adapts compensates for overrun and insufficient flow.

Number of preSelected (Units)

The preset batch volume.

Maximum Correction

The correction in percent that triggers an error message or an alarm.

Reset Batch Error

Reset the batch correction percentage to 0%.
Settings and Limits for Batch Counters

Batch counter units

Available units are l, hl, kl, m³, ft³, gal and MG.

Start, stop or pause with Digital Input

The manual and the adaptive batch counters can be started, stopped or paused via the digital input (DI).

On-time

The pulse length of the opto digital output (DO 1) is adjustable from 1 ms to 10 secs.

The pulse length of the mechanical digital relay (DO 2) is adjustable from 100 ms to 10 secs.

Volume between pulses

Select a volume between pulses as listed in the table overleaf. The relays are limited to a minimum and a maximum of pulses pr. hour depending on the 20 mA scale and the on-time of the relay in milliseconds.
### MagFlux Batch Counter Output Settings

<table>
<thead>
<tr>
<th>DN [mm]</th>
<th>Optical DO 1 @100 mSec.</th>
<th>Mechanical DO 2 @100 mSec.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>min.</td>
<td>max.</td>
</tr>
<tr>
<td>3</td>
<td>0,0000139</td>
<td>0,0006944</td>
</tr>
<tr>
<td>6</td>
<td>0,0000556</td>
<td>0,0027778</td>
</tr>
<tr>
<td>8</td>
<td>0,0001111</td>
<td>0,0055556</td>
</tr>
<tr>
<td>10</td>
<td>0,0027778</td>
<td>0,0138889</td>
</tr>
<tr>
<td>15</td>
<td>0,0027778</td>
<td>0,0138889</td>
</tr>
<tr>
<td>20</td>
<td>0,0005556</td>
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</table>
Limitation of the automatic batch counter on DO 1 (Opto Relay)

The maximum limit is 500 pulses per second at 1 ms pulse length.

The formula for the minimum flow unit per pulses is:

\[(\text{flow at 20mA}) \times (\text{pulse delay in mSec}) / 1800000\]

Example: Min. flow unit/pulses for DN 100 max. flow 300 m³/h?

Minimum flow unit per pulses = \(300 \text{ m}^3 \times 100 \text{ mSec} / 1800000 = 0.016 \text{ m}^3\) which is rounded to 0.1 m³ by the MagFlux.

The formula for the maximum flow unit per pulses is:

\[(\text{flow at 20mA})\]

Example: DN 100 max. flow 300 m³/h?

Maximum flow unit per pulses = 300 m³

Limitation of the automatic batch counter on DO 2 (mech. relay)

The maximum limit is 120 pulses per hour.

The formula for minimum flow unit per pulses is:

\[(\text{flow at 20mA}) / 120\]

Example: DN 100 max. flow 300 m³/h?

Minimum flow unit per pulses = \(300 / 120 = 2.5 \text{ m}^3\)

The formula for maximum flow unit per pulses is:

\[(\text{flow at 20mA})\]

Example: DN 100 max. flow 300 m³/h?

Maximum flow unit per pulses = 300 m³

Limitation of the manual and adaptive batch counter on DO 1 or DO 2

The formula for minimum flow unit per pulses is:

\[(\text{flow at 20mA}) / 360\]

Example: DN 100 max. flow 300 m³/h?

Minimum flow unit per pulses = \(300 / 360 = 0.833 \text{ m}^3\)
The formula for maximum flow unit pr pulses is:
(flow at 20mA)

Example: DN 100 max. flow 300 m³/h ?
Maximum flow unit pr pulses = 300 m³

High Flow/Low Flow
The high and low flow options provide alarms and trigger relays when certain volume limits are exceeded or not reached.
The available output options for High Flow and Low Flow are:

- **Mechanical Relay (DO2)**
- **Opto Relay (DO1)** (light-triggered, electronic relay)
- **Display only** (signals to the Display Unit only)
- **Not in use** (the High/Low Flow option is not being used)

**On at Flow**

Issues an alarm and/or sends a signal when for example a high flow limit is exceeded.

**OFF at Flow**

Cancels an alarm and/or sends a signal when recovering from for example an overflow situation.

**Delay**

A delay in seconds can be set to compensate for positive and negative spikes in the flow. The length is the time between an incident and setting an alarm.

**Relay Function**

- **NO** (Normally Open) determines the relay state under normal conditions.
- **NC** (Normally Closed) determines the relay state under normal conditions.
Flow Direction

The "Flow Direction" option indicates the flow direction of the flow and determines the open/closed state of the relay.

The default Flow Direction is set to "Direction A". If flow "Direction A" and the "NO" function are chosen, the relay is on at a negative flow ("Direction B").

The available output options for "Flow Direction" are:

- **Mechanical Relay (DO2)**
- **Opto Relay (DO1)** (light-triggered electronic relay)
- **Display only** (signals to the Display Unit only)
- **Not in use** (the Flow Direction option is not being used)

**Delay**

A delay in seconds can be set to compensate for positive and negative spikes in the flow. The length is the time between an incident and setting an alarm.

