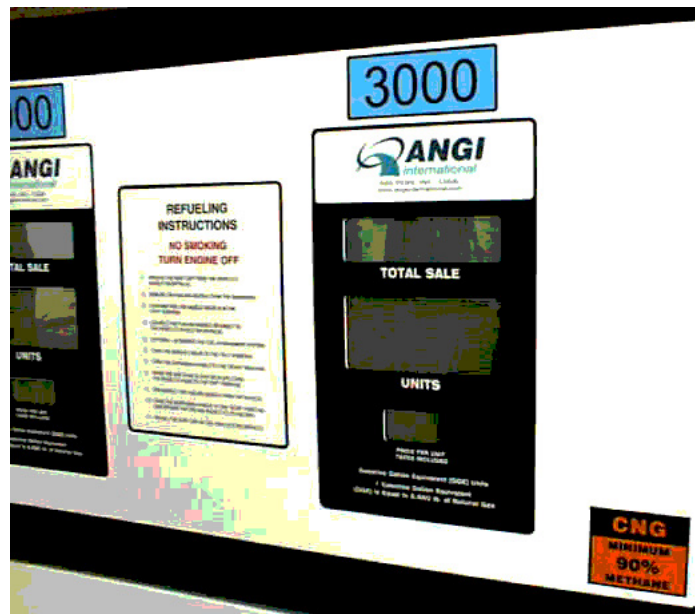
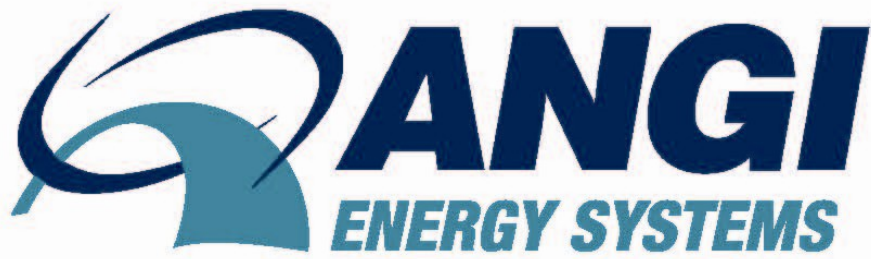




BASIC OPERATION MANUAL

ANGI Series II Dispenser

Rev. 9

NOTICE

IMPORTANT SAFETY INFORMATION

Only operate this equipment in accordance with the instructions provided in this manual. Improper application or operation of this equipment may cause serious bodily injury or death. Improper application or operation of this equipment will void the warranty.

Contact ANGI Customer Service if this equipment is to be used in a different application than it was originally designed for.

This equipment must be repaired and maintained by ANGI Customer Service Personnel, or the customer's qualified service representative.

Should you detect a gas leak...

- Immediately shut down the compressor and leave the compressor station.
- Extinguish any open flame or source of ignition.
- Shut off the supply valve and contact your authorized ANGI service representative and/or gas supply company.

WARRANTY

ANGI hereby warrants that the EQUIPMENT sold hereunder shall be free of defects in material and workmanship appearing within 12 months from the date the EQUIPMENT is placed into service or 18 months from the date the GOODS are available to be shipped; whichever comes first. PURCHASER must give written notice of any defect covered by this warranty to ANGI within the warranty period. For any defect covered by this warranty, ANGI shall repair or replace the EQUIPMENT. Repairs or replacement parts are warranted for 90 days from the date that the repaired or replaced EQUIPMENT OR GOODS are shipped from the factory or until termination of the original warranty, whichever is longer. This warranty does not cover labor costs and other contingent expenses for the diagnosis of defects or for removal and reinstallation of the EQUIPMENT. Such repair or replacement shall be PURCHASER's sole and exclusive remedy for ANGI's breach of this AGREEMENT.

This warranty does not extend to any GOODS or EQUIPMENT which have been (a) subject to misuse, neglect, accidents, acts of God, or causes of a similar nature; (b) repaired or altered by anyone other than ANGI, without ANGI's prior approval; (c) improperly installed by anyone other than ANGI or someone under its direction or (d) to consumable parts or materials such as filter elements, seals, belts, or fuses, or (e) damage resulting from overloading the GOODS or EQUIPMENT. This warranty does not extend to nor does ANGI provide any warranty to components such as motors and drive engines that are separately covered by a warranty issued by their respective manufacturers. ANGI shall transfer or pass through to PURCHASER any such warranties received by ANGI. This warranty is in lieu of all other warranties expressed or implied.

EXCEPT TO THE EXTENT PROHIBITED BY APPLICABLE LAW, THIS IS THE ONLY WARRANTY GIVEN FOR THE SALE OF GOODS, EQUIPMENT AND/ OR SERVICES. NO WARRANTIES OF MERCHANTABILITY AND FITNESS FOR PARTICULAR PURPOSE SHALL APPLY. IN NO EVENT SHALL ANGI BE LIABLE FOR CONSEQUENTIAL, SPECIAL, INDIRECT, PUNITIVE, OR INCIDENTAL DAMAGES RESULTING FROM THE PURCHASE OR USE OF ANGI EQUIPMENT, GOODS, AND/OR SERVICES RESULTING FROM ANY DELAYS OR FAILURE OF PERFORMANCE OF ANGI UNDER ANY AGREEMENT BETWEEN ANGI AND PURCHASER, OR RESULTING FROM ANY SERVICES FURNISHED BY ANGI.

This warranty may not be modified, amended, or otherwise changed except by a written document properly executed by ANGI.

For warranty issues contact: Customer Service
ANGI Energy Systems, Inc.
15 Plumb Street
Milton, WI, USA 53563
Phone: 608-868-4626
Fax: 608-868-2723
E-mail: service@angienergy.com
Website: www.angienergy.com

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1. Introduction

The ANGI Series II dispenser offers precision sequencing and temperature compensation for refueling natural gas vehicles. The Series II is a microprocessor-controlled system that controls the dispenser's operation using ANGI's proprietary software. The dispenser measures and delivers gas by using mass flow meters, pressure sensors, and valves to start and stop flow from a high-pressure gas supply source. The dispenser fills a vehicle tank to a temperature-compensated final pressure and displays the delivered mass and sale amount. The dispenser is programmed to perform a coordinated shutdown in the event of an emergency or loss of power.

The Series II dispenser is offered in single and two hose models. This documentation is written for a two hose application; for single applications, the second hose's functions will be non-operative.

2. Refueling Instructions

1. Remove the dust cap from the vehicle's nozzle receptacle.
2. Remove the fueling nozzle from the dispenser.
3. Confirm that the nozzle valve is in the OFF position.
4. Connect the fueling nozzle securely to the vehicle's nozzle receptacle.
5. Optional: Authorize the fuel management system.
6. Turn the Nozzle's Valve the FILL position.
7. Turn the dispenser handle the START position.
8. Optional: Enter sale preset amount or full.
9. When the gas flow slows or stops, turn the nozzle's valve to the OFF position.
10. Turn the handle to the STOP position.
11. Disconnect the fueling nozzle from the vehicle and return the fueling nozzle to its holder.
12. Install the dust cap on the vehicle's receptacle.

Note: Turn off the engine while refueling. No smoking while refueling.



3. Dispenser Fill Sequence

All display windows will show all segments on for 10 seconds after power is applied to the dispenser. After 10 seconds, the unit and sale values for the last sale will be displayed.

The dispenser fills a vehicle from three supply tanks: low bank, mid bank, and high bank. The dispenser operates a valve that connects the fill line to each of these supplies. The controller cycles through these supplies, or “banks,” one at a time to fill a vehicle. The dispenser will perform a fill sequence when initiated by the user.

The dispenser will sit idle and monitor the pressure of the hose; the hose is typically charged to full pressure. The operator will begin the sequence by connecting the hose to the vehicle and open the nozzle valve. This action discharges the hose and the controller detects the pressure drop, which is also known as a “hose drop.” Once the controller senses a hose drop, it is assumed that the vehicle is connected and the nozzle valve is open. The controller retains this information for 60 seconds. When the handle is turned to the START position and the dispenser is authorized to begin fueling, the controller begins the fill sequence. The display flashes with all the LCD segments on for one second, and then display sale and quantity are cleared to zero. If the dispenser is not authorized the display will read all 1s (or 2s if the extra authorize input is used).

