Flow Meter
User Manual

Products that speak Z-Wave work together better.™

INTRODUCTION

The FMI is a Z-WavePlus™ enabled device that interfaces with flow meter devices in order to measure liquid flow and temperature. In case of unexpected flow or high/low temperature conditions it will send alerts on your Z-Wave™ network. The FMI is compatible with other Z-Wave™ and Z-WavePlus™ certified products. *For the latest User Manual, go to www.fortrezz.com*

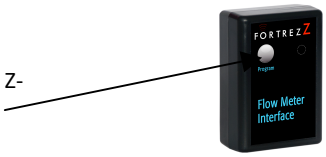
SPECIFICATIONS

Power:	5 volts (nominal) DC from regulated Power supply @~ 500mA capability with optional AA alkaline battery (2) backup
Battery Life (without AC Mains):	40 hours depending on battery capacity/quality and no alarms and default Z-Wave network settings. The FMI typically is not powered by the AA batteries. The batteries are optional; they will keep the FMI functional during short power outages and will maintain continuity of the water usage data for customers who prefer to have historical usage data. The battery life while running on AC main power is generally the normal shelf life.
Frequency Range:	908.4MHz (US); 868.4MHz (EU)
Distance Range:	Max 100ft line of sight in unobstructed environment
Enclosure Size (LxWxD):	3" (76 mm) x 2.1" (53mm) x 1.1" (30mm)
Weight:	0.25 lb (110 g)
Operating Temperature:	-10°C (14F) to +70°C (158F)
Input Signal 1 (SIG1):	Digital Input 0 to 16V DC, minimum 32 ms high or low time.

WARNINGS AND PRECAUTIONS

- ***Do not store highly flammable items such as oily rags or other combustibles near your FMI.***
- ***Do not apply electrical power to the unit unless the unit is fully assembled.***
- ***Install unit in accordance with electrical codes and regulations. In case you are unsure about any parts of these instructions consult an electrician or Z-Wave™ home automation specialist.***
- ***FMI functionality is based on wireless (RF) transmissions. Any wireless transmission can be subject to RF interference or loss of communication. This interference or loss of communication may cause the unit to not operate as intended. You, the end-user, are responsible for ensuring that the FMI functionality and installation meets your desired requirements.***
    - ***WARNING - The FMI must not be used in life support and / or safety applications.***
- ***Do not place FMI on or near metal objects. This decreases range and/or blocks wireless transmissions.***
- ***Information provided in this manual is for your convenience and may be superseded by updates. This manual is subject to change without notice. <u>It is your responsibility to ensure that the FMI functionality meets your needs and specifications.</u>***

<u>Using the FMI in a Z-Wave™ Network</u>



Program Switch for Inclusion or Exclusion The switch is used for including or excluding the FMI in a Z-Wave™ network. Refer to your controller's User Manual for specific details on network inclusion, exclusion, and association.

Inclusion in (**adding** to) a network: 1) Set up the inclusion mode at the controller; 2) Briefly press the switch once and the controller will indicate the unit has been included in the network. Also, the LED will blink when the inclusion completes. *Inclusion and exclusion are always done at normal transmit power mode. This product can be included and operated in any Z-Wave network with other Z-Wave certified devices from other manufacturers and/or other applications. All non-battery operated nodes within the network will act as repeaters regardless of vendor to increase reliability of the network.*

Exclusion from (**removing** from) a network: 1) Set up the exclusion mode at the controller; 2) Briefly press the switch once and then release. The controller will indicate the unit has been removed from the network. The LED will blink when the exclusion completes.

Associations: Once in a network, a controller can be used to associate the FMI with other devices in the Z-Wave™ network, such as a light or a remote audible alarm. *Refer to your controller's documentation on how to associate FMI with another device in your network.* The FMI supports four association groups (including the controller Lifeline) with a maximum of five devices in each group. Refer to the Association section below for details on the FMI association groups.

Node Info / Keep-Alive: The FMI will send the Z-Wave™ Node information frame when the switch is briefly pressed. This is primarily used for inclusion as described above; however, status information is also sent after a button press.

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Status Indications The MIMO2+ provides a status light to indicate various situations. As shown in the table below, the light blinks a variable number of times, fast or slow, periodically or only once.

Fast Blinks	Slow Blinks	Periodic?	Description
1			Button has been pressed
	1	Yes	Network-Wide Inclusion (NWI) mode (automatically entered at power-up when not 'in-network')
2			MIMO2+ is 'in-network' (indication after inclusion and after power up)
	2		Main Power (+5V adapter) has dropped out
4		Yes	MIMO2+ is not 'in-network' (indication after button is pressed during NWI mode without inclusion or after 30 second timeout from NWI mode)
	3		Waiting for Over-The-Air firmware update (initiated by pressing the button quickly three times in a row; exit by another button press)
30 (approx.)			After a device reset has been completed (initiated by holding the button and then releasing after 15 or more seconds)

Choosing a mounting location

The FMI is suitable for use in normally dry, interior locations only. Avoid placing the unit close to a metal frame, or other metal enclosures that may affect RF range. Place the unit so that any leaks that may occur will not drip directly on the unit.