**Relay Function**

- **NO** (Normally Open) determines the relay state under normal conditions.
- **NC** (Normally Closed) determines the relay state under normal conditions.
Empty Pipe

A signal and/or an alarm can be set, when the sensor becomes practically empty (see also pages 19 - 22 incl.), or if the conductivity drops below 5 μS/cm.

The available output options for "Empty Pipe" are:

- **Mechanical Relay (DO2)**
- **Opto Relay (DO1)** (light-triggered electronic relay)
- **Display only** (signals to the Display Unit only)
- **Not in use** (the Empty Pipe option is not being used)

**Delay**

A delay in seconds can be set to compensate for positive and negative spikes in the flow. The length is the time between an incident and setting an alarm.

**Relay Function**

- **NO** (Normally Open) determines the relay state under normal conditions.
- **NC** (Normally Closed) determines the relay state under normal conditions.
**24h Flow**

The "24h Flow" option measures the total flow (FTot) for 1 day (24 hours) and logs at midnight (12 PM). Contact MJK for detailed information. Valid settings are "No" and "Yes" (default is "No").

**Status**

The "Status" option provides an overview of the in- and output status. The check boxes can contain four different characters to indicate the current status at that very moment:

- **X** A cross (X) in a check box indicates an active state
- **/** A blinking forward slant (/) in a check box indicates that the input/output is in the process of being activated. Eventually it turns into a steady X.
- **\** A blinking backward slant (\) in a check box indicates that the input/output is in the process of being de-activated. Eventually the check box is cleared.

An empty check box indicates a de-activated state.

![Status Diagram]

- **DO1** Not in use
  - Digital output D01 is active (an empty check box).

- **DO2** X Totalizer Forward
  - Digital output D02 for Totalizer Forward is activated (a ticked check box).

- **DI** Totalizer Forward
  - Digital input DI for Totalizer Forward is active (an empty check box)

- **mA output 6.250 mA**
  - The present analog output current is 6.250 mA.
Service Menu

The "Service Menu" provides options intended for service personnel during installation, calibration, operation, monitoring and maintenance.

All parameters can be read without any restrictions, but certain parameters can only be changed after a password has been typed.

Sensor Calibration Code

Each and every MagFlux® has a unique calibration code that contains calibration data for the specific unit. A calibration code could for example be dw5uq4 or 7v3ri0.

The current converter firmware requires an 8-character input, but it also accepts 6 characters plus two "Ok"s. If the code is dw5uq4, enter:

```
d w 5 u q 4 "Ok" "Ok"
```

where "Ok" indicates that you press the "Ok" key without selecting any character. Only small letters can be entered from the MagFlux® key-pad.
**IMPORTANT:** All letters are **small** letters (e.g. “a” and not “A”), and numbers are **big** characters (e.g. “0”, zero and not “o”, small o).

A potential source of error is incorrect reading of numbers and letters, where a small “o” is confused with a zero (“0”), or a small “l” is confused with the number one (“1”).

Note also that the default flow direction from factory is “A”.

See page 14 regarding the calibration code.

A password is not required to add or change the sensor calibration code.
Converter SW Ver.

The converter software version and bootloader version are displayed, so that you can determine whether a software (firmware) upgrade is required or not.

<table>
<thead>
<tr>
<th>Converter</th>
<th>842009-005</th>
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<tbody>
<tr>
<td>Build</td>
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<tr>
<td>Bootload</td>
<td>840020-002</td>
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<tr>
<td>Build</td>
<td>719</td>
</tr>
<tr>
<td>Back</td>
<td></td>
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</tbody>
</table>

**Product Data**

Key product data like ID, hardware type no., track no., etc. are displayed.

<table>
<thead>
<tr>
<th>Product ID</th>
<th>56136</th>
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**Product type No.**

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<tr>
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**Track No.**

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**HW type No.**

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<tr>
<td>Back</td>
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</table>
Reset Counter Time
The counter reset and runtime can be reset for fault finding, error correction and similar service procedures.

<table>
<thead>
<tr>
<th>Reset Counter Time</th>
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<tbody>
<tr>
<td>Reset Counter: 11</td>
</tr>
<tr>
<td>Systen Runtime: 1632838</td>
</tr>
<tr>
<td>Since reset: 426838</td>
</tr>
<tr>
<td>Runtime (days): 18</td>
</tr>
<tr>
<td>Back: Select: OK</td>
</tr>
</tbody>
</table>

Internal Meas. & Cal.
Internal measurements and calculations are for service technician use only, and are used for adjustments and calibrations.

