



## NATIONAL TYPE EVALUATION PROGRAM

# Certificate of Conformance

for Weighing and Measuring Devices

**For:**

Retail Motor Fuel Dispenser  
Electronic Computing  
Models: 2200, 2300 and 2400 Series\*  
Generic Name: Horizon®  
Flow Rates:  
1 - 24 gpm (Bennett Model SB-100 Meter)

**Submitted By:**

Bennett Pump Company  
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**Standard Features and Options**

\*The specific models of dispensers covered by this certificate are listed on Pages 2 and 3.

**92 D, 708 and 96 D Electronics**

Display Totals: Total Money: \$9 999.99  
Total Volume: 999.999 gal  
Total Unit Price: \$9.999/gal

Mechanical meter calibration only  
Post pay, prepay, and stand-alone transactions  
Remote console interface capability  
High/low hose configuration  
Electronic cash register interface capability  
LCD display  
Computer interface

**Options:**

Electronic blender with event counter (category 1)  
92 D electronic head  
96 D electronic head  
708 electronic head  
X19 Electronics  
preset volume preset money  
Self-contained pump  
Two-tier pricing capability  
Card reader  
1 to 4 primary products  
Key reset  
(Continued on Page 2.)

**99 D Electronics**

99D electronic computer and LCD display  
Post pay and stand-alone transactions  
Remote console interface  
Electronic meter calibration  
Programmable units of measurement  
Programmable pulser output  
Remote price setting  
Non-resettable electronic totalizer  
High/low hose configuration

## Display Totals:

**Mechanical interface**

Total money: \$7499.99  
Total Volume: 999.999 gallons  
Total Unit Price: \$7.500 per gallon

**Digital Interface**

Total Money: \$9999.99  
Total Volume: 999.999 gallons  
Total Unit Price: \$9.999 per gallon

**Options:** Mechanical meter calibration

Preset volume or money  
Key reset

This device was evaluated under the National Type Evaluation Program and was found to comply with the applicable technical requirements of "NIST Handbook 44: Specifications, Tolerances and Other Technical Requirements for Weighing and Measuring Devices." Evaluation results and device characteristics necessary for inspection and use in commerce are on the following pages. \*Editorial changes, not affecting the type or metrological content, corrected this certificate.

Kristin Macey  
Chairman, NCWM, Inc.

Jerry Buendel  
Committee Chair, National Type Evaluation Program Committee  
Issued: July 11, 2017

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**Bennett Pump Company**  
Retail Motor Fuel Dispenser / 2200, 2300 and 2400 Series

**Application:** For use in dispensing retail motor fuels. Motor fuel devices with two fueling outlets shall be installed so that it shall be clear that the receiving vehicle is fueling. Jurisdictions may require physical barriers, visible valves, or lighting systems. For use with approved and compatible certified fueling systems.

The 2200 Series is a low cost single or two-product dispenser that incorporates 96D or 99D electronics which are limited versions of the 92D electronics found in the 2300 and 2400 Series dispensers. The 2300 and 2400 Series dispensers may also support the version 708 electronics. When the 99D electronics is interfaced to a console that is mechanical interface, the unit price per gallon cannot exceed \$7.50.

**Standard Features and Options Continued:**

**X19 Electronics**

Display Totals: Total Money: \$999999.99  
Total Volume: 99999.999 gal  
Total Unit Price: \$99.999/gal

- Mechanical or Electronic meter calibration
- Post pay, prepay, and stand-alone transactions
- Console interface capability
- High hose configuration
- LCD display
- Computer interface
- Category 2 Audit Trail
- 1 to 4 primary products
- Remote or Suction configuration
- 2 Tier Pricing

**Identification:** The identification badge is applied to the lower front of the cabinet. The Horizon dispenser identification number (DIN) is a multi-digit alphanumeric sequence, which identifies the total construction of the dispenser. The DIN for position numbers 1 through 8 in Table 1 are common positions between all dispenser versions. Table 1a is for dispensers manufactured prior to October 22, 1997 and Table 1b is for serial numbers not listed and manufactured before 8/1/2017.