During an alarm

If flow is detected or over/under-temperature or power low conditions are detected, the unit will send an alert message(s) to the Z-Wave™ network (if included in the network). The type of alert message depends on how the FMI is configured. If associations are configured, Basic Set messages will be sent for water flow as described below under *Associations*. If Heat or Power Alarms have been configured (via the Notification Command Class), then the FMI will send alert messages to the Lifeline group (Association Group 1). Association alert messages and Alarm alert messages may both be configured and sent. If an over/under temperature Alarm occurred and the temperature alarm conditions are no longer present, an 'alarm clear' message is also sent.

Also, depending on your Z-Wave™ controller, it is possible to receive a remote alert from the FMI. For example, with some gateway controllers, you can receive an email or cell phone text message when an alarm is activated. Depending on your specific controller's capabilities you will be able to remotely check the status of any FMI in your network.

Low Power

The FMI will send an alert on the Z-Wave™ network at regular intervals when it detects a low power condition on the main adapter. (See the Lifeline description in the Association section below.) These messages will be 'AC Mains Disconnected' notifications. Two AA batteries may also be installed for back-up in case of AC main power loss. If these batteries are new or fully charged they should provide enough power under normal power loss conditions to avoid resetting the device and losing the meter count. Do not rely on these batteries for more than 40 hours (less if the batteries are old). New batteries should be installed (while keeping the device powered with the main adapter) after lengthy power dropouts, or when the low battery indication is given. Do not install batteries that appear damaged or unsealed. When replacing batteries, the water seal may be broken around the screws. After screwing the parts back together, the use of some sealant, such as silicone caulk, around the screws is recommended.

Configuring the FMI

The high and low temperature setpoints in the FMI can be configured. The low temperature setpoint must always be set at least two degrees below the high temperature setpoint. The low temperature setpoint cannot be set less than –10 degrees C and the high temperature setpoint cannot be set greater than 70 degrees C. The temperature setpoints can be configured via a 'smart' controller after inclusion.

The meter count can also be reset in case, for example, the unit has been unpowered for too long and the previous count was lost. The time interval between meter reports while water is flowing can be set in increments of 10 seconds. The threshold for water flow (small/large) reporting can be configured. Selection of the type of message to send for water flow indications can also be set. Details of these configurations are provided in the technical appendix.

ASSOCIATIONS

Once in a network, your controller can be used to associate the FMI inputs with other devices in the Z-Wave™ network, such as a light or remote audible alarm. For example, when an unexpected flow is detected, the FMI can be set up to automatically send a command to turn on a device(s) associated with that condition, such as a flashing light. *Refer to your controller's documentation on how to associate the FMI with another device in your network.* The FMI supports four association groups with a maximum of 5 associated devices in each group. The

association groups and functionality are listed in the table below. The Lifeline association should be automatically set up by your controller if it is Z-Wave™ Plus compatible.

Note that Association Group 1 (Lifeline) allows the temperature to be sent to an associated device (such as the controller). The FMI sends the temperature when it changes but no more often than 30 seconds. If the temperature is toggling between two consecutive numbers the FMI performs filtering to avoid continually sending reports.

Association Group (Name)	Max. Associations per Group	Supported Events (Command Classes)
1 (**Lifeline** – the controller should automatically set up this association)	5	• Device Reset Locally (via 3 quick presses of the program switch) • Multilevel Sensor Temperature Report • Meter Pulse Report (flow count) • Notifications ▪ Under temperature detected ▪ Over temperature detected ▪ Power (Voltage Drop/Droop)
2	5	Basic Set Command with value = 0xFF is sent to the associated nodes to indicate that a Temperature High condition has been detected. When the temperature is back in the normal range, one additional report with value = 0x00 is sent.
3	5	Basic Set Command with value = 0xFF is sent to the associated nodes to indicate that a Temperature Low condition has been detected. When the temperature is back in the normal range, one additional report with value = 0x00 is sent.
4	5	Basic Set Command with value = 0xFF is sent when the meter count is incremented (i.e., flow has started). Do not set associations for this group if water flow is expected. When flow is not expected (for example, at a vacant vacation home), this association group can be set to perform various tasks such as commanding a water valve to open in order to stop the flow of water and/or commanding a siren/strobe unit to activate. Since the Basic Set Command (value 0xFF) is sent every 30 seconds while the water is flowing; this commanding should be turned off by removing the associations in this group if water flow is normally expected. Note that no command is ever sent with a value of 0x00 because the FMI cannot know if or when conditions have returned to normal.