The display will be cleared and the fill-sequence will start as soon as the dispenser gets the authorization signal. For dispensers with the sale preset option the display will read “PRESET” in the quantity field and will wait for a sale amount to be entered into the sale total field. The display will clear to zero after the operator pushes the START key. After zeroing, all gas flow will be measured. The controller measures the hose pressure, which is understood to be the vehicle tank pressure, and the ambient temperature. From these measurements, it calculates a target pressure for a full tank. The controller stops when the vehicle tank pressure reaches the target pressure.

Note: some fuel management systems authorize the dispenser by a valid card swipe prior to receiving card approval. This allows the dispenser to run before the fuel management system gets the approval. That fuel management system will remove authorization from the dispenser if it detects it is filling without approval (error code E6).

The fill sequence starts on the low supply or “low bank.” The low bank fills most of the vehicle’s tank. The controller switches off of the low bank, pauses, and then switches to the mid bank. During the pause, the controller samples the actual tank pressure for filling adjustments. The mid bank continues to fill the vehicle. Finally, the controller switches off of the mid bank, pauses, and then switches to the high bank to fill the final amount. After the final target is reached the high bank valve shuts off. The control pauses one last time to let the pressure and flow settle. Mass flow measurement is then halted, the displayed values are final, and the fill data is recorded in the controller’s permanent memory. This completes the filling sequence. If the sale-preset amount was entered, the dispenser will stop before the sale amount is reached and coast to the exact amount. This can happen anytime during the sequence. Any extra mass is clipped off the total to get the exact sale. The dispenser then goes through the above description of ending the process. Note: this function is used only where law allows it. The operator completes the process by turning the handle to the STOP position. While the dispenser is filling the vehicle, the controller continuously updates the dispenser’s display, and updates the sale and unit quantity information to the station control.

An extra step is added if the nozzle valve has not opened by the user before the handle is turned to the START position. The controller does not detect a hose drop. The dispenser performs the extra sequence step to confirm that the nozzle valve has been opened, which is called a “hose check.” When the handle is turned to the START position, the display value is cleared. To see if the nozzle valve is opened, the controller turns on the high bank valve for a short time. The controller measures the amount of mass delivered during this time. If the amount is substantially more than the hose can hold, it is assumed that the nozzle valve is opened and all the mass went into the vehicle. This mass measurement is retained and the dispenser then begins the normal fill sequence.

If the mass delivered is the amount that the hose can hold or less, it is assumed the user did not open the nozzle valve. The dispenser control waits 60 seconds for the user to open the nozzle valve. When the nozzle valve is opened, the hose pressure will drop to the vehicle tank pressure. The controller will detect the hose drop, and the controller disregards the mass from the hose drop and zeroes the display values again. The controller starts the regular fill sequence. The dispenser controller will report an error if the valve is not opened within 60 seconds. It is assumed the user has left the dispenser unattended with the handle in the START position. The dispenser will not proceed to the fill sequence. The user must return the handle to the STOP position and start the cycle over (see Error Codes).

The dispenser will terminate a fill sequence immediately if:

- The authorization signal is removed
- The handle is turned from the START position
- The dispenser detects an abnormal fill event or an error



4. Display Operation During Fills

During the fill sequence, the display reports the amount of gas being dispensed and the sale amount. When the handle is turned to the START position, the display will show all segments on. This occurs so the user may detect any missing or failed LCD segments before filling. The user can abort the fill if the display is faulty by returning the handle to the STOP position. Any error codes displayed will be cleared when the handle is turned to the START position.

If authorization is present, all segments will stay on for one second after the handle is turned to the START position. After one second, the control will start the fill sequence. (See Sale Preset section 14 if you have that feature). If the authorization is not present after one second, the display will show all "1's" until the request to fill is authorized. The controller will start the fill sequence once it is authorized.

If the operator turns the handle to the OFF position before authorization is granted or during the one-second period, the display will return to the previous fill values.

At the start of the fill sequence the display unit quantity and the sale values are cleared to zero. The cleared values will be displayed for 1/3 of a second before the fill sequence starts flow. Any amount of gas that flows will be continuously recorded in the Unit display window. The sale value will update with the unit quantity value. The bar graph will scroll up as the gas is being dispensed. The bar graph shows the percentage of mass being delivered with respect to the tank size. The tank size value is adjusted during the fill.

The lower 4-digit display shown in the Units window will monitor the estimated tank pressure. When the fill is complete, the bar graph will show 100% and the pressure will be replaced with the word "FULL". The final tank pressure value will return to the 4-digit display when the user turns the handle to the STOP position. The quantity and sale values will remain on the display until the next fill. If there is an error, an ERROR CODE will replace the pressure in the Units window. The ERROR CODE is displayed using an "E" or "F" followed by an error code number (see Error Codes). For dispensers operating with program revs 3.910 and greater there is an overfill word "OvEr" is the

dispenser malfunctioned in a way to put more gas than targeted instead of an error code. The amount of pressure above target to indicate an over fill is set by an internal parameter. Default is 15%. For program revs 3.961 there are two words added as event indicators. One is an under fill word "Undr" displayed instead of the error code E1. The amount of pressure below target to indicate an under fill is set by an internal parameter. Default is 0%. The second is a power loss "PloS". A power loss condition is detected when the internal dispenser DC power supply voltage goes below 21 vdc during a fill. This is to finish up a fill, by force, and record the transaction results before the power goes away completely. The dispenser typically has ½ second of charge to do this. If for some reason the power supply is low, below 21 volts, but does not lead to a complete power loss the display will show "PloS" and all "8" on the display if the handle is turned on. The dispenser will not start a fill sequence with the power supply not at the proper voltage above 22 vdc.

