

## 1.0 GENERAL INFORMATION

The following Application for FCC Certification of a low power transmitter is prepared on behalf of Marsh-McBirney, Inc. in accordance with Part 15.245 of the Federal Communications Commissions rules and regulations. The Equipment Under Test (EUT) was the Marsh-McBirney, Inc., Flo-Dar 450, FCC ID: NIV-450-01. The test results reported in this document relate only to the item that was tested.

All measurements contained in this Application were conducted in accordance with ANSI C63.4 Methods of Measurement of Radio Noise Emissions, 1992. The instrumentation utilized for the measurements conforms to the ANSI C63.4 standard for EMI and Field Strength Instrumentation. Some accessories are used to increase sensitivity and prevent overloading of the measuring instrument. These are explained in the appendix of this report. Calibration checks are performed regularly on the instruments, and all accessories including the high pass filter, preamplifier and cables.

All radiated and conducted emissions measurement were performed manually at Rhein Tech, Incorporated. The radiated emissions measurements required by the rules were performed on the three meter, open field, test range maintained by Rhein Tech Laboratories, Inc., 360 Herndon Parkway, Suite 1400, Herndon, Virginia 20170. Complete description and site attenuation measurement data have been placed on file with the Federal Communications Commission. The power line conducted emission measurements were performed in a shielded enclosure also located at the Herndon, Virginia facility. Rhein Tech, Labs, Inc. is on the FCC accepted lab list as a Facility available to do measurement work for others on a contract basis.

### 1.1 PRODUCT DESCRIPTION

#### Specifications:

##### MONITOR:

##### Graphic Display

Passive matrix color LCD

320 x 240 quarter VGA

Dimensions – 4.6" x 3.6" (11.7cm x 9.15cm)

Displays flow rate, flow totals, average velocity and level.

##### MONITOR (secondary unit):

CPU Clock 33 MHz

Main supply 66 kHz

+5 DC/DC Converter (PS1) 100kHz

LT1372 4-20mA Current loop power 500kHz

MAX686 LCD power 300 kHz

Inverter board (backlight supply): ignition 47 kHz, DC/DC converter 90 kHz

Multi I/O PC 104 cards: A/D conversion/channel 2 kHz, D/A update 3.125kHz

##### Data Entry

Touch Screen Keypad

Menu-driven programming

Time base accuracy: 1 second per day

External Input-Accepts pulse (+5V leading edge triggered, less than 1 second pulse) from external devices (rain gages, etc.)

**Outputs**

- 4-20mA outputs: Isolated with up to 600ohm load per output.
- Two (2) outputs standard
- Third output optional
- Each output selectable between flow rate, velocity or level.

Proportional Contact Clsure-one from C dry contact closure (rating 1 amp at 28 volts)

Selectable for either total flow, flow rate, velocity or level

Rating: 1A 30VDC (resistive)  
0.5A 125VAC (resistive)

**Power Requirements**

AC: 85-264 VAC, 47-63Hz, 32 watts  
DC: 18-36 VDC  
(Nominal 24VDC @ 2 amps)

**Enclosure**

Material: NEMA 4, ABS Plastic  
Dimensions: (with mounting bracket in place)  
10.2" W x 13" H x 7.25" D  
(25.9 cm W x 33 cm H x 18.4 cm D)  
Weight: 7.5lbs

**Temperature**

Operating Range: 0° F to 122° F  
(-18° C to 50° C)  
(relative humidity non-condensing 10-90%)  
Storage Temperature: -40° F to 140° F  
(-10° C to 140° C)

**SENSOR:****Enclosure**

Material: Polystyrene  
Dimensions: 6.9" W x 16.65" L x 11.7" D  
(17.5 cm x 42.3 cm x 29.7 cm)  
Weight: 10.5 lbs

**Temperature**

Operating Range: -32° F to 122° F  
(0° C to 50° C)  
Storage Range: -40° F to 140° F  
(-20° to +60° C)

**Sensor Cable**

Material: Polyurethane jacketed  
Standard Length: 30' (9.15m), maximum 500' (152.4m)  
Disconnectable at both sensor and monitor

**Transducers(Radar/Doppler):**

Microwave signal 24.125 GHz +/- 25 MHz  
Duty Cycle 8us every 208us  
Ultra sonic signal 84 kHz  
Duty Cycle 190us every 12.8ms

**Microprocessor:**

AD 841 kHz  
Sclk 176.8 kHz  
Microprocessor 28.6 MHz

**Switching power supplies:**

Main supply 5V - 500 kHz  
Supply 8 V - 500kHz  
Charge pump - 130 kHz  
Supply 3.3 V - 2.84 kHz