OTHER PROGRAM BUTTON PRESS ACTIONS

As mentioned above, the program button can be pressed once to include or exclude the FMI from a network by sending a Node Information Frame. The single button press will put the unit into Network Wide Inclusion (NWI) mode or will take it out of NWI mode. The following button press sequences can also be performed.

- Device Reset to Factory Defaults – Press and hold the button for 15 or more seconds and then release. This can be done while the device is either in or out of a network, but not while in NWI mode. ***CAUTION – When a reset is done in-network, the device will no longer be in the network. All configurations and associations will be set to default.***
- Enter Over-the-Air (OTA) Firmware Update mode – Quickly press the program button three times while in-network. ***Warning – This should not be done unless a firmware update will be immediately started at the controller. Do not allow the OTA mode to continue indefinitely without starting the firmware update at your controller; otherwise, the potential for your FMI to be hacked is increased.*** Refer to your controller's manual for update procedures. Press the button once to exit the OTA mode.

WATER FLOW

While water is flowing, the meter can be configured to send a Notification report or a Multilevel Sensor report to the Lifeline. The Notification report is for Water (Type 5) with a water flow event type (6) and event parameters below threshold (2) or above threshold (3). The water flow determination is based on the configuration parameters described in the Technical Appendix (i.e., flow above/below parameter 5 within the parameter 4 time interval). The Multilevel Sensor report is similar. A General Purpose Sensor report is sent with value of 0 for inactive, 128 below threshold and 255 above threshold.

TROUBLESHOOTING

The FMI has been tested with various controllers from other vendors. However, it is not possible to test with every controller on the market. For specific troubleshooting procedures, please refer to your controller instruction manual and/or contact your controller manufacturer. Also, check the FortrezZ, LLC website www.fortrezz.com for helpful FAQs and updates to the User Manual / Technical Appendix.

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REGULATORY INFORMATION

FCC Compliance Statement Statements

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

1. This device may not cause harmful interference, and
2. This device must accept any interference received, including interference that may cause undesired operation. **Contains Transmitter Module FCC ID: WRD-FM5202**

FCC Warning (Part 15.21). Changes or modifications not expressly approved by the party responsible for compliance could void he user's authority to operate the equipment.

FCC Interference Statement (Part 15.105 (b)). This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Industry Canada Statement per Section 4.0 of RSP-100

The term "**IC:**" before the certification/registration number only signifies that the Industry Canada technical specifications were met.

Section 7.1.5 of RSS-GEN. Operation is subject to the following two conditions: 1) This device may not cause harmful interference, and 2) This device must accept any interference received, including interference that may cause undesired operation.
From section 5.2, RSS-Gen, Issue 2, June 2007 Equipment Labels: **Contains IC: 8156A-FM5202; PN: Model: FM5202-US-SMT**
From section 7.1.6, RSS-Gen, Issue 2, June 2007

Digital Circuits:
If the device contains digital circuitry that is not directly associated with the radio transmitter, the device shall also have to comply with ICES-003, Class A or B as appropriate, except for ICEC-003 labeling requirements. The test data obtained (for the ICES-003 tests) shall be kept by the manufacturer or importer whose name appears on the equipment label, and made available to Industry Canada on request, for as long as the model is being marketed in Canada.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes : (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

Note: Changes or modifications not expressively approved by the party responsible for compliance could void the user's authority to operate the equipment.

HELPFUL WEB SITE: Industry Canada http://www.ic.gc.ca/

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Europe

The FMI module has been tested for use in European countries. The following testing has been completed:
Test standard EN 300 220 ; (2012-05) Test standards ETSI EN 301 489-1 ; (2011-09)
A helpful document that can be used as a starting point in understanding the use of short range devices (SRD) in Europe is the European Radio Communications Committee (ERC) Recommendation 70-03 E, downloadable from the European Radio Communications Office (ERO) http://www.ero.dk. **The end user is responsible for ensuring compliance with harmonized frequencies and labeling requirements for each country the end device is marketed and sold. A Declaration of Conformity must be issued for each of these standards and kept on file as described in Annex II of the R&TTE Directive.**

	The Waste Electrical and Electronic Equipment (WEEE) directive (2002AA/96/EC) was approved by the European Parliament and the Council of the European Union in 2003. This symbol indicates that this product contains electrical and electronic equipment that may include batteries, printed circuit boards, liquid crystal displays or other components that may be subject to local disposal regulations at your location. Please understand these regulations and dispose of this product in a responsible manner.