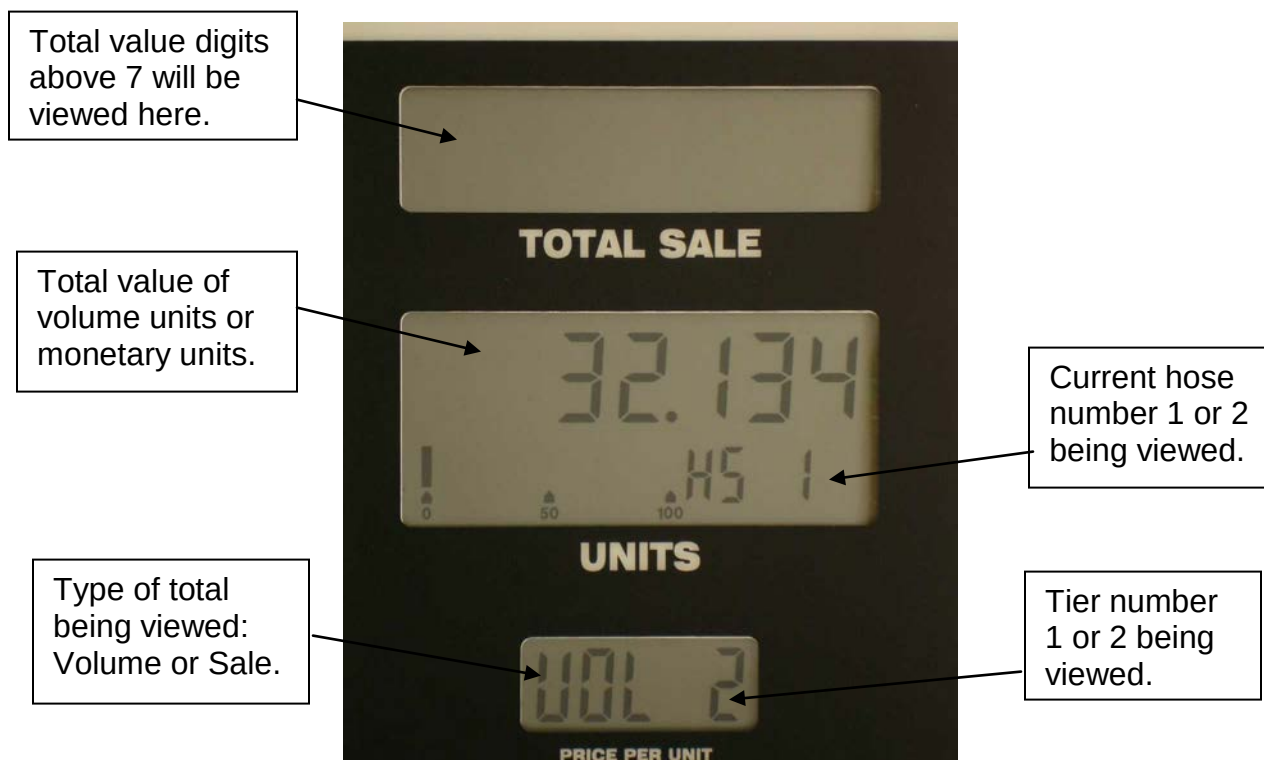


5. Keypad Operation

The keypad is a tool used to control the display of the running totals, to set price per unit, and to select tier pricing. The ANGI Series II dispenser retains a running total of all gas dispensed for each hose during a shift and an accumulated total from the initial start-up of the dispenser. Running totals are the accumulated amount of all fills, both volume and sale for each hose. There are two types of running totals: a clearable total or SHIFT total, and a non-clearable total. Price per unit is the amount charged per unit of mass, which is used to calculate the total sale. Each hose has the ability to pre-assign two prices for each hose. This is called tier pricing. Tier pricing allows the attendant or fuel management system to easily switch between two prices for various customers. These totals are retained in the controller's permanent memory, which holds these values when power is removed from the dispenser. (See the Sale Preset Operation section if your dispenser has this option).

6. Displaying Totals

To display a desired total for a hose, press a key marked TOTAL or SHIFT and the “3” or “6” key. The “3” key selects A hose. The “6” key selects B hose. This displays the total amount on all of the LCD displays. The number is displayed starting in the Units window. If the total number expands larger than 7 digits, the upper additional digits will be displayed in the Total Sale window. The number can expand up to 12 digits.



The Price Per Unit window will indicate “SALE_” or “VOL_” and specify which pricing tier has been selected. Example: If you press TOTAL SALE T2 (the “4” key), the Price Per Unit window will display “SALE2.” If you press TOTAL VOL T1 (the “2” key), the Price Per Unit window will display “VOL 1.” The 4-digit display in the Units window will indicate “HS_” for the selected hose. Pressing the “3” key will display “HS 1” for hose A. Pressing the “6” key will display “HS 2” for hose B. The total will not be displayed until a hose is chosen. Pressing the DISPLAY RESET button will return the display to the normal running mode. If a key is not pressed, the display will return to the normal running mode after 60 seconds.

The SHIFT totals are clearable to zero. A SHIFT total will be cleared by pressing and holding the key down for 3 seconds. After performing this function, the display will indicate zero. Pushing the DISPLAY RESET key accepts the cleared value. The SHIFT

total will restart from this point. The previous shift value is deleted and is not recoverable.

If the DISPLAY RESET is not pressed following the 3-second hold, the previous value can be returned by simply pressing the SHIFT total key again or pressing any other key except the DISPLAY RESET key.

If a key is not pressed for 60 seconds, the display returns to the normal running mode and the SHIFT total is returned to the previous value; the previous value will not be cleared.



To display the total volume units dispensed from a hose since the dispenser's initial start-up, press the MASS key (the "9" key) and then a hose key: "3" or "6." The MASS function displays the total volume delivered from that hose. This number is not clearable. The price per unit window will show "ALL V" and the 4-digit display in the Units window will show "HS 1" for hose A or "HS 2" for hose B. Press the PRICE SET HOSE A TIER 1 key to display the total number of fills for that hose. The price per unit window will show "ALL C". Press the DISPLAY RESET key to return to the normal running display.

Total volume value up to 13 digits. Digits 8 – 13 roll up in the sale field above.



Hose number 1 or 2.
Key 3 = hose 1.
Key 6 = hose 2.

Viewing volume (mass) dispensed from one hose sum of both tiers.

Total number of fills values up to 10 digits.



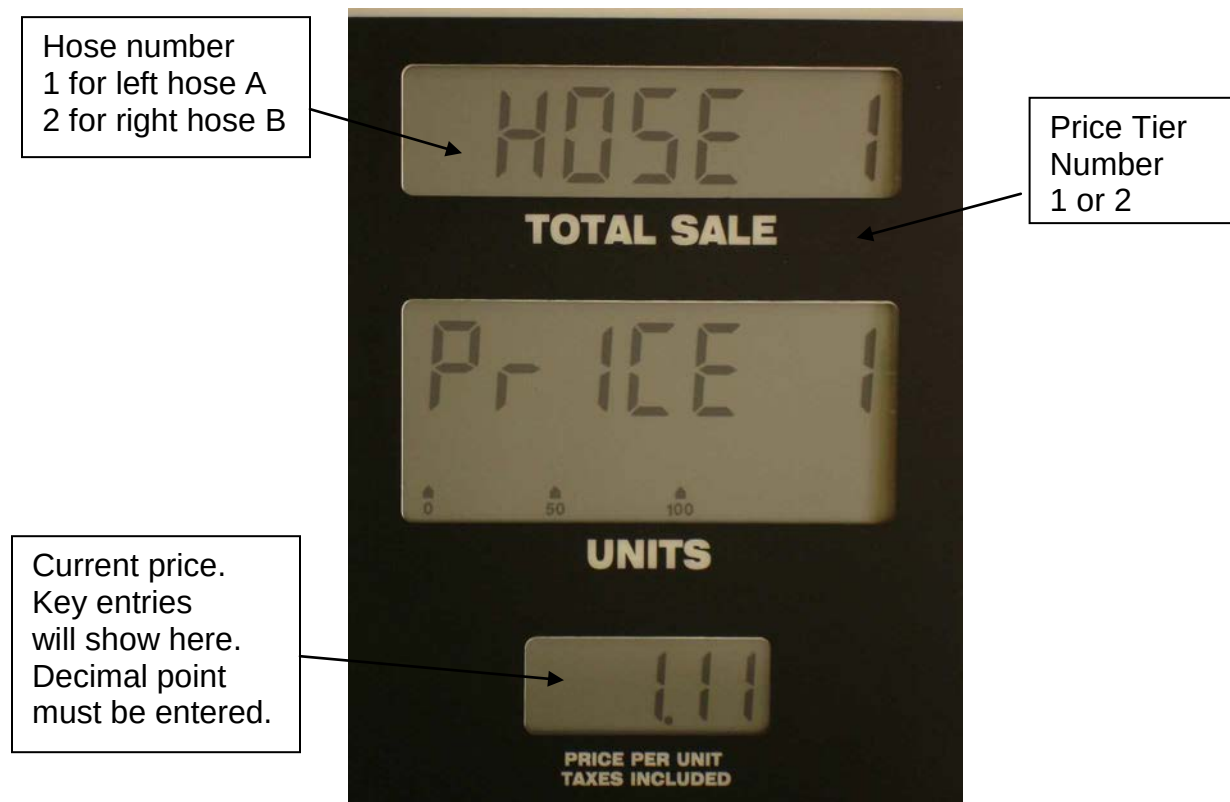
Hose number 1 or 2.

Viewing total number of fills dispensed from one hose sum of both tiers.

7. Price Setting

The ANGI Series II Dispenser has the ability to assign two prices for each hose. This is called tier pricing. Tier pricing allows the user to easily switch between two different prices for various customers. There are four keys that enable prices entering for each hose and each pricing tier:

- PRICE SET HOSE A TIER 1
- PRICE SET HOSE B TIER 1
- PRICE SET HOSE A TIER 2
- PRICE SET HOSE B TIER 2



Pressing these keys will put the dispenser in the price setting mode. To enter new prices, the handle must be in the STOP position. In the price setting mode, the number and the decimal point keys are enabled. The Total Sale window will indicate which hose is being edited, "HOSE 1" for hose A and "HOSE 2" for hose B. The Units window will indicate the pricing tier, either "PRICE 1" for tier 1 or "PRICE 2" for tier 2. The present price will continue to be displayed until a number key is pressed. Once a number key is pressed, the old price is cleared and the pressed number is placed in the price display's lowest digit. The numbers entered will shift to the left; the new digit always enters at the right. The decimal point must be used if it is required. Example: to get "1.23," press keys: 1, decimal point, 2, and 3, in that order. After the new price is entered, press the PRICE ENTER key to save the new value. If the numbers entered are not correct, press the PRICE SET key again and the old price will return, closing the price setting mode. In

the price setting mode, all displays will show the same price value during editing regardless of which display you are looking at.