<table>
<thead>
<tr>
<th>Internal Meas. &amp; Cal.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sensor Direction Test</td>
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<tr>
<td>View Vgate</td>
</tr>
<tr>
<td>Coil Current</td>
</tr>
<tr>
<td>View ADC Factor</td>
</tr>
<tr>
<td>Calibrate Vground</td>
</tr>
<tr>
<td>Calibrate Vref</td>
</tr>
<tr>
<td>View Vwater</td>
</tr>
<tr>
<td>View Raw ADC</td>
</tr>
<tr>
<td>View ADC Current</td>
</tr>
<tr>
<td>Back: Select: &gt;</td>
</tr>
</tbody>
</table>

Minimum Velocity
The incoming data is below the measuring accuracy. The option forces the minimum velocity to zero.

<table>
<thead>
<tr>
<th>Minimum Velocity</th>
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<tbody>
<tr>
<td>Minimum Velocity: 0.100 m/ sec</td>
</tr>
<tr>
<td>Back: Select: &gt;</td>
</tr>
</tbody>
</table>

MJK AUTOMATION A/S
Byageren 7
DK-2800 Nørumburg
Fax: +45 45 56 06 46
DK-2800 Nørumburg
Byageren 7
Calibrate Flow Now

First "View Flow Now" is displayed, and then afterwards you can calibrate the flow.

Calibration Volume

The volume counter can be reset and a new value can be entered.
Calibrate mA

From this menu the mA reading can be calibrated against a multimeter.
Test Velocity

Test velocity is for service technician use only and can be used to compare the actual velocity against the flow/velocity/diameter chart.

![Test Velocity Diagram]

- Set velocity: 0.000 m/sec
- Velocity: 4.039745 m/sec
- Flow: 7.136209 m³/h
- Enable test: Yes

![Diagram of Test Velocity Steps]
**Freeze Coil**
For service technician use only. The sensor coil current and voltage values can be "frozen" to enable read-out using an standard multimeter.

**Read Eventlog**
See the events within a certain time frame.

![Diagram of Freeze Coil and Eventlog](image-url)
Read sensor data

Access the sensor's key data.

Back on Stock

The factory settings can be re-established with the "Back On Stock" option.
Display Setup

The "Display Setup" menu provides configuration options for language, clock and factory settings, Modbus parameters and software version display.

1. Press the up/down keys to highlight the required menu line (here: Display Setup) and then press OK to select it.

The available options are described in detail on the following pages.

Note: The option "Communication" is only visible (and selectable), if a communication module is installed and connected to the MagFlux display. If the communication module is removed, the option disappears automatically.

A description of available communication settings can be found in the manual for communication modules "Communication Moduler for Displays".
Language

The *MagFlux*® is installed with a language package, and GB English is the default language.

In the "Language" menu several national languages can be selected.

![Language Menu](image)

Additional languages can be added using the MJK-Field Link software program (see also Appendix B on page 115).

1. Chose the required language using the up/down keys up and then press OK.
Set Clock

The "Set Clock" menu provides setting of the built-in clock and the time format.

1. Select the date and time digits with the left/right keys and change the setting with the up/down keys.
2. Press OK and repeat step 1 for all remaining digits.
3. Press OK to save the time/clock settings.
Modbus

The MagFlux® is delivered with a standard Modbus RTU protocol, and up to four MagFlux® converters can be connected for concurrent operation.

When several converters are to be added, it is necessary to change each converter device address to a unique ID address before connecting the converter to the Display Unit.

Add Device

Four MagFlux® Converters can be connected to one Display Unit using the RS485 interface connection. Note that only one Display Unit can be used with several converters.

The Display Unit can easily be moved to another converters for readout and configuration.

1. Select "Add Device", click OK and wait for the scan process to finish.
2. The found converters are finally displayed.

Change Device Address

To change each converter's device address it is required that you connect
the Display Unit to each converter one by one. If neglected, a conflict between the units will arise when the RS 485 serial loop is established.

Change for example "Device 1" to "Device 2" as follows:
1. Press OK and use the up/down keys to change "1" to "2".
2. Press OK.

The MagFlux® converter ID is now changed to "2", and more converters can be added to the Display Unit with the "Add Device" option.

Remove Device
If a device is to be removed from the Display Unit, proceed as follows:
1. Select the required device with the up/down keys.
2. Click OK to remove it.

The device is now removed from the Display unit and display returns to the "Modbus" menu.

Change Display ID No.
The display ID number and the number of displays may have to be changed to avoid conflicts on the Modbus.

Set No. of Retries
If the data communication lines are subject to noise or other disturbances, the number of retries can be raised to increase the chances of a successful change of settings.
Factory Settings
The "Factory Settings" menu provides log deletion and resetting to factory settings of the display unit.

1. Press the up/down keys to highlight the required option and press OK.

Important:
The Data Logger will be reset, and all devices will be deleted from the display Unit. This is indicated by the MJK start-up screen which is displayed within a few seconds.