TABLE 1 Dispenser Identification Number Chart				
Position No.	Description	Suffixes		
1	Series	2 = Horizon		
2	Dispenser Chassis	2 = 2200	3 = 2300	4 = 2400
3	No. Grades	1 or 2 = 2200	1 through 5 = 2300	3, 4 or 5 = 2400
4	Hoses	1, 2 or 4 for 2200 and 2300 Models	1, 2, 3, 4, 6, or 8 for 2400 Model	
5	Display Type	E = Electronic (92 D)	S = Electronic 92 D Single Tier Pricing	L = Electronic (96 D)
		V = Volume only Electronic (96 D)	A= electronic Retail (99D)	B = Electronic Volume only (99D)
		F = Electronic (708)		
6	Flow Rate	S = Standard	M = Medium (Heavy Duty)	H = High (LC Meter)
7	Fueling Position	1 = 1 Side	2 = 2 Sides	4 for 2224 Model
8	Profile	H = High Hose	L = Low Hose	S = Side Mounted



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TABLE 1a					
Dispenser identification number chart for dispensers built prior to October 22, 1997 with serial numbers in the following ranges: 6X492754 - 9X498078, 10X499172 - 10X502632, 11X502781 - 11X504212, 1X505435 - 1X507826, 2X509101 - 2X509128, 2X511582 - 3X513167, 3X513889 - 3X513898, and 4X515753 - 4X515772.					
X = Year dispenser manufactured.					
Position No.	Description	Allowable Suffixes			
9	Pump Type	R = Remote	S = Self-contained	H = Heavy Duty	
10	Blender	X = None	B = Electronic Blender		
11	Vapor Recovery	X = None	1 = Balanced	2 = Franklin	
12	Dispenser Type	X = NA	M = Master	S = Satellite	C = Combination
13 - 23	Non-metrological features such as card accepters, presets, speakers, hand-crank, etc. (alphanumeric)				
24	Units	G = Gallons	L = Liters		
25	Calibration Type	M = Mechanical			
26 - 34	Non-metrological features such as packaging and colors (alphanumeric)				
35	Graphics	GG			

TABLE 1b					
Dispenser identification number chart for all dispensers built after October 22, 1997 and those not found in Table 1a.					
Position No.	Description	Allowable Suffixes			
9	Truck Stop Configuration	X = Not Applicable	M = Master	S = Satellite	C = Combo
10	Hydraulics	R = Remote	S = Self-contained	H = Heavy Duty	
11	Blender	X = None	B = Electronic Blender		
12	Vapor Recovery	X = None	1 = Balanced	2 = Active	
13	Dispenser Card Acceptor	O = None	1 = DCA (Dispenser Card Acceptor)		
14	Cash Acceptor	O = None			
15 - 18	Non-metrological Features				
19	Units	G = Gallon	I = Imperial Gallons	L = Liters	
20	Calibration	M = Mechanical	E = Electronic *		
21 - 34	Non-metrological Features				

\* **Position 5, A or B only – 99D electronics.**

The serial numbers found in the above charts all have a prefix of 1X through 12X, which are insignificant. However, as of January 1, 1999, dispenser serial numbers carry a meaningful prefix indicating manufacturer's date code as follows:

The numbers 1 through 12 represent the month of manufacture.

The letters A through Z represent the year of manufacture, starting with A=1999, excluding the letters I, O and Q.