8. Price Tier Selection

The price tier used by the dispenser is selected by two methods:

- The price tier is selected using the keypad
- The price tier is selected by a hard-wired input

These methods are selected in the control parameters in the dispenser's software program.

9. Using the Keypad for the Tier Selection

To change the pricing tier, confirm that the Start/Stop handle is in the STOP position, and press the desired PRICE SET key twice. This will update the display to the desired price. Example: To display the tier 2 price for hose A, press the "PRICE SET - HOSE A - TIER 2" key once to show the selection. The display will show "HOSE 1," "PRICE 2," and the price. Press the "PRICE SET - HOSE A - TIER 2" key again to accept the selection. This sets the current price for hose A at tier 2 pricing. The display returns to the normal running mode. All future sales will be calculated at this price.

While the price is being updated:

- The Start/Stop handle must be in the STOP position
- The hose is non-operative
- The Start/Stop handle will be non-functional
- The dispenser will not operate if the handle is turned to the START position
- The dispenser will not start the next fill sequence if the handle was left in the START position after the price was entered. The handle must be returned to the STOP position before the next sequence can begin.
- The price change mode cannot be entered if the Start/Stop handle is in the START position
- The displayed sale amount from the last fill will not be recalculated when the price is changed; it will retain the values calculated from the previous fill.

10. Using a Hard-Wired Input for Tier Selection

The dispenser can be programmed to allow remote selection of the price tier. This function is provided by a hard-wired control board input for each hose (reference TB3 on the Interface Board). The dispenser uses the tier 1 pricing when the input is OFF and the tier 2 pricing when the input is ON for each hose. Price tier selection by the keypad is disabled when the dispenser is programmed with this function. When using this function, the tier price can be remotely changed any time the dispenser is idle.

When the user starts the fill, the price tier displayed is the one used for the sale calculation. This allows an optional remote system to set the price before the dispenser is authorized and before the handle is turned to the START position. The displayed price tier is protected from being changed during a fill; the input is disabled. If the input is changed to the other price tier during a fill, the controller will not update that change until the fill is complete and the handle is turned to the STOP position.

11. Special Mass Unit Selection

The dispenser can be set to temporarily display a standard mass unit different from its programmed mass unit. To display a “special mass unit” press and hold the “MASS” key (the “9” key) for three seconds. Pressing the “3” key will scroll through four standard conversions. The Price Per Unit window will display “SPU 0” for the normal programmed unit. The Unit window will display the grams per mass unit conversion. The four choices are:

- “SPU 1” Kilograms 1000.0 grams/Kg
- “SPU 2” Pounds 453.6 grams/lb
- “SPU 3” Equivalent Liters 667.7 grams/Eliter
- “SPU 4” Equivalent Gallons 2567.4 grams/Egal
- “SPU 5” Standard Cubic Meters 769.1 grams/SCM

Pressing the DISPLAY RESET key will accept the displayed units. All fills, totals, and shift totals unit quantities will be displayed in the selected units. Example for weights and measures testing: to display pounds, press and hold the “9” key for three seconds (with the handle in the STOP position). Press the “3” key twice to get to “SPU 2” “453.6” and press the DISPLAY RESET key. The display will return to the normal running mode. The displays will read how many pounds of gas were last dispensed.

The dispenser will retain these units as long as the power is on. If power is cycled, the units revert back to the programmed units: “SPU 0.” Going into the selections again and choosing “SPU 0” can select the normal running units. This should be done after a weights and measures test is completed.

Note: For controllers with rev. 3.05 or lower the mass pulses to the card reader were scaled to the special mass units. For rev. 3.06 and higher the mass pulses remain scaled by the normal programmed units SPU 0.

12. Error Codes

An error code is displayed in the 4-digit Units window when a hardware fault or a fill sequence fault occurs. It shows a capital “E “for fill events and an “F “for faults followed by a decimal number for fill events. All errors will remain displayed until they are cleared by cycling the START/STOP handle or cycling the dispenser’s power. Intermittent hardware errors are detected and retained. The display will cycle through multiple errors by displaying each error code for one second. Hardware and fill errors shut the fill sequence down. The fill sequence continues on events.

<u>Error</u>	<u>Definition</u>	<u>Type</u>
E1	Final Bank stop because of low flow and under-fill Revision 3.961 and higher: not defined.	Fill event
F2	Bank pressure exceeds 135% (Pmax) of absolute allowable pressure or the fixed pressure trip parameter “pressure_trip”	Fill error
F3	Bank pressure exceeds 135% (Pmax) of calculated pressure target	Fill error
E4	Tank pressure exceeds target pressure during bank shift	Fill event
E5	Operator aborted fill; Handle turned off before complete	Fill event
E6	Authorization removed during fill; Fill aborted by attendant or fuel man.	Fill event
F7	Hose exceeded allowable maximum flow; “hose burst”	Fill error
F8	Flow detected with valves closed, can not sequence	Fill error
E9	Hose drop timed out; Dispenser left unattended while attached to vehicle	Fill error
E10	Meter activity or error	Hardware
E11	Switch1-1 is ON	
E12	Flow detected when the dispenser is off (idle), meter lost zero	Event
F13	Ambient temperature out of range	Error
F14	Broken wire or signal loss of main pressure sensor	Hardware
F15	Flow meter not communicating	Hardware
F16	Display not communicating	Hardware
F17	Redundant pressure sensor; Not in agreement with main sensor	Fill Error
E18	Gilbarco communication link overrun error	Com Error
E19	Gilbarco communication link parity error	Com Error
E20	Gilbarco communication link framing error	Com Error
E21	Gilbarco communication link checksum error	Com Error
E22	Gilbarco communication link data length error	Com Error
E23	Gilbarco communication link command error	Com Error
E24	Gilbarco communication link invalid grade error	Error
F25	Parameter value is different than what is stored in memory	Data
F26	Meter is programmed with the wrong mass flow engineering unit	Data
F27	Meter is programmed with the wrong mass engineering unit	Data
F28	Broken wire or signal loss of secondary pressure sensor	Hardware
F29	Shorted wire or signal loss of secondary pressure sensor	Hardware
F30	Shorted wire or signal loss of main pressure sensor	Hardware
E31	Gilbarco Comm off line	
F32	Sudden hose pressure drop during fill	Fill error

13. Diagnostic Keypad Functions

The keypad provides an access to the internal workings of the dispenser controller by displaying the program parameters and variable values areas on the dispenser's LCD screens. Flow-meter parameters and the parameter change log (Audit Trail) are also viewable. The values are displayed in the Sale and Unit Total fields with the least significant digit in the right most digit in the units field. Numbers larger than seven digits roll over into the Sale field. Technicians troubleshooting the dispenser can change parameter values from the keypad. The parameter changes are password protected.

Accessing these areas are done with the 1, 2, 4, and 5 keys. To open an area, press and hold the key for 3 seconds. The bar graph will grow from the left to the right for that time. Press the DISPLAY RESET key to exit and return to normal. The price set keys will be redefined for scrolling and editing functions depending on the area being viewed. The areas are:

Key 1: Audit Trail, parameter change log.

Key 2: Hose "A" flow-meter parameters and variables.

Key 4: Dispenser controller parameters and variables.

Key 5: Hose "B" flow-meter parameters and variables.