Display SW Version
The "Display SW Version" menu provides a read-out of the display software (actually firmware) version, the build date and last-edited date of the the multiple languages file.
8. Mechanical Dimensions

Standard Flanges - EN-1092-1:2001 - Europe

Flange marking: **zzz/EN 1092-1/01 A/DN xxxx/PN ww/S235JR/yyyyy**

where:

- **zzz** = Manufacturer’s name/trademark
- **EN 1092-1** = Standard number
- **01 A** = Flange type
- **DN xxxx** = DN (size)
- **PN ww** = PN (pressure)
- **S235JR** = Material symbol/no/grade
- **yyyyy** = Traceable ID or control no.

---

**Flange Dimensions - EN-1092-1:2001**

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<th>Pressure</th>
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<th>No. of holes</th>
<th>Hole diameter [mm]</th>
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## Electromagnetic Flow Meter

### Standard Flanges - ANSI B 16.5 - U.S.A.

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300-600-900 psi: Consult the factory.
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## Standard Flanges - AS-4087-2004 (cont'd)

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<td><strong>Alarm</strong> - Sensor flow can not be measured correct. Input is over max. level. Will normally only occur starting from zero flow to high flow. Will be present for max. 12 minutes.</td>
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<tr>
<td><strong>Alarm</strong> - Flow totalize EEPROM error (non-resettable counter maybe incorrect in EEPROM)</td>
</tr>
<tr>
<td>Sensor Setting error</td>
</tr>
<tr>
<td><strong>Alarm</strong> - Sensor Setting error (some settings are incorrect or changed)</td>
</tr>
<tr>
<td>Counter output Forward Pulsoverflow</td>
</tr>
<tr>
<td><strong>Alarm</strong> - Counter output Forward Pulse overflow (too low pulse volume)</td>
</tr>
<tr>
<td>Event Description</td>
</tr>
<tr>
<td>--------------------------------------------------------</td>
</tr>
<tr>
<td>Counter output Reverse Pulsoverflow</td>
</tr>
<tr>
<td>Batch counter Pulsoverflow 1</td>
</tr>
<tr>
<td>Batch counter Pulsoverflow 2</td>
</tr>
<tr>
<td>Flow totalizer overflow</td>
</tr>
<tr>
<td>mA Error</td>
</tr>
<tr>
<td>mA flow Error</td>
</tr>
<tr>
<td>Batch1 Adaptive Error</td>
</tr>
<tr>
<td>Batch2 Adaptive Error</td>
</tr>
<tr>
<td>Low flow</td>
</tr>
<tr>
<td>High flow</td>
</tr>
</tbody>
</table>
### Events

<table>
<thead>
<tr>
<th>Event Description</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sensor Auto Cal.</td>
<td>Event - Hold of flow output value because of auto calibration in converter (Normal)</td>
</tr>
<tr>
<td>Batch1 Ended</td>
<td>Event - Batch 1 has finished</td>
</tr>
<tr>
<td>Batch2 Ended</td>
<td>Event - Batch 2 has finished</td>
</tr>
<tr>
<td>System reset has occurred</td>
<td>Event - The converter has experienced a software or hardware reset (normal if the sensor number has been changed)</td>
</tr>
</tbody>
</table>

### Exceptions

<table>
<thead>
<tr>
<th>Exception Description</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Illegal function</td>
<td>Modbus function is not supported</td>
</tr>
<tr>
<td>Illegal address</td>
<td>The address is not valid</td>
</tr>
<tr>
<td>Illegal format</td>
<td>Data has an illegal format</td>
</tr>
<tr>
<td>Illegal data value</td>
<td>Data has a non-valid value</td>
</tr>
<tr>
<td>Missing user login</td>
<td>User password required to access</td>
</tr>
<tr>
<td>Missing MJK login</td>
<td>MJK password required to access</td>
</tr>
<tr>
<td>Relay used for pulse counter positive</td>
<td>The relay is already in use by another function. Select a different relay.</td>
</tr>
<tr>
<td>Relay used for pulse counter negative</td>
<td>The relay is already in use by another function.</td>
</tr>
<tr>
<td>Used for Resettable totalizer total</td>
<td>The relay is already in use by another function.</td>
</tr>
<tr>
<td>Used for batch counter 1</td>
<td>The relay is already in use by another function.</td>
</tr>
<tr>
<td>Used for batch counter 2</td>
<td>The relay is already in use by another function.</td>
</tr>
<tr>
<td>Used for low flow</td>
<td>The relay is already in use by another function.</td>
</tr>
</tbody>
</table>
### Electromagnetic Flow Meter

<table>
<thead>
<tr>
<th>Used for high flow</th>
<th>The relay is already in use by another function.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Used for flow direction</td>
<td>The relay is already in use by another function.</td>
</tr>
<tr>
<td>Used for empty pipe</td>
<td>The relay is already in use by another function.</td>
</tr>
<tr>
<td>Used for system error</td>
<td>The relay is already in use by another function.</td>
</tr>
</tbody>
</table>