**Table 1C** below is for Dispenser manufactured after 8/1/2017.



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<b>TABLE 1C</b>			
<b>Dispenser Identification Number Chart</b>			
Position No.	Description	Suffixes	
1	Series	2 = Horizon	
2	Dispenser Chassis	4 = 2400	
3	No. Grades	1 – 4 Products	
4	Hoses	1, 2, 3, 4, 6, or 8	
5	Hydraulics	N = None B = Blender M = Mixer	
6	Flow Rate	S = Standard	
7	Fueling Position	1 = 1 Side 2 = 2 Sides	
8	Hydraulics	R = Remote S = Suction	
9	Pump Communications	C = Current Loop R = RS-485 W = Generic Current Loop	
10	Payment Options	N = None A = 7" EMV Ready, No Audio B = 7" EMV No Audio C = Credit 7" No Audio D = EMV Ready 10" w/ Audio E = EMV 10" w/ Audio F = Fleet Ready G = 7" Alpha Numeric Credit H = EMV Ready 7" w/ Audio I = EMV 7" w/ Audio	J = EMV 7" Ready NFC K = EMV 7" NFC L = Local Preset M = EMV Ready 7" NFC w/ Audio O = EMV 7" NFC w/ Audio P = EMV Ready 10" NFC w/ Audio R = EMV 10" NFC w/ Audio S = Credit 7" NFC V = Video Only 10" w/ Audio
11	Fuel	S = Standard A = Alcohol	
12	Unit of Measure	G = Gallons – ECAL L = Liters – ECAL A = Gallons – MCAL B = Liters - MCAL	
13 - 35	Non Metrological Features		



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**Calibration and Sealing:** The mechanical adjustment mechanism for the Bennett SB100 meter is accessed by unlocking the lower hinged panel and swinging it out of the way. The device is adjusted by removing a metal pin and turning the calibrator wheel to increase or decrease the delivery amounts. A wire security seal can be threaded through a hole in the metal pin to prevent removal of the pin. A wire security seal can be threaded through holes in screw heads that secure a metal cover over the meter calibration mechanism for the Liquid Controls M5 meter.

**92D and 96D electronics:** The audit trail for the blend ratio, gal/lit (gallon to liter), conversion and pulser setting event counters can be accessed by pressing a hidden button behind the Bennett logo. The hidden button is located behind the “ett” letters in the Bennett logo on the face of the dispenser. The hidden button must be pressed to display “Audit Trail.” Press and release the hidden button to increment through “BLEndr” (blender), “GALL It” (gallon), and “PULSEr” (pulser) audit trail counters. Each indication can be viewed on the main TOTAL and GALL screen on the front of the dispenser. The display will return to normal after 30 seconds, when the dispenser handle is lifted, or by holding the hidden button for two seconds.

**708 electronics:** The audit trail for the blend ratio and the gal/lit (gallon to liter conversion) event counters may be accessed by touching a hidden button in the keypad window. The hidden button is located 1 inch up and 2 1/2 inches from the lower right corner of the keypad window. Touch and hold this hidden button until "Audit Trail" is displayed. Touch and release the button to increment through “BLEndr” (blender) and “GALL It” (gallon) audit trail counters. Each indication can be viewed on the main TOTAL and GALL screen on the front of the dispenser. The display will return to normal after 30 seconds, when the dispenser handle is lifted, or by holding the hidden button for two seconds.

**X19 Electronics:** The Audit Trail for calibration, blend ratio, volume resolution and Unit of measure are all accessible by a magnet. Hold the magnet over the Main Display, under the Top line, to the left of the text “Total Sale. Once the displays shows “AUDIT TRAIL” remove the magnet, then swipe it over the same area, it will scroll through the audit trail values. It will time out, or lift the handle to go back to operational mode

The dispensers are not capable of remote calibrations. The 92D, 96D and 708 electronics incorporate Category 1 event counters. The X19 Electronics use a Category 2 Audit Trail. All sealable calibration and configuration parameters are protected and accessible through the four-digit manager’s code, as well as a calibration switch, sealable on the main CPU board.