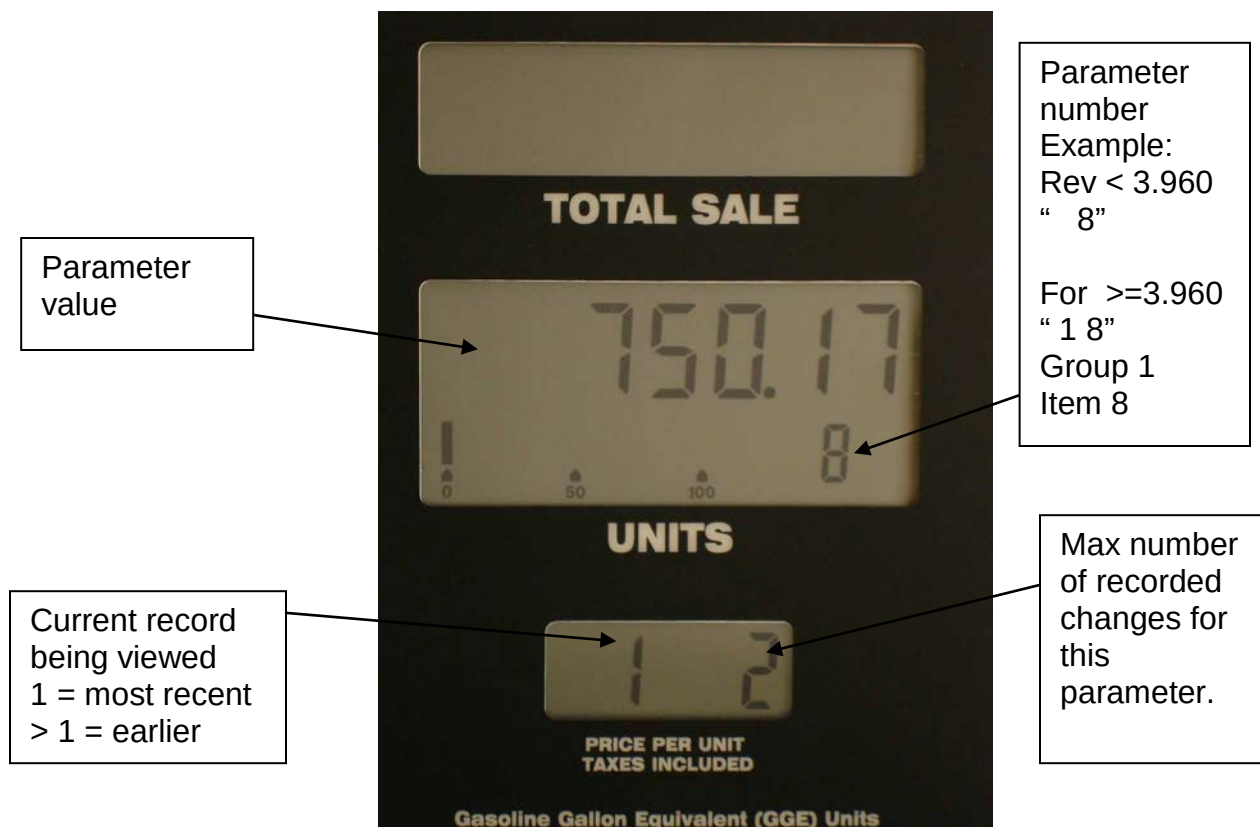
13.1. Audit Trail

The dispenser audit trail logs all and any parameter changes that have occurred through the dispenser's entire lifetime. The audit trail is stored in non-volatile memory that retains the information without the dispenser being powered. This permits the dispenser to be used for legal custody transfer of product without resorting to use of a physical seal on the dispenser control cabinet. It also allows the dispenser control to be accessed by remote communication devices where parameter changes are password protected. When a parameter is changed, the new value is stored in the trail along with the date, time, and change count. The date and time is read from the dispenser controllers on board clock. A maximum of 1024 changes can be recorded. When the audit area is full, any change writes over the oldest record. For dispenser controllers that are running on program revision 3.08 or higher, flow-meter parameter changes are also recorded if the changes are done through the controller with the PC-based monitoring tool.

In the audit trail view mode, the value is displayed in the units and sale fields. There are two types of values displayed: decimal numbers up to 10 digits with a decimal point or real numbers display in scientific notation. Real numbers will all start with a sign, one units digit followed by a decimal point, 6 decimals, an "E" for to indicate the exponent, an exponent sign, and the two digit exponent. Example 1.200000E -01 means the value is 0.12. The pressure field on the LCD will display the parameter number. The number can use to look up the parameter in a table. The price field will show two numbers: the right most number is the total number of changes recorded for that parameter, the left most number indicates which change is displayed starting with the most recent. For program revisions 3.960 and higher, the parameter number is split into a group and item field that matches how parameters and variables are stored in the dispenser controller

and displayed by the monitor software one can run on a computer. See Series II Technical Function Manual for the parameter and variable list.

The controller program sorts the audit trail for display. Pressing the PRICE SET HOSE