### USB

<table>
<thead>
<tr>
<th>Flash programming please wait</th>
<th>Programming is in progress but not finished.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flash programming done</td>
<td>Programming is finished.</td>
</tr>
<tr>
<td>Flash crc error</td>
<td>Cyclic redundancy check error.</td>
</tr>
<tr>
<td>Unknown command flash user text</td>
<td>Unvalid command issued.</td>
</tr>
<tr>
<td>Flash address overrun</td>
<td>A write error has occurred.</td>
</tr>
<tr>
<td>File phase error</td>
<td>Internal USB error.</td>
</tr>
<tr>
<td>File write failure</td>
<td>A write error has occurred.</td>
</tr>
<tr>
<td>USB protocol overrun</td>
<td>A communication error has occurred.</td>
</tr>
</tbody>
</table>
Appendix B. MJK-Field Link Software

The MJK-Field Link software package provides several utilities that is described in detail in the manual regarding Field Link.

1. Current MagFlux® log data must be saved in a file before transferring and installing new firmware.

2. Note down all display and converter settings before upgrading new firmware.

System Requirements Field Link
- Microsoft Windows XP sp2/ Vista /Win 7, 32bit
- Updated Java package
- USB 2.0 connection, Use with USB cable 691095

Download Field Link™

Download Field Link at MJK download Center>Accessories>Instrument Software

Connect a PC to the Flow Meter

Download the 840110-051_MJK_Field_Link_Win_XP_7.zip file from the Download center, save it on your PC and unzip. The version number (051) may change.

The Un-zipped folder contains the file MJK-Field-Link 840110-051.EXE and the manual regarding the software.

Execute MJK-Field-Link 840110-051.EXE.
2. Unscrew the four screws that hold the Display Unit.
3. Lift out the Display Unit and connect a USB mini A/B cable to the mini USB female B connector on the rear of the front panel.
4. Connect the other end of the USB cable (max. 4.7 metres long) to the PC.
5. Select "File" in the menu bar and click "Connect".
   If the connection is successful, a "Device Clock" window for PC and device time synchronisation is displayed (if PC and device clock were out of sync.) along with a link status display (see below).

If the connection fails, first remove the cable and then re-connect it.

For further details, read the manual regarding MJK Field Link:
Appendix C. FAQs - Frequently Asked Questions

Question:
Which size flow meter should I choose for my installation? I would prefer a flow meter with the same diameter as the tube(s).

Answer:
The minimum and the maximum flows determine the size. Use the size chart (on page 18) to find the correct flow meter size, and avoid selecting a too large size.

Question:
Where do I install the flow meter in relation to valves, bends, pumps, etc.?

Answer:
Minimum 3 times the flow meter’s internal diameter (DN) up-stream, and minimum 2 times the flow meter's internal diameter (DN) down-stream.

Question:
Must the tube be completely filled with liquid to perform reliable flow measurements?

Answer:
Yes. Always ensure a filled tube.

Question:
Do I need a separate display unit for each sensor?

Answer:
No. A display unit can manage up to four converters.

Question:
Is the analogue mA output an active output?

Answer:
Yes, it is.
**Question:**

The tubes are made of plastic. Do I need grounding rings?

**Answer:**

It is a very good question, but there isn’t a straight forward answer. It depends on the sensor type, the size and several other parameters. The issue is that the liquid and the sensor must have the same voltage potential.

MJK flow meters with DN ≤ 50 must always be equipped with grounding rings. MJK flow meters with DN > 50 have a built-in ground electrode that makes grounding rings superfluous.

Coated metal tubes always require grounding rings.

If the conductivity is less than 100 μS/cm, grounding rings are recommended.

When in doubt, always contact your local MJK representative or the MJK hot lines and describe your installation.

**Question:**

Are the relays potential-free?

**Answer:**

Yes, they are.

**Question:**

Does the sensor/flow meter comply with IP68?

**Answer:**

It will once you employ a wall mounting kit, a special cable and a gel potting kit to protect the electrical connections.

**Question:**

Can I use a MagFlux flow meter to measure non-conductive liquids such as diesel oil?

**Answer:**

No. The electromagnetic principle presupposes conductivity. The conductivity limit is 5 μS/cm.
**Question:**
I have an "Empty pipe" indication, but the pipe is not empty!

**Answer:**
There aren’t any grounding rings, or the rings have not been properly grounded. See examples on page 23.

**Question:**
I can’t set the counter to the required output, only to a value that is higher. Why is that?

**Answer:**
The measuring range does not support a sufficient number of pulses at 100% flow. The solution is to adjust the mA output to a lower flow and to keep in mind that the max. flow is not exceeded (≤ 20 mA).

**Question:**
I do not understand the language on the display. What's wrong and how do I fix it?

**Answer:**
For example lightning and a too noisy environment can have caused the problem.  
The solution is to perform a system reset by pressing all four display keys simultaneously. The default language, English, will consequently be the display language (that you can change to your native language if required).

