Introduction

These instructions describe how to upgrade an existing MagMaster MF/F flowmeter (DN80 to DN1600) installation with remote transmitter for use with the new remote WaterMaster transmitter.

This guide should be read in conjunction with the following publications:

- WaterMaster FET100 User Guide, OI/FET100–EN
- WaterMaster Programming Guide, IM/WMP
The Company

We are an established world force in the design and manufacture of instrumentation for industrial process control, flow measurement, gas and liquid analysis and environmental applications.

As a part of ABB, a world leader in process automation technology, we offer customers application expertise, service and support worldwide.

We are committed to teamwork, high quality manufacturing, advanced technology and unrivalled service and support.

The quality, accuracy and performance of the Company’s products result from over 100 years experience, combined with a continuous program of innovative design and development to incorporate the latest technology.

Quality Control

The UKAS Calibration Laboratory No. 0255 is just one of the ten flow calibration plants operated by the Company and is indicative of our dedication to quality and accuracy.

UKAS Calibration Laboratory No. 0255
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1 Electrical Installation

Note. These upgrade instructions and the use of WaterMaster with existing MagMaster sensors is supported only on the MF/F product code style of sensors, not the MF/E type.

Install the WaterMaster transmitter in accordance with User Guide, OI/FET100–EN.

1.1 Configuration DIP Switches

Remove the transmitter cartridge as detailed in the User Guides, OI/FET100–EN.

The transmitter backplane PCB contains 3 DIP switches as shown in Fig. 1.1.

For retrofit applications the flowmeter sensor memory, that contains all the sensor-related calibration factors and settings, is not present on the older MagMaster style of flowmeter sensors. For these flowmeters this 'sensor memory' is switched to use the fitted memory on the backplane PCB of the WaterMaster. This must be turned on using SW3.

SW3 – Defines the ‘Sensor Memory’ EEPROM location

OFF = Remote sensor memory
ON = Use Integral transmitter sensor memory

For WaterMaster electronics working with MagMaster sensors (also called ‘Retrofit’ units) set the DIP switches as shown in Fig. 1.2. Leave SW1 & SW2 unaltered as they are not part of the retrofit upgrade detailed here.

Note. The backplane-fitted ‘sensor memory’ enables the transmitter cartridge to be changed in a repair situation (all the settings are retained on the backplane when a new transmitter cartridge is fitted). If the transmitter enclosure is replaced for any reason, re-install the new transmitter (refer to OI/FET100–EN) and perform all of the retrofit procedures detailed in this publication (IM/MM2WM–EN).
2 MagMaster Sensor Cable

2.1 MagMaster Sensor Cable Wiring to WaterMaster Transmitter
Check the wiring of the sensor cable carefully to ensure good, clean connections. Ensure there are no stray strands of wire and all terminals are tight.

Fig. 2.1 Shows the wiring of the sensor cable to the remote WaterMaster electronics.

![Diagram of sensor cable connections at transmitter terminal block](image)

**Caution.**
- Do NOT reverse the inner / signal [E1, E2] and outer / screen [S1, S2] cores of the coaxial cables.
- Ensure the black anti-microphonic layer in the grey and white screened cables is removed.

**2.1.1 Sensor Coil Resistance**
WaterMaster transmitter requires a minimum sensor coil resistance of 15 Ω for correct operation. The coil resistance can be measured between M1 and M2 with the meter turned off.

**Note.** An alarm on the WaterMaster display indicates if the coil resistance is too low for the WaterMaster transmitter to operate. For the MF/F flowmeter sensor this alarm should not occur. Contact ABB Service if it does.
3 Programming & Configuration

3.1 Startup
The first time power is applied the HMI screen displays the following message:

Press ‘No’. This screen does not appear on subsequent power up.

3.2 Accessing the Programming Menus
Refer to WaterMaster Programming Guide (IM/WMP) and login at Advanced security level.

3.3 Programming Menu – Sensor Setup

The 'Sensor Setup' programming menu enables the WaterMaster electronics to be 'Retro-Fitted' to MagMaster MF/F sensors.

For retrofit applications an extra menu (Sensor Setup) appears at the end of the menu tables; it is not present on factory-calibrated WaterMaster flowmeters. Note that after completing configuration of the retrofit installation, this menu disappears.

If this menu is not present and you are unable to configure the necessary calibration factors below, contact ABB Service.

The 'Sensor Setup' menu (while visible) enables the setting of items such as the [Sensor Type], [Sensor Size] and calibration [Span Ss] and [Zero Sz] at 'Advanced' level access. These items are normally editable only at 'Service' level and are hidden after setup.

Note. When [Cal. Status] = Not Complete, a Sensor setup not complete alarm appears on the display and 'S110.034 Sensor setup not complete' alarm appears in the active alarms list.