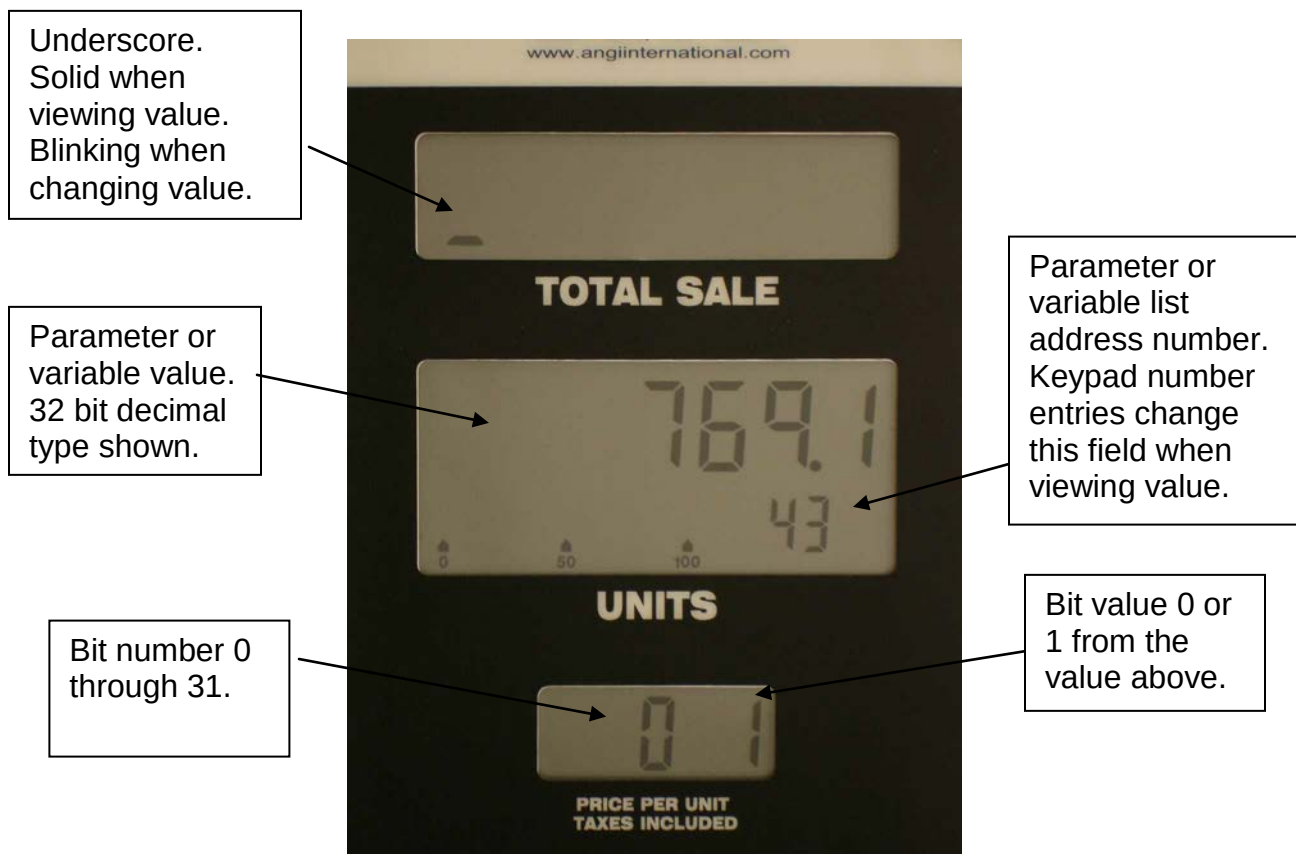


B TIER 2 key scrolls through the trail starting with the lowest number parameter. When at the end of the trail the scroll returns to the lowest parameter number. Parameters that have never been changed are not displayed. The PRICE SET HOSE A TIER 1 key scrolls back to earlier changes. The left most number in the price field will increment up. The scroll will stop when number reaches the maximum number of changes. The PRICE SET HOSE B TIER 1 key scrolls forward to later changes. The scroll will stop when left most number in the price field reaches one. Pressing the PRICE SET HOSE A TIER 2 key displays the time and date of the parameter change. The time is displayed in the sale field. The date is displayed in the units field. When a flow-meter change is displayed, the pressure field will display in left most digit the hose letter, "A" or "b", followed by the meter parameter number. The meter manufacturer defines the meter parameter number. For MicroMotion meters some parameters are displayed in a special format. Real numbers are displayed in scientific notation described previously. Non-real numbers are displayed up to 10 digits. The flow calibration number is displayed with underscores where the decimal points are shown on the nameplate. Example: the nameplate number flowcal = 111.434.50 will display as 111_434_50.

13.2. Dispenser Controller Variables and Parameters

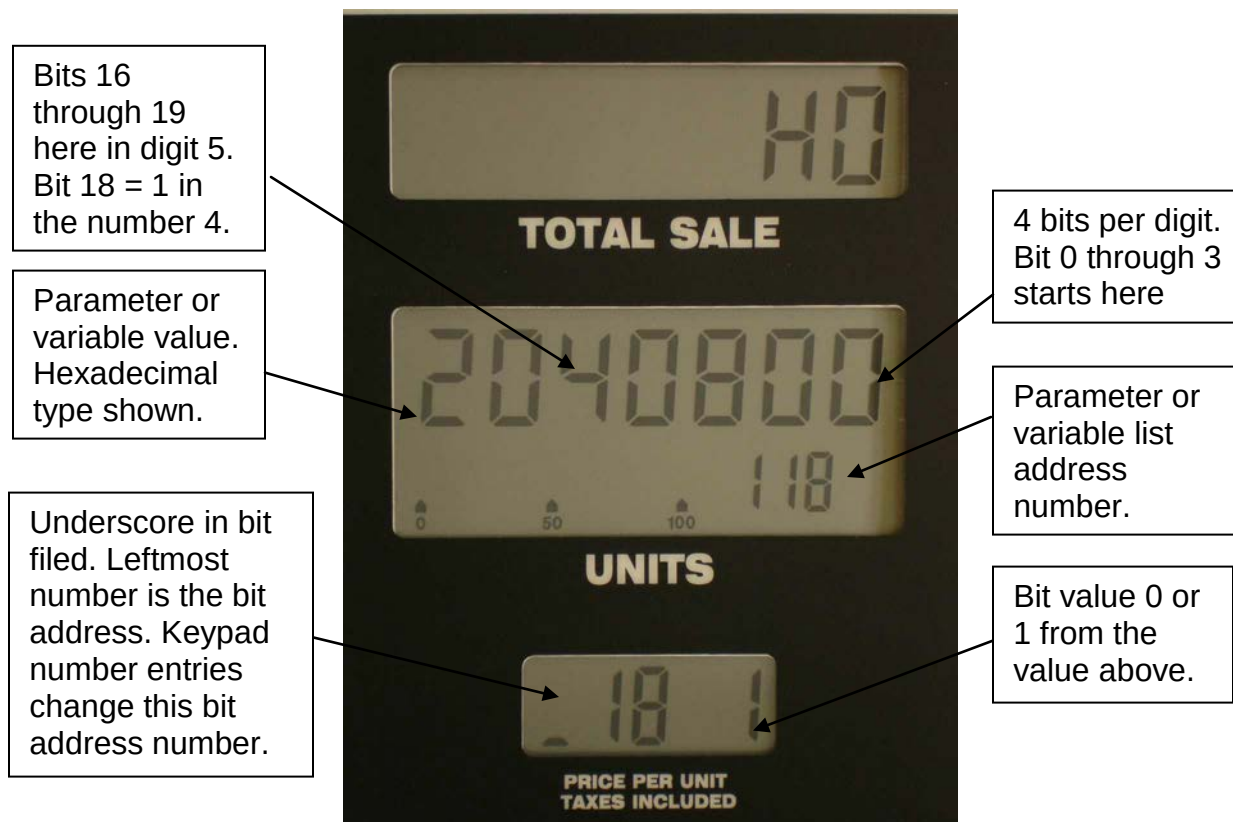
Key 4 opens the controller variable and parameter area. The values are displayed in the units and sale field. Each value in the dispenser controller is a 32 bit wide number. The number value can range from 0 to 4,294,967,295. The values can be displayed in decimal, hexadecimal, or scientific format depending on their definition in the controller's program. The hexadecimal format starts with an "H" followed by 8 digits. The digits are 0-9 and A, b, C, d, E, and F for 10-15 respectively. The variable and parameter address number is displayed in the pressure field. The price field displays the individual bit value. The left most number in the price field is the bit number 0 – 31. The right most number is the bit value of 0 or 1.

Scrolling through the parameters is done with the PRICE SET HOSE A TIER 1 and the PRICE SET HOSE B TIER 1 keys. Pressing the PRICE SET HOSE A TIER 1 key will increment the parameter number in the pressure field by one. Pressing the PRICE SET HOSE B TIER 1 key will decrement the parameter address number in the pressure field by one. A parameter address number can be entered directly with the number keys. Pressing a number key puts that number into the least significant digit, the rightmost digit, in the pressure field. The decimal point key acts as a backspace removing the rightmost digit. An underscore "_" will be displayed in the left most digit of the sale field. This indicates the focus is on the parameter value.



To scroll through the bit values of the parameter value, press the PRICE SET HOSE A TIER 2 key. This will switch the focus to the bit values in the price field. The underscore

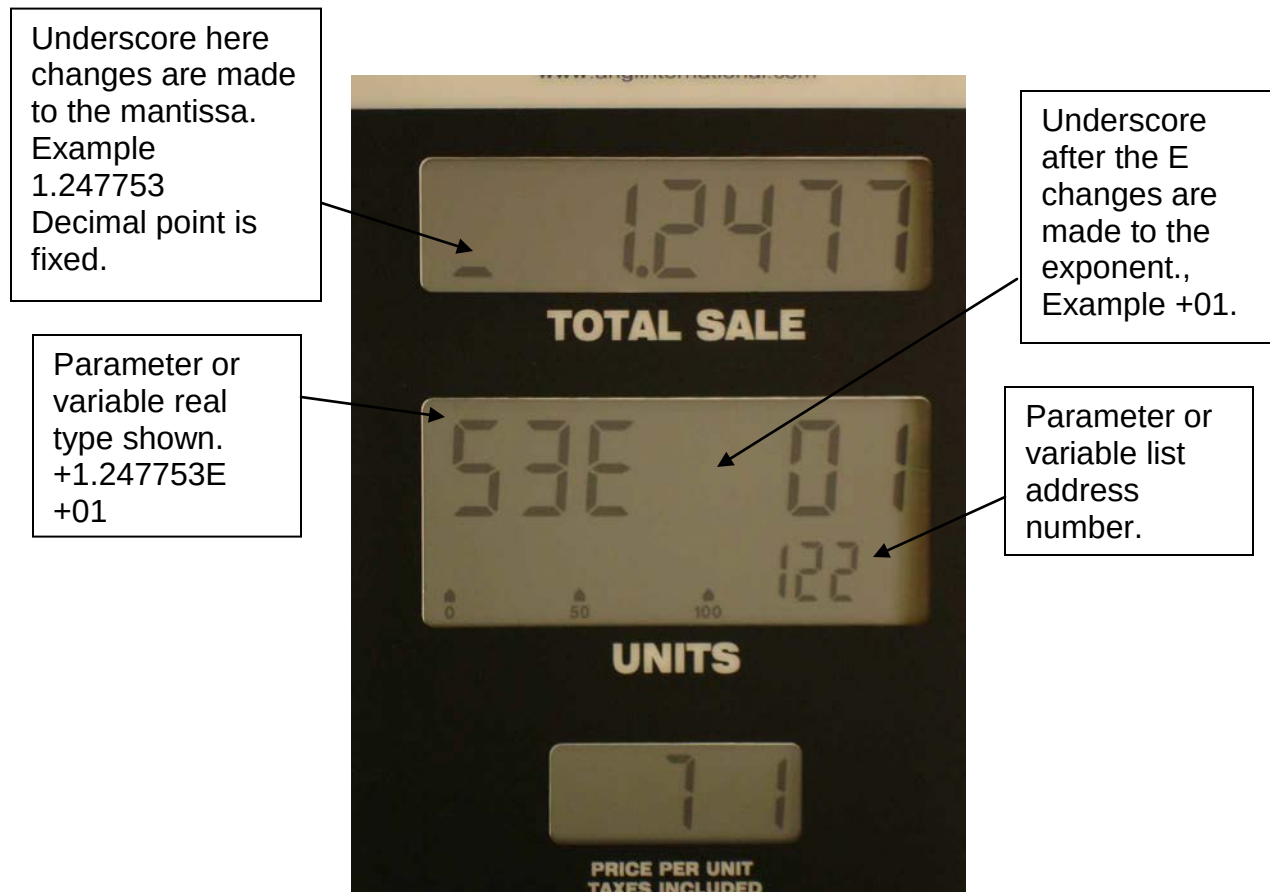
will be moved to the leftmost digit in the price field. The PRICE SET HOSE A TIER 1 and the PRICE SET HOSE B TIER 1 keys will change the bit address number from 0 through 31, the leftmost number in the price field. The number keys will enter a bit address number directly. Pressing the decimal point key will backspace the bit number. Pressing the PRICE SET HOSE A TIER 2 key again will return the focus to the parameter value. The underscore will return to the sale field.