**VELOCITY MEASUREMENT**

Method: Radar  
Range:  $\pm 0.25$  to 20 ft/s  
( $\pm 0.8$  m/s to 6.10 m/s)  
Accuracy:  $\pm 0.5\%$ ;  $\pm 0.1$  ft/s ( $\pm 0.03$  m/s)

**LEVEL MEASUREMENT**

Method: Ultrasonic  
Operating Range: 0 to 60 in.  
(0 to 152.3cm)  
Temperature Compensated  
Accuracy:  $\pm 0.25$  in ( $\pm 0.64$  cm)  
1% Accuracy

**SURCHARGE LEVEL MEASUREMENT**

Method: Piezo-resistive pressure transducer  
Maximum Range-275 inches (7 meters)

**FLOW MEASUREMENT**

Based on Continuity Equation  
Accuracy:  $\pm 5.0\%$  of reading typical where flow is in a channel with uniform flow conditions and is not surcharged.

## 1.2 RELATED SUBMITTAL(S)/GRANT(S)

N/A. This is an original submission for Certification.

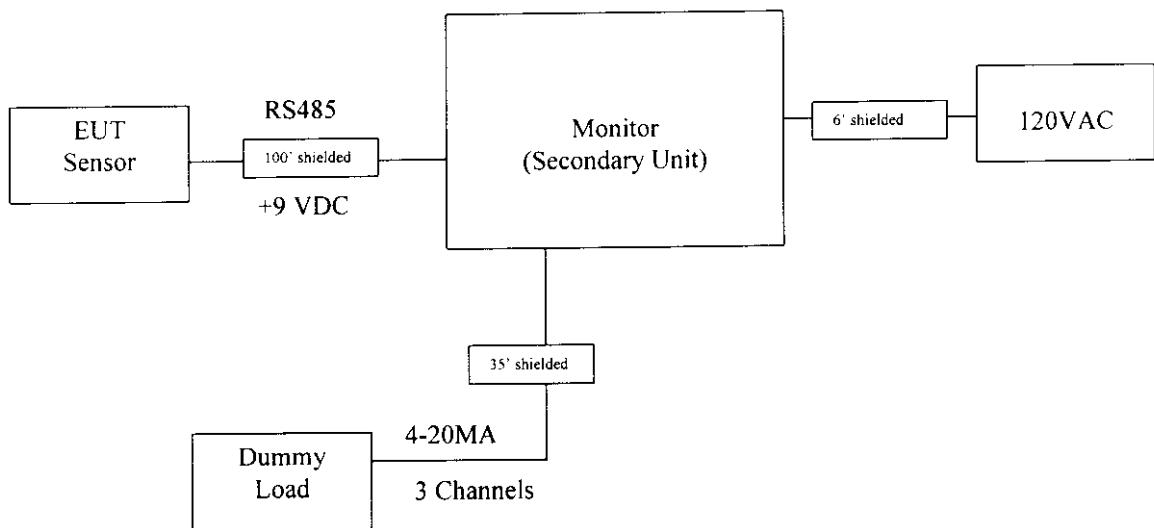
## 1.3 TEST SYSTEM DETAILS

The FCC Identifiers for all equipment, plus descriptions of all cables used in the tested system (including inserted cards, which have grants) are:

### External Components

Equipment	Supplier	Part Number	Category	Serial Number	Serial Description	RTL Bar Code
SENSOR (EUT)	MARSH-MCBIRNEY, INC.	170-0117-01	BA-0101	N/A	SHIELDED RS485	010279
SECONDARY MONITOR UNIT	MARSH-MCBIRNEY, INC.	M/N 450	N/A	N/A	SHIELDED POWER, SHIELDED 4-20 MA 3 CHANNEL	010281

## 1.4 CONFIGURATION OF TESTED SYSTEM



## **1.5 TEST METHODOLOGY**

Both conducted and radiated testing were performed according to the procedures in ANSI C63.4 1992. Radiated testing was performed at an antenna to EUT distance of 3 meters. Emissions above 1 GHz were video averaged.

## **1.6 TEST FACILITY**

The open area test site and conducted measurement facility used to collect the radiated data is located on the parking lot of Rhein Tech Laboratories, Inc. 360 Herndon Parkway, Suite 1400, Herndon, Virginia 20170. This site has been fully described in a report dated March 3, 1994, submitted to and approved by the Federal Communication Commission to perform AC line conducted and radiated emissions testing (ANSI C63.4 1992).