Type of Flow Sensor, set to WM Full Bore:

<table>
<thead>
<tr>
<th>Sensor Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Probe</td>
<td>DE4*</td>
</tr>
<tr>
<td>Process</td>
<td>DE2*</td>
</tr>
<tr>
<td>Hygienic</td>
<td>Process OIML*</td>
</tr>
<tr>
<td>WM Reduced Throat</td>
<td>Hygienic OIML*</td>
</tr>
<tr>
<td>WM Full Bore</td>
<td>No Sensor*</td>
</tr>
</tbody>
</table>

*Do not use these settings
### Sensor Setup

#### Sensor Size (Bore)
Nominal bore size of flow sensor in mm:

<table>
<thead>
<tr>
<th>Size</th>
<th>DN1</th>
<th>DN1_5</th>
<th>DN2</th>
<th>DN3</th>
<th>DN4</th>
<th>DN6</th>
<th>DN8</th>
<th>DN10</th>
<th>DN15</th>
<th>DN20</th>
<th>DN25</th>
<th>DN32</th>
<th>DN40</th>
<th>DN50</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>*</td>
<td></td>
<td>*</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>*</td>
<td></td>
<td></td>
<td>*</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Do not use these settings as they are not supported by the upgrade.

#### Sensor Cal Mode
Calibration Mode used for sensor, set to WaterMaster.

- **WaterMaster**
- **ProcessMaster**

*Do not use these settings

#### Span Ss
Calibration Span of the attached flow sensor – equivalent to MagMaster Cal Fact 1.

1. Refer to Table 3.1, page 6 to calculate WaterMaster Span Ss value from MagMaster Cal Fact 1 (Snsr Fact 1). This Cal Fact 1 is identified on the data label, identified as 'Cal 1'. It is also available on the meter calibration certificate.
2. Multiply the MagMaster Cal Fact 1 by the 'Cal Fact 1 to Ss Multiplier' to find the Span Ss value.
3. Enter the correct Span Ss % value as calculated.
4. Ensure flow is present in the sensor.
5. If the flow reads in the wrong direction, enter the span as a negative value (for example, −123.45 % instead of 123.45 %).

#### Zero Ss
Calibration Zero Offset of the attached flow sensor – equivalent to MagMaster Cal Fact 2.

This is identified on the MagMaster sensor data label as 'Cal. 2/3/4'. The zero value is the first number – for example, 'Cal. 2'.

1. Refer to Table 3.1, page 6 to calculate WaterMaster Zero Ss value from MagMaster Cal Fact 2 (Snsr Fact 2).
2. Multiply the MagMaster Cal Fact 2 by the 'Cal Fact 2 to Sz Multiplier' to find the Zero Ss value.
3. Enter the correct Zero Ss value as calculated.
<table>
<thead>
<tr>
<th>MF/F DN</th>
<th>Cal Fact 1 to Ss Multiplier</th>
<th>Cal Fact 2 to Sz Multiplier</th>
</tr>
</thead>
<tbody>
<tr>
<td>80</td>
<td>102.3</td>
<td>0.1</td>
</tr>
<tr>
<td>100</td>
<td>102.0</td>
<td>0.1</td>
</tr>
<tr>
<td>150</td>
<td>101.9</td>
<td>0.1</td>
</tr>
<tr>
<td>200</td>
<td>101.8</td>
<td>0.1</td>
</tr>
<tr>
<td>250</td>
<td>103.8</td>
<td>0.1</td>
</tr>
<tr>
<td>300</td>
<td>103.1</td>
<td>0.1</td>
</tr>
<tr>
<td>350</td>
<td>104.9</td>
<td>0.1</td>
</tr>
<tr>
<td>400</td>
<td>104.5</td>
<td>0.1</td>
</tr>
<tr>
<td>450</td>
<td>104.0</td>
<td>0.1</td>
</tr>
<tr>
<td>500</td>
<td>105.0</td>
<td>0.1</td>
</tr>
<tr>
<td>600</td>
<td>105.4</td>
<td>0.1</td>
</tr>
<tr>
<td>700</td>
<td>105.4</td>
<td>0.1</td>
</tr>
<tr>
<td>760</td>
<td>101.4</td>
<td>0.1</td>
</tr>
<tr>
<td>800</td>
<td>101.2</td>
<td>0.1</td>
</tr>
<tr>
<td>900</td>
<td>101.9</td>
<td>0.1</td>
</tr>
<tr>
<td>1000</td>
<td>101.8</td>
<td>0.1</td>
</tr>
<tr>
<td>1050</td>
<td>101.8</td>
<td>0.1</td>
</tr>
<tr>
<td>1100</td>
<td>101.8</td>
<td>0.1</td>
</tr>
<tr>
<td>1200</td>
<td>101.8</td>
<td>0.1</td>
</tr>
<tr>
<td>1400</td>
<td>101.8</td>
<td>0.1</td>
</tr>
<tr>
<td>1500</td>
<td>101.8</td>
<td>0.1</td>
</tr>
<tr>
<td>1600</td>
<td>101.8</td>
<td>0.1</td>
</tr>
</tbody>
</table>

*Table 3.1 WaterMaster Span Ss Values*
[Sensor Setup] continued

[Trim St] Calibration ‘trim’ adjustment in % applied to the main span [Span Ss].
Is set to 0.000%.