Parameter values can be changed from the keypad. The write-protect status for a parameter is indicated by the bar graph. No bar indicates the value can not be changed. A bar graph 30%, 60%, or 100% indicates the number can be changed. The dispenser controller's parameters are all write protected on power-up. To change parameter values, the write-protect must be "unlocked" by entering a password number in a certain variable. The password number and variable is not given in this manual but must be obtained from ANGI International LLC for authorized personnel only. Once the write-protect is unlocked, it will stay unlocked as long as the parameters are being viewed. The write-protect will stay unlocked for one hour after exiting. To open a parameter for changing, make sure the underscore is in the sale field and press the PRICE SET HOSE B TIER 2 key. The underscore will blink once a second indicating the number can be edited. New values are written with the number keys. The SHIFT SALE T2 key backspaces out numbers. The decimal point in all values is fixed and is not changeable. New values are accepted and stored in the controller memory by pressing the PRICE ENTER key. These new values are always stored in the audit trail. To discard a change and escape, press the PRICE SET HOSE A TIER 1 key. Pressing the PRICE SET HOSE B TIER 1 and PRICE SET HOSE B TIER 2 key will do nothing in at this time.

Pressing the PRICE SET HOSE B TIER 2 will switch focus to the bit number. The underscore will move to the price field and will continue to blink. Pressing the PRICE SET HOSE B TIER 1 key can toggle individual bit values from zero to one. The parameter value will reflect the change in the bit value. The number keys will change the bit number and not the value of the bit. The new bit value is saved or aborted by the same keys described for the main value. After a new value is entered or escaped from, the underscore will stop blinking and the key functions will revert back to their value viewing actions.

When changing real number values, the PRICE SET HOSE A TIER 2 key will toggle the focus between the mantissa (the first 7-digit number) and the exponent. The underscore will shift from before the mantissa to after the “E” in the exponent. The PRICE SET HOSE B TIER 1 key will toggle the sign before the value. The number keys and the SHIFT SALE T2 key are used to change the values in the same way as described for decimal numbers described above. Bit values cannot be changed in real numbers.

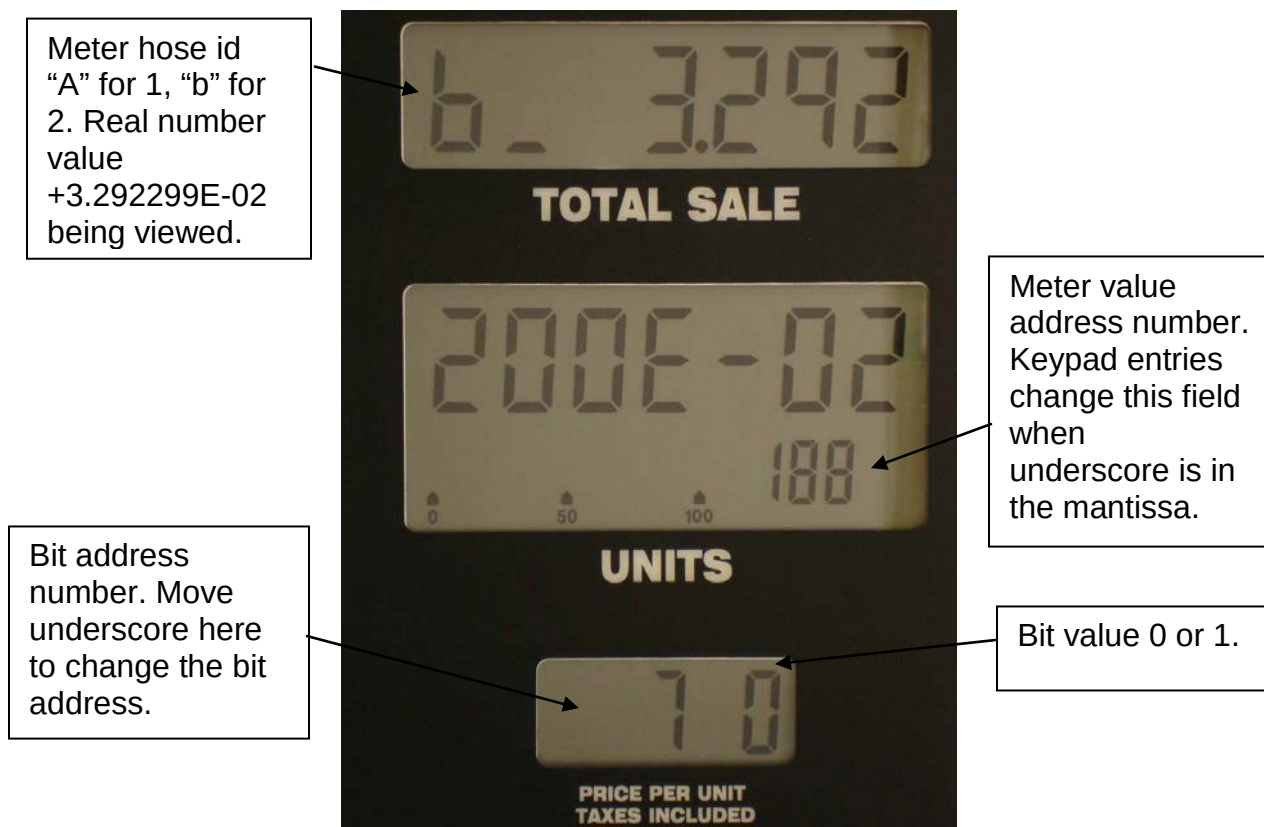


When changing hexadecimal numbers, the PRICE SET HOSE B TIER 1 key toggles between the 0 – 9 numbers and the A – F numbers. After entering into the change value mode by pressing the PRICE SET HOSE B TIER 2 key, the display will show a “0-9” before the hexadecimal value. The number keys will enter 0 through 9. Pressing the PRICE SET HOSE B TIER 1 key will change the display to “A-F” before the number. A value of 10 is added to the number keys so that the zero key equal 10 or A, the one key equals 11 or b, and so on to the five key equaling 15 or F. Keys six through nine do nothing. Bit values are changed in the same way as described above for decimal numbers. Press PRICE SET HOSE A TIER 2 to enter the bit change mode.