**Electronic Calibration (2200 with 99D electronics only):** If the meter is out of calibration it can be reset to zero electronically. Record the error value and proceed as follows. Tape the Managers Keypad template over the membrane switch of the meter requiring calibration. Unlock the display door and set on top of the enclosure. Unsnap the display face at the top two plastic snaps and pull out and down. Follow the steps below to calibrate the meter.

- Step 1: Cut the wire seal on the memory board next to the main display, then unscrew the pin and remove the pin.
- Step 2: Push the calibration switch inward and re-snap the dial face in its upright position. The pump display will now indicate tSt CAn 000.0 which means test measure size. Replace the electronic door.
- Step 3: Enter the test measure size by making a keypad entry (example: keypad entry 50 will show as 5.0 on the pump display.
- Step 4: Push the ENTER key on the keypad. The pump display will show “Err in 00.0” which is asking for you to enter the error recorded in your test.
- Step 5: Enter the cubic inch error using the keypad (+/- button toggles + or - values and the 8 arrow toggles cubic inch or percent error). The decimal point in the display allows fractional cubic inch entries.
- Step 6: Push the ENTER key on the keypad, the pump display will show “CAL On 0.000”.
- Step 7a: To exit go to step 9.
- Step 7b: To verify the new calibration setting, remove the nozzle and turn the dispenser on and deliver a 5-gallon draft then turn the dispenser off.
- Step 8a: If the test measure reading indicates the meter is still in need of adjustment, repeat steps 5, 6, and 7.
- Step 8b: If calibration is accurate, go to step 9 exit.
- Step 9: To exit, remove the electronics door and pull down the display face. Pull the calibration switch outward, re-install the pin and a new wire seal, then resnap the dial face in its upright position and re-place and lock the electronics door. Remove the template.



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The 99D electronic incorporates an event counter with 999999 events for sealable parameters that are protected and accessible through a four-digit manager's code. The calibration parameters are only accessed by breaking the physical wire seal, but the event counter counts anytime there is a calibration change. The dispensers are not capable of remote calibration.

To access the audit trail, push and hold the Safety Stop Only button approximately 8 seconds until the display reads "Audit trAiL". Using the manager keypad template or if equipped with local preset, press the ENTER button\*\* and the display will advance to ECAL 1 (e-cal), pressing ENTER again advances the display to "Unit Ch" (gallons to liters to imperial gallons) audit trail counters. To exit, press the CLEAR button or the display will automatically return to operation mode after 30 seconds.

\*\* If no managers keypad template is available the ENTER button will be hidden but located exactly 1 ½ inches to the left of the Safety Stop Only button.

**X19 Electronics:**

The meter can be electronically calibrated as follows:

Step 1: Unscrew and remove the calibration switch pin at the top of the CPU board.

Step 2: Push the calibration switch to the left to allow for calibration.

Step 3: Attach the portable keypad into the J3 socket on the top right side of the unit price display. The display will show "Enter Side 1". Press "enter" on the key pad

Step 4: The device will show "CODE 00". Press "03" (manager's mode) on the key pad then press "mode" to enter the manager's mode. Enter the manager's access password and press, "enter". Press the "cancel" button to return to the code selection screen (the device will show "CODE 00")

Step 5: Press "27" on the keypad then "mode" to enter the calibration mode. The display will show the first configured meter and the correction factor. Using the UP-ARROW button or DOWN-ARROW button scroll through the meters until the desired meter is displayed. Press the "enter" button to select that meter.

Step 6: The main display will show the test prover size entry prompt. Enter the prover size and press "enter" to select that size prover. Once entered, the prover size will show in the first price per volume display. The main display will show "READY" and the second price per volume display will show the volume units of measure ("USG" for United States Gallons, "LIT" for liters or "BIG" for British Imperial Gallons).

Step 7: Turn on the pump handle. If the push to start is active the user will be prompted to press the start button. If the pump handle supports multiple products the user will be prompted to select the desired product. Once the product has been selected the main display will reset. The total sale display will identify the meter being calibrated as well as show the current calibration factor. The current volume will be displayed in the volume display.

