

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 Closure-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/Dopler):

- 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: ± 0.25 to 20 ft/s(± 0.8 m/s to 6.10 m/s)Accuracy: $\pm 0.5\%$; ± 0.1 ft/s (± 0.03 m/s)**LEVEL MEASUREMENT**

Method: Ultrasonic

Operating Range: 0 to 60 in.

(0 to 152.3cm)

Temperature Compensated

Accuracy: ± 0.25 in (± 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.

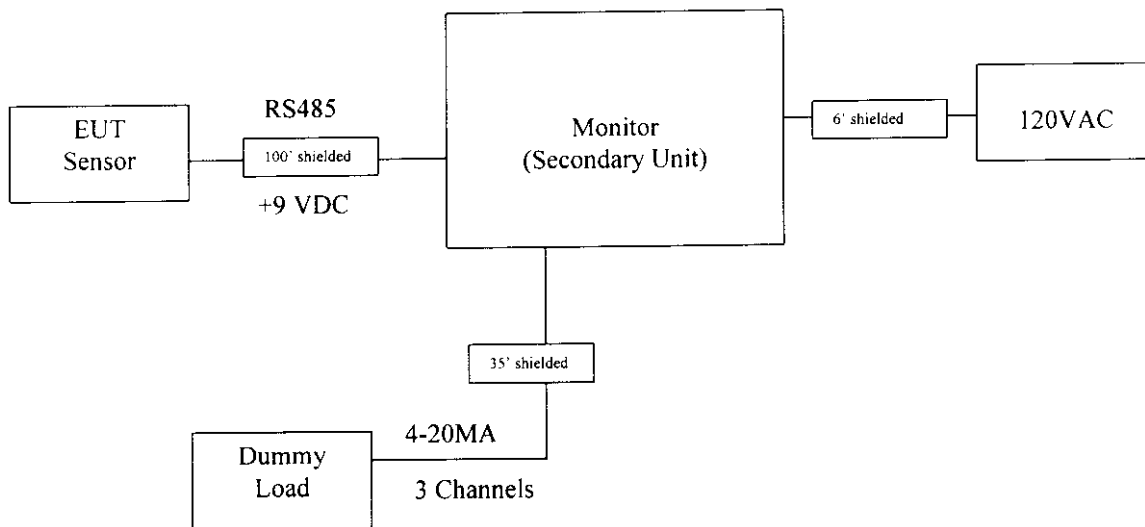
1.3 TEST SYSTEM DETAILS

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

Part	Manufacturer	Model	Serial Number	FCC ID	Cable 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).