13.3. Meter Variables and Parameters.

The register values in the MicroMotion mass flow meters can be read through the display. Pressing and holding the two key for three seconds enters the hose A values and the five key for hose B values. The values in the meter cannot be changed from the keypad. The parameter address number is displayed in the pressure field. This address number is used to lookup what parameters or variable is displayed from a manual table. An "A" or a "b" is displayed in the leftmost digit of the sale field to indicate which meter is being read. An underscore will be displayed after this letter. The PRICE SET HOSE A TIER 1 and PRICE SET HOSE B TIER 1 keys scroll through the parameters one at a time. The number keys edit the parameter address number directly. The SHIFT SALE T2 key backspaces out the parameter address number. Unlike the dispenser controller, the values from the meter are 16 bits wide. The values range from 0 to 65536. To represent numbers larger than that or real numbers, two address numbers are used together. All real numbers in the meter start on odd address numbers. Even address numbers will display the same value as the address directly below it. The PRICE SET HOSE A TIER 2 key toggles between the main value and the bit value. The underscore will shift to the price field. The PRICE SET HOSE A TIER 1 and PRICE SET HOSE B TIER 1 keys scroll through the bit addresses one at a time. The number keys enter the bit addresses directly. The SHIFT SALE T2 key will backspace out the bit address number.

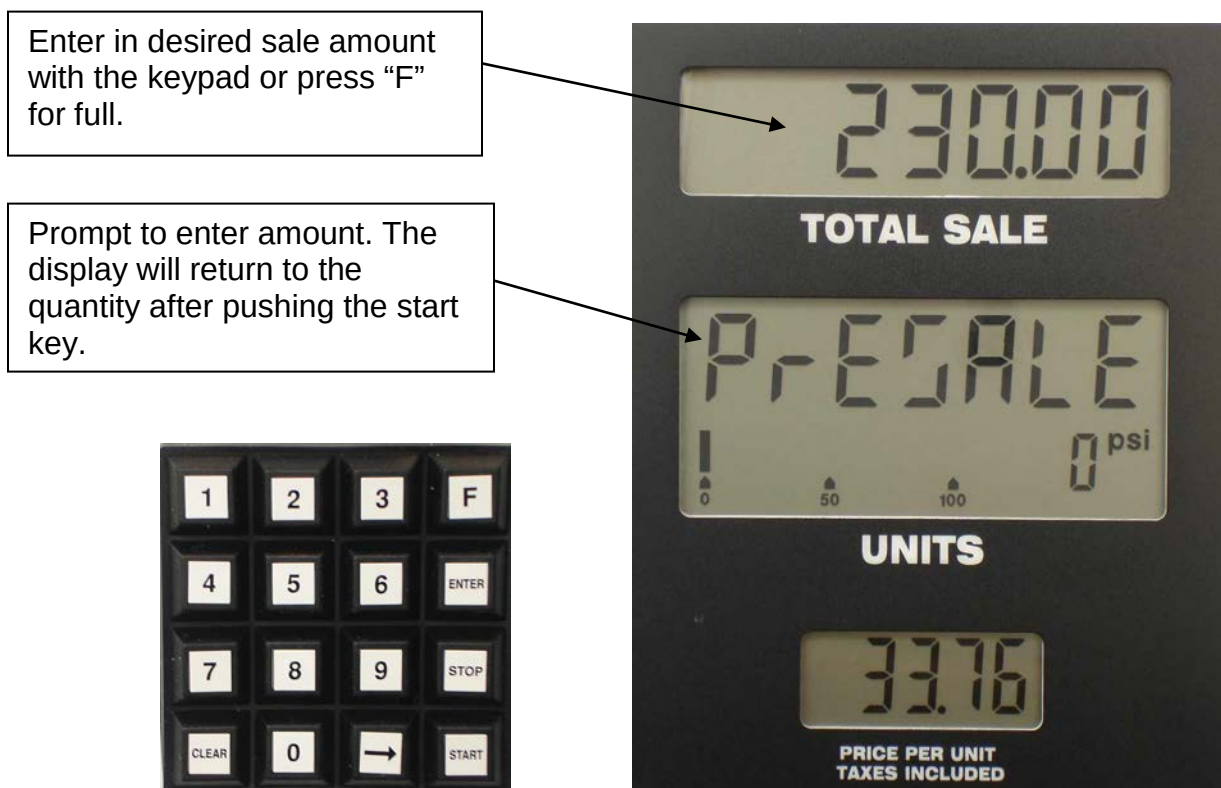
The meter display mode will only display meter values that are retrieved by the dispenser controller. Addresses that are not retrieved will come up zero on the LCD. The display will also be zero if the meter is not communicating with the dispenser.



14. Sale Preset Operation.

This option allows the user to enter in a final sale amount before filling for a partial fill. The dispenser will stop filling when the sale total gets close to the preset amount and “rolls up” to the exact amount. The fill is stopped at a mass amount calculated from the current flow taking into account the time it takes for the flow to settle. A parameter is adjusted to get the target as close as possible. Yet any extra mass that flowed beyond what makes the exact sale amount is ignored (the mass amount is clipped). This option is not supplied to sites where it violates a type approval requirement. A user accessible keypad is mounted next to each main hose display. An extra step is added to the fill sequence for the sale amount entry. After connecting the hose to the vehicle and pushing the start button, the user is prompted to enter a sale amount after the dispenser is started. The user then pushes the START key on the keypad to begin filling. The key descriptions are as follows:

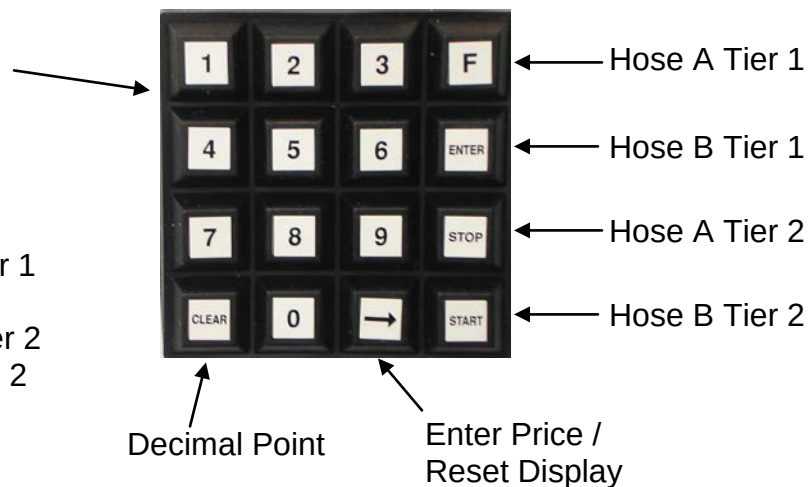
0-9:	Number entry keys.
CLEAR:	Clears the entry to zero.
->:	Backspace key. Removes the least significant digit from the entered amount.
F:	Selects a full fill instead of the preset. The dispenser fills to the temperature compensated pressure target. The display will read “FULL” in the sale field when active.
ENTER:	Escapes from the full selection. Goes back to entering a preset sale amount.
STOP:	Aborts the preset and fill sequence. Does not stop the dispenser once it is started.
START:	Begins the fill sequence after an amount is entered or full is selected. Will not start if the amount entered is zero.



The preset sale keypad is also used to enter the price-per-unit. The door keypad takes place of the internal keypad described in section 5. The button layout on the door keypad is identical to the internal keypad. Price changing is allowed only when not filling with the start button not pushed. An extra security option allows price changing only if the display door is unlocked and opened by an attendant. This keeps customers from entering their own price.

Number Keys:

- 1: Sale Tier 1
- 2: Volume Tier 1
- 3: Hose A
- 4: Sale Tier 2
- 5: Volume Tier 2
- 6: Hose B
- 7: Shift Sale Tier 1
- 8: Shift Volume Tier 1
- 9: Mass Total
- Clear: Shift Sale Tier 2
- 0: Shift Volume Tier 2



15. Revision History

Rev 1: Corrections to original the release. 5-19-2004.

Rev 2: Added section 11, Special Unit selection. 11-10