Step 8: Dispense product until the volume display reads as close as possible to the prover size. Turn the pump off by lowering the handle.

Step 9: The device will show either "in Err" (for errors entered in cubic inches) or "cc Err" (for errors in milliliters) depending on what the device was set to dispense (gallons or liters). Enter the amount of any error (positive or negative) or zero then press "enter". The main display will show "READY". At this point another run may be made by returning to step 7, or press the "CANCEL" button to exit.

Step 10: Return the calibration switch to operate by pushing it to the right. Remove the keypad from the device (If switch is left in the calibrate mode the device will indicate an error and no sale would be allowed.)

**Operation:** The multi-grade 2300 and 2400 Series blenders are used to dispense gasoline from either of the two primary fuel tanks plus one or three blends of these primary fuels. In certain applications, a third primary product (usually diesel fuel) will be available



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at the blend dispenser through a separate hose and nozzle (3 + 1 manifold). In self-service applications, either "Mode 1" or "Mode 2" may be programmed for use of the cash/credit buttons in multi-tier pricing operations. For full-service applications, "Mode 2" only is to be programmed. These devices can be set-up to operate as a stand-alone dispenser or by console authorization. The blender allows setting the ratio of one primary product to the other primary product to create the desired octane level for the blended products to be dispensed. Every blend dispenser delivers the two primary products in addition to either one, two or three blended products (depending upon the model) through a separate hose and nozzle. These dispensers are often referred to as "3 + 1" blenders.

The devices may be equipped with two-tier price select buttons, which are located adjacent to the main display. The customer selects the method of payment by pushing one of the price select buttons. Two modes of operation are available for two-tier pricing. For both modes, the customer or attendant selects the method of payment and corresponding unit price using the price select buttons.

**Mode #1 (Self-Serve Application Only):** Initially, the unit price display indicates the method of payment selected for the last transaction. The customer uses the price select buttons to select the method of payment and unit price. The individual unit price display indicates the price for method of payment selected. The customer can toggle back and forth to view available unit prices. Once the product type is selected by lifting the on/off handle at the nozzle boot (or removing the nozzle if equipped with an auto-on switch), the unit price display reflects the selected unit price, and the remaining individual unit price displays blank. Product can now be dispensed at the unit price selected.

**Mode # 2 (Full-Serve or Self-Serve Application):** Following a transaction the customer or attendant is not able to change the unit price display by use of the price select buttons. The method of payment and unit price in the main display cannot be changed until the on/off handle (or removing the nozzle if equipped with an auto on switch) for the product is selected.

**Test Conditions:** This Certificate supersedes Certificate of Conformance Number 96-121A4 and was issued to include a card reader. A Bennett dispenser model 2324FS2HRXXXGM was interfaced with a Verifone OP4100 card reader. The emphasis of the evaluation was on the operation, receipt format, performance and agreement of indicated and recorded values. Also a two minute time out test was conducted. The evaluation was performed in a lab environment using Varsol as the test liquid. Five tests were performed at 12 gpm, 3 tests were performed at 7 gpm and five tests were performed at 3 gpm. After 30 days the tests were repeated using the same criteria. Tolerances applied were 3 cubic inches as provided for in the Liquid-Measuring Device Code, National Institute of Standards and Technology (NIST) Handbook 44, 2017 edition. Previous test conditions are listed below for reference.