[Mains Frequency] Frequency of the local AC mains / line supply voltage (for noise rejection).
[50 Hz]
[60 Hz]
Set as per the local AC mains / line supply. It must also be set for DC versions.

[Drive Mode] Coil Excitation mode to be used for flow sensor.
Dependent on sensor size. Refer to table below for correct value to set. If this value is altered, the WaterMaster transmitter reboots automatically. After reboot, re-login and continue setup.

[Coil Measurement F] Frequency to use for sensor coil diagnostic measurements.
Dependent on sensor size. Ensure the ‘Drive Mode’ is set first. Refer to Table 3.2 for the correct value to enter.

<table>
<thead>
<tr>
<th>Sensor Size</th>
<th>Drive Mode</th>
<th>Coil Measurement F</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; DN350</td>
<td>5A</td>
<td>40 Hz</td>
</tr>
<tr>
<td>DN350</td>
<td>5A</td>
<td>20 Hz</td>
</tr>
<tr>
<td>DN400</td>
<td>5A</td>
<td>20 Hz</td>
</tr>
<tr>
<td>DN450</td>
<td>5A</td>
<td>20 Hz</td>
</tr>
<tr>
<td>DN500</td>
<td>5A</td>
<td>20 Hz</td>
</tr>
<tr>
<td>DN600</td>
<td>7A</td>
<td>8 Hz</td>
</tr>
<tr>
<td>DN700</td>
<td>7A</td>
<td>8 Hz</td>
</tr>
<tr>
<td>DN760</td>
<td>7A</td>
<td>8 Hz</td>
</tr>
<tr>
<td>DN800</td>
<td>7A</td>
<td>8 Hz</td>
</tr>
<tr>
<td>DN900</td>
<td>7A</td>
<td>8 Hz</td>
</tr>
<tr>
<td>DN1000</td>
<td>7A</td>
<td>8 Hz</td>
</tr>
<tr>
<td>DN1200</td>
<td>7A</td>
<td>8 Hz</td>
</tr>
<tr>
<td>DN1400</td>
<td>7A</td>
<td>8 Hz</td>
</tr>
<tr>
<td>DN1600</td>
<td>7A</td>
<td>8 Hz</td>
</tr>
</tbody>
</table>

Table 3.2 Drive Mode and Coil Measurement Frequency
[Sensor Setup] continued

[Coil Current] The current to be used for sensor coil drive.
All systems using WaterMaster electronics must be set to 180 mA.
[180mA].

[Sensor Calibration]
[First Cal. Date] Date of first calibration.
For retro-fit units set to date on calibration certificate (if known) or set to the date of installing the WaterMaster Transmitter. The date format can be set to user preferences – refer to IM/WMP.

[Last Cal. Date] Date of last calibration. For retro-fit units set to date of installing WaterMaster transmitter

[Last Cal. Location] Set to Location of last calibration. Set to Stonehouse.
[Stonehouse] [Warminster]* [Shanghai]* [ ]
[Gottingen]* [Moorebank]* [Burlington]*

*Do not use these settings

[Sv] Calibration correction factor.
Set to Zero for retro-fit sensors.
0.000

[Sc] Calibration correction factor.
Set to Zero for retro-fit sensors.
0.000

[Cal. Status] Status of calibration settings for this flowmeter.

Caution. Changing this setting to [Calibrated] causes the 'Sensor Setup' menu to disappear. This sensor calibration data (type, size, span, zero, etc.) is then LOCKED. Modification is then possible only by ABB Service engineers.

Only when programming of calibration settings is complete, fully checked and the flowmeter is working correctly adjust this setting to 'Calibrated'.
The 'Sensor Setup Not Complete' alarm should now disappear.
Upgrade of the MagMaster sensor is now complete.
Further programming or troubleshooting of the flowmeter can be achieved as normal via the keypad (refer to the WaterMaster Programming Guide, IM/WMP).
Products and customer support

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— Actuators
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— Zirconia Oxygen Analyzers, Katharometers, Hydrogen Purity and Purge-gas Monitors, Thermal Conductivity

**Customer support**
We provide a comprehensive after sales service via a Worldwide Service Organization. Contact one of the following offices for details on your nearest Service and Repair Centre.

**UK**
ABB Limited
Tel: +44 (0)1453 826661
Fax: +44 (0)1453 829671

**USA**
ABB Inc.
Tel: +1 215 674 6000
Fax: +1 215 674 7183

**Client Warranty**
Prior to installation, the equipment referred to in this manual must be stored in a clean, dry environment, in accordance with the Company’s published specification.
Periodic checks must be made on the equipment’s condition. In the event of a failure under warranty, the following documentation must be provided as substantiation:
— A listing evidencing process operation and alarm logs at time of failure.
— Copies of all storage, installation, operating and maintenance records relating to the alleged faulty unit.