**Question:**
Can I always allow up to 50 meters between the sensor and the converter?

**Answer:**
It really depends on the cabling and the amount of electrical noise in the vicinity. Avoid running in parallel with high voltage and other power lines. If that is not possible, the converter must be installed closer to the sensor.
Appendix D. Front Panel Cut-out Drawing

The dotted line indicates the front panel outline and measures 155 x 145 mm.
Appendix E. Test Certificate

**TEST CERTIFICATE**

**MagFlux® Flow Meter**

<table>
<thead>
<tr>
<th>FLOW SENSOR</th>
<th>SENSOR SPECIFICATIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Part no.:</td>
<td>207222</td>
</tr>
<tr>
<td>Serial no.:</td>
<td>23734</td>
</tr>
<tr>
<td>Calibration code:</td>
<td>au2921</td>
</tr>
<tr>
<td>Size:</td>
<td>DN50</td>
</tr>
<tr>
<td>Protection:</td>
<td>IP67</td>
</tr>
<tr>
<td>Pressure rating:</td>
<td>PN16</td>
</tr>
<tr>
<td>Lining:</td>
<td>Hard rubber</td>
</tr>
<tr>
<td>Electrodes:</td>
<td>AISI 316 TI</td>
</tr>
<tr>
<td>Media temp.:</td>
<td>-10 to 80°C</td>
</tr>
</tbody>
</table>

**Test conditions:**
The meter tests were carried by a volume method with flying start.

**Test facility:**
Helios AG, SRN electro-mechanical weighing machines of capacities
4800 kgs production series numbers 9229012, 47583.
Last calibration date 27th December 2006, calibration sheets No. 305-KL-V347-06.

**Test results:**
- Deviation 0.09 % at a velocity of 0.5 m/s
- Deviation 0.01 % at a velocity of 1.5 m/s
- Deviation 0.00 % at a velocity of 6.5 m/s

**DATE**
31 January 2007

**SIGNATURE**

---

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www.mjk.com

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FW: 842018/842009
Appendix F. Log Files

The example log file shown below is the result of a CSV file from the converter having been opened in with Microsoft® Excel® spreadsheet utility. This example below illustrates four MagFlux converters being logged every 10 secs.

The entries are described on the following page.
Index Converter ID (here 4 converters: 32, 33, 34 and 35)
MB Address Modbus address (here: 1, 2, 3 and 4)
Unit SI unit according to the MJK unit codes (here: 19 = m³/h)

<table>
<thead>
<tr>
<th>Code no.</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>16</td>
<td>GPM</td>
</tr>
<tr>
<td>17</td>
<td>l/min</td>
</tr>
<tr>
<td>19</td>
<td>m³/h</td>
</tr>
<tr>
<td>23</td>
<td>MGD</td>
</tr>
<tr>
<td>24</td>
<td>l/sec</td>
</tr>
<tr>
<td>28</td>
<td>m³/sec</td>
</tr>
<tr>
<td>57</td>
<td>%</td>
</tr>
<tr>
<td>95</td>
<td>mg/l</td>
</tr>
<tr>
<td>96</td>
<td>kg/l</td>
</tr>
<tr>
<td>97</td>
<td>g/l</td>
</tr>
<tr>
<td>130</td>
<td>ft³/h</td>
</tr>
<tr>
<td>138</td>
<td>l/h</td>
</tr>
<tr>
<td>139</td>
<td>ppm</td>
</tr>
<tr>
<td>246</td>
<td>NTU</td>
</tr>
<tr>
<td>248</td>
<td>FNU</td>
</tr>
<tr>
<td>249</td>
<td>EBC</td>
</tr>
<tr>
<td>250</td>
<td>FTU</td>
</tr>
</tbody>
</table>

Value ID Modbus address for flow (here: 600)
Device Type The device type (here: 2 = MagFlux)
Frequency Log interval in seconds (here: 10 seconds)
Range Max Maximum value for graph
Range Min Minimum value for graph
Precision The precision of the SI value
Column J The sensor name as entered by the operator.
Time Date and time in Central European Standard Time (CEST)
UTime The time in UNIX format. Number of seconds since January 1, 1970
SI Value The value in SI units (Système International d'Unités) (here: m³/h)
To plot the log file's data, proceed as follows:

1. Start Excel and open the csv log file.
2. Sort by "Index", click the "Diagram Guide" tool in the toolbar and select the required curve or graph (see example below).
Appendix G. Digital Input/Output Connections

The digital in- and outputs, DI and DO, can be interconnected to external equipment to achieve a number of functions such as alarms, counter reset, flow direction indication, etc.

The two schematics below illustrate a simplified mode of operation.
Appendix H. Remote Slave Display Unit

This example describes the cable connections and display configurations for one MagFlux converter with a local "master" display unit and one remote "slave" display unit.

Connection Board - with a remote "slave" display unit
Converter Connection Board - with a "master" display unit

Wiring

1. Connect a lead between:
   "Display, A" on the Converter Connection Board to
   "Connection for remote display unit, A" on the Connection Board.
2. Connect a lead between:
   "Display, B" on the Converter Connection Board to
   "Connection for remote display unit, B" on the Connection Board.
3. Connect a lead between:
   "Display, -" on the Converter Connection Board to
   "Connection for remote display unit, -" on the Connection Board.
4. Connect a lead between:
   "Mains supply, L" on the Converter Connection Board to
   "Connection for remote display unit, +" on the Connection Board.
5. Connect a lead between:
   "Mains supply, N" on the Converter Connection Board to
   "Connection for remote display unit, -" on the Connection Board.
6. Connect two leads between:
   "Mains supply, L and N" on the Converter Connection Board to
   an external 10 - 30 V DC power supply
7. Connect the earth terminals to earth as required.
8. Turn on power (10 - 30 V DC) to the Converter Connection Board.

Configuration for the master unit

1. Press "Setup" and select "Display Setup".
2. Select "Modbus" and "Change Display ID No.".
3. Change the display ID no. to "1" (if different from "1").
4. Change the "Number of Displays" to "2".

Configuration for the slave unit

1. Press "Setup" and select "Display Setup".
2. Select "Modbus" and "Change Display ID No.".
3. Change the display ID no. to "2".
4. Change the "Number of Displays" to "2".
Main Menu Overview

The size of this manual does not provide sufficient space for showing the complete, contiguous menu structure.
As a compensation a cut-up presentation of the menu structure is shown on the following pages.

Main Menu Overview

<table>
<thead>
<tr>
<th>Main Menu</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specify Main Screen</td>
</tr>
<tr>
<td>Factory Settings</td>
</tr>
<tr>
<td>Data Logger</td>
</tr>
<tr>
<td>Password</td>
</tr>
<tr>
<td>Set Sensor Name</td>
</tr>
<tr>
<td>Converter Setup</td>
</tr>
<tr>
<td>Display Setup</td>
</tr>
<tr>
<td>Back</td>
</tr>
</tbody>
</table>

Specify Main Screen
- Select Line
  - Line 1 - Sensor Name
  - Line 2 - Flow
  - Line 3 - FTot
  - Line 4
  - Line 5
  Back | Select | OK

Factory Settings
- Recover Factory Settings
- Cancel
- Default
- Set to Metric
- Set to US
Back | Select | OK

Data Logger
- Set Log Interval
- 0010 sec
Back | Select | >
Converter Setup Menu Overview

The size of this manual does not provide sufficient space for showing the complete, contiguous menu structure. As a compensation a cut-up presentation of the menu structure is shown on the following pages.
R Totalizer Reverse

Electro-mechanical Relay
Opto Relay
Display only

Back Select OK

Electro-mechanical Relay

Totalizer Forward Unit
l
hl
kl
m³
ft³
gal
MG
Back Select OK

Reset with Digital Input
Yes
No
Back Select OK

On-time
00100 mSec
Back Select >

Volume between Pulses
01.00000 m³
Back Select >

R Totalizer Sum

Totalizer Forward Unit
l
hl
kl
m³
ft³
gal
MG
Back Select OK

Reset with Digital Input
Yes
No
Back Select OK

On-time
00100 mSec
Back Select >

Volume between Pulses
01.00000 m³
Back Select >
NR Totalizer Forward

- Totalizer Forward Unit
  - m³
  - Gal
  - MG
  - Back Select OK

NR Totalizer Reverse

- Totalizer Reverse Unit
  - m³
  - Gal
  - MG
  - Back Select OK

NR Totalizer Sum

- Totalizer total Unit
  - m³
  - Gal
  - MG
  - Back Select OK

Batch Counter 1

- Electro-mechanical Relay
- Opto Relay
- Not in use
  - Back Select OK

- Batch Counter 1 Unit
  - m³
  - Gal
  - MG
  - Back Select OK

- Pause with Digital Input
  - Yes
  - No
  - Back Select OK

- Resetting the Batch Counter 1
  - Automatic
  - Manually
  - Adaptive
  - Back Select OK

- On-time
  - 00100 mSec
  - Back Select >

- Number of preselected (Units)
  - 00.002778 m³
  - Back Select >
### Converter Setup Menu Overview

- **mA Output**
- **Units**
- **Totalizer Sum**
- **Averaging**
- **Minimum Flow**
- **Status**

- **Empty Pipe**
  - Electro-mechanical Relay
  - Opto Relay
  - Display only
  - Not in use
  - Back Select >

- **20 mA = 20,000 m³/t**
- **(4 mA = 0 Flow)**

- **Converter Setup**
  - **Back Select >**
  - **20 mA = 20,000 m³/t**
  - **(4 mA = 0 Flow)**