**Certificate of Conformance Number 96-121A4:** This Certificate supersedes Certificate of Conformance Number 96-121A3 and is issued to include the X19 electronics in the 2300 and the 2400 series dispensers. The X19 electronics have been previously evaluated in the Pacific Dispenser, 07-098. This testing was performed using a Bennett EMV Debit system, Verifone Ruby Point of Sale. Testing was done on a Dispenser: 2448NS-2SCDSGANL1N2TNV

**Certificate of Conformance Number 96-121A3:** This Certificate supersedes Certificate of Conformance Number 96-121A2 and is issued to include the 708 electronics in the 2300 and the 2400 series dispensers. This was a hardware revision only, with the software the same as that used on the 92D. The upper display door is painted sheet metal and is hinged at the bottom for serviceability. A proximity switch keypad is used for product selection. Technical information, pictures and drawings were submitted for review. The lower hydraulic section of the dispenser has not changed, it uses the same SB100 meter (CC 91-095A2) and the Liquid Controls M5 meter (CC 89-063A6) No additional testing was deemed required. Previous test conditions are listed below for reference.

**Certificate of Conformance Number 96-121A2:** This Certificate supersedes Certificate of Conformance Number 96-121A1 and is issued to include a Model 2200 Series dispenser with 99D electronics and Liquid Controls M5A1 meter (CoC 97-023A2). The emphasis of this evaluation was on the device design, operation, marking, and performance. The device was initially evaluated at a normal flow rate (35 gpm), a mid point flow rate (22gpm), and a slow rate (12gpm). After 40 days the meters were retested at the same flow rates. Two additional Model Series are added to the Certificate, the 2200 Series dispenser with 99D electronics and Bennett SB100 meter. No additional testing was required based on test results on Go Pump (CC 00-059). The second Model Series is the 2300 Series dispenser with the 92D electronics and the Liquid Controls M5 meter configured either as a low hose unit or with a canopy and hose retractor to hold the hose off the ground. No additional testing was required based on previous test results on Bennett high capacity 7800 Series employing 92D electronics and Liquid Controls M5 meter (CC 89-063A6).

**Certificate of Conformance Number 96-121A1:** This Certificate superseded Certificate of Conformance Number 96-121 and is issued to include the Model 2200 dispenser with a Bennett SB100 (Certificate of Conformance Number 91-095A1) or a Liquid Controls M5A1 meter (Certificate of Conformance Number 94-028A1), dispenser electronics 92 D and 96 D, and electronic



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proportional blending. An initial and permanence test of 30 days was performed on the 2200 “Big Squirt” with a Liquid Controls M5A1 meter, 92 D and 96 D electronics, and electronic proportional blending. Testing of the LC meters was to evaluate the compatibility of the 2200 dispenser electronics. Octane verification was performed on the proportional blender to verify accuracy.

The operation’s text for Mode #1 (self-service only) was edited to correct an error in the operation mode based on information provided by the manufacturer.

**Certificate of Conformance Number 96-121:** This Certificate was issued based on this test and the previous evaluations. The Models 2300 and 2400 Series electronic and mechanical components are identical to the Bennett 7000 and 9000 Series dispensers (Certificate of Conformance Number 89-063A6) and the Model SB100 (Certificate of Conformance Number 91-095A1), and Liquid Controls Model M5 (Certificate of Conformance Number 92-028A2 and 92-075) measuring elements. A Model 2432ES2HR dispenser was installed in a field site and tested initially (including meter calibration and sealing), and again after 50 000 gallons throughput of gasoline using six Model SB 100 measuring elements.

**Evaluated By:** Tom Michel (CA), 96-121A1; R. W. Wotthlie (MD), Michael Garfield (MI), Robert De Rueis (MI); 96-121A2; Michael Frailer (MD) David Bliss (MI) 96-121A3; Michael Frailer (MD) David Bliss (MI) 96-121A4; H. Hairr, J. Wethington (NC) 96-121A5

**Type Evaluation Criteria Used:** NIST Handbook 44, 2017 Edition, NCWM Publication 14, 2017 Edition

**Conclusion:** The results of the evaluations and information provided by the manufacturer indicate the devices comply with applicable requirements.

**Reviewed By:** Ronald Flores (CA) 96-121A1, S. Patoray, L. Bernetich (NCWM) 96-121A3, 96-121A4; J.Trux (NCWM) 96-121A5

**Example of device:**