Limited Warranty

THE PRODUCT IS PROVIDED WITH ONE YEAR LIMITED MANUFACTURER WARRANTY. FORTREZZ, LLC warrants its products to be free from defects in material and workmanship under normal use for one year, and is not responsible for consequential damages or installation costs of any nature. FORTREZZ, LLC. expressly disclaims all implied warranties, including but not limited to the implied warranties of merchantability and fitness for a particular purpose. FORTREZZ, LLC. does not warrant, guarantee, or make any representations regarding the use or the results of the use of the products or any accompanying materials in terms of their correctness, accuracy, reliability or otherwise. In no event shall FORTREZZ, LLC. be liable to Purchaser hereunder or in respect of any products ordered or delivered to Purchaser, whether in contract, tort including negligence or otherwise for a loss of profits or loss of use or for any incidental, consequential, special or indirect damages howsoever caused whether or not FORTREZZ, LLC. has been advised of the possibility of such loss or damage. FORTREZZ, LLC's maximum liability to Purchaser under these conditions shall in no event exceed the amount paid by Purchaser for the products that are the subject of the claim and in respect of all claims for products ordered from FORTREZZ, LLC. to which these conditions apply to the amount paid by Purchaser for the products which are the subject of the claims. If you are not comfortable with your limited warranty, or not completely satisfied with the MIMO, or the FMI does not perform as expected we encourage you to return the FMI to your DISTRIBUTOR for an exchange or for a full refund within 30 days of purchase. Or, you can return the FMI to FORTREZZ, LLC with an RGA number.

All products to be returned to FORTREZZ, LLC. must have a valid Returned Goods Authorization (RGA).

Send the returned unit to: **FortrezZ, LLC Warranty Replacement, 1080 Centre Rd. Ste C. Auburn Hills, MI 48326,** postage prepaid with a payment of US$ 9.95 to cover the cost of return shipping, postage and handling. You must use the original packaging and include a proof of purchase (photocopy of receipt) along with the RGA # and the returned product.

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TECHNICAL APPENDIX

Z-Wave™ INFORMATION

Node Information Frame (NIF): Always listening flag set, Optional functionality flag set
Manufacturer ID 0x0084
Product Type ID 0x0473 (US) 0x0471 (EU)
Product ID varies

Device Type / Supported Command Classes
Generic Device Type: GENERIC_TYPE_SENSOR_MULTILEVEL
Specific Device Type: SPECIFIC_TYPE_ROUTING_SENSOR_MULTILEVEL

COMMAND_CLASS_ZWAVEPLUS_INFO_V2
COMMAND_CLASS_VERSION_V2
COMMAND_CLASS_MANUFACTURER_SPECIFIC_V2
COMMAND_CLASS_DEVICE_RESET_LOCALLY_V1
COMMAND_CLASS_ASSOCIATION_GRP_INFO_V1 (Info about Root Associations)
COMMAND_CLASS_NOTIFICATION_V7 (Power Management, Water Flow, and Heat alarm handling)
COMMAND_CLASS_ASSOCIATION_V2 (Refer to Association Section)
COMMAND_CLASS_POWERLEVEL_V1
COMMAND_CLASS_BASIC_V1 (for controlling associated nodes during/Heat alarms; received Basic Set commands are ignored)
COMMAND_CLASS_METER_V2 (Default scale: Gallons with precision 1 = tenths of gallons)
COMMAND_CLASS_SENSOR_MULTILEVEL_V8 (Temperature sensor and General Purpose sensor types)
COMMAND_CLASS_CONFIGURATION_V1
COMMAND_CLASS_FIRMWARE_UPDATE_MD_V2
COMMAND_CLASS_BATTERY_V1

COMMAND_CLASS_CONFIGURATION Parameters

PARA-METER	DESCRIPTION	DEFAULT VALUE	SIZE (bytes)	POSSIBLE VALUES
1	Temperature low threshold	0x04 (4°C)	1	0xF6..0x45 (-10..69°C)
2	Temperature high threshold	0x46 (70°C)	1	0xF7..0x46 (-9..70°C)
3	Meter Count (tenths of gallons)	0	1,2,4	0 – 0x7FFFFFFF (count roles over at 99,999,999)
4	Meter Report Interval, while liquid flow is detected (in increments of 10 seconds). If 0 is set, then no continuous reporting during liquid flow; in this case, a report is sent every 10 hours whether or not flow is detected.	6 (60 seconds)	1	0 to 0xFF
5	Meter Leak Threshold. If this number of meter counts is exceeded during the above Meter Report Interval, then General Multilevel Sensor Report (MLS) with value=255 and large threshold leak notification messages are sent. If less than the threshold, then MLS value=128 and low threshold leak notification messages are sent. If flow stops, then MLS value = 0 and inactive water notification messages are sent.	50 (tenths-of-gallons = 5 gallons)	1,2 (max)	0 to 0xFFFF
6	Multilevel Sensor (MLS) Flow Report Enable (when MLS report is disabled, Water Notification is enabled and vice versa)	0 (MLS report disabled)	1	0 (disabled), Non-zero (enabled)