- **Service Menu**
  - **Back Select OK**

- **0.177 m³/h**
- **GPM**
- **MGD**
- **ft³/h**
- **l/h**

- **On-time**
  - **Delay 00010 Sec**
  - **Back Select >**

- **Relay Function**
  - **NO NC**
  - **Back Select >**

- **Electro-mechanical Relay**
  - **Opto Relay**
  - **Display only**

- **Batch Counter 2**
  - **Batch Counter 1**
  - **24h Flow Not in use**
  - **Back Select >**

- **Totalizer Forward Unit**
  - **Reset with Digital Input**

- **Volume between Pulses**
  - **On-time**
  - **Delay 00010 Sec**
  - **Back Select OK**

- **Totalizer Total Unit**
  - **Reset with Digital Input**

- **Number of**
  - **Manual**
  - **Automatic**

- **Reseting the**
  - **Yes**
  - **No**
  - **Pause with Digital Input**

- **PreSelected Units**
  - **Manual**
  - **Automatic**

- **Reset Batch Error**
  - **Back Select >**

- **Not in use**
  - **Adaptive**
  - **Manual**
  - **Relay Function**
  - **Relay Function**
  - **Delay**
  - **Back Select OK**

- **Flow Forward**
  - **OFF at Flow**
  - **ON at Flow**

- **Relay Function**
  - **NO NC**
  - **Back Select >**

- **Opto Relay**
  - **Display only**

- **Type Password**
  - **Sensor Calibration Code**
  - **Product Data**
  - **Converter SW Ver.**
  - **Back Select OK**

- **Minumum Velocity**
  - **Internal Meas. & Cal.**
  - **Calibrate mA**
  - **Read Event Log**
  - **Freeze Coil**
<table>
<thead>
<tr>
<th>Status</th>
<th>Service Menu</th>
</tr>
</thead>
<tbody>
<tr>
<td>DO1</td>
<td>Type Password</td>
</tr>
<tr>
<td>DO2</td>
<td>00000</td>
</tr>
<tr>
<td>DI</td>
<td>Back</td>
</tr>
<tr>
<td>mA output</td>
<td>Select</td>
</tr>
<tr>
<td>6.250 mA</td>
<td>OK</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Delay</td>
<td></td>
</tr>
<tr>
<td>00010 Sec</td>
<td>OK</td>
</tr>
<tr>
<td>Back</td>
<td>Select</td>
</tr>
<tr>
<td></td>
<td>&gt;</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Relay Function</td>
<td>Sensor Calibration Code</td>
</tr>
<tr>
<td>NO</td>
<td>Converter SW Ver.</td>
</tr>
<tr>
<td>NC</td>
<td>Product Data</td>
</tr>
<tr>
<td></td>
<td>Reset Counter Time</td>
</tr>
<tr>
<td></td>
<td>Internal Mess. &amp; Cal.</td>
</tr>
<tr>
<td></td>
<td>Minimum Velocity</td>
</tr>
<tr>
<td></td>
<td>Calibrate Flow now</td>
</tr>
<tr>
<td></td>
<td>Calibrate Volume</td>
</tr>
<tr>
<td></td>
<td>Calibrate mA</td>
</tr>
<tr>
<td></td>
<td>Test Velocity</td>
</tr>
<tr>
<td></td>
<td>Freeze Coil</td>
</tr>
<tr>
<td></td>
<td>Read Event Log</td>
</tr>
<tr>
<td></td>
<td>Back on Stock</td>
</tr>
<tr>
<td></td>
<td>Back</td>
</tr>
<tr>
<td></td>
<td>Select</td>
</tr>
<tr>
<td></td>
<td>OK</td>
</tr>
</tbody>
</table>
Service Menu Overview

The size of this manual does not provide sufficient space for showing the complete, contiguous menu structure.

As a compensation a cut-up presentation of the menu structure is shown on the following pages.

Service Menu

Type Password
0000
Back Select >

Sensor Calibration Code
Converter SW Ver.
Product Data
Reset Counter Time
Internal Meas. & Cal.
Minimum Velocity
Calibrate Flow now
Calibrate Volume
Calibrate mA
Test Velocity
Freeze Coil
Read Event Log
Back on Stock

Sensor Calibration Code

Sensor Calibration Code
7V3RI0
Back Select >

Set flow direction
Follow arrow A
Follow arrow B
«A--------------------------B»
Back Select >

DN
00025
Back Select >

Converter SW Ver.

Converter SW Ver.
842007
Bootload version 7428
Back

Product Data

Product ID
56136
Back Select >

Product type No.
0000027910
Back Select >

Track No.
00000
Back Select >

HW type No.
00000510250
Back Select >
Display Setup Menu Overview

The size of this manual does not provide sufficient space for showing the complete, contiguous menu structure.
As a compensation a cut-up presentation of the menu structure is shown on the following pages.
This page intentionally left blank.
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Calibrate Volume .................................. 91
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DI Totalizer Forward ......................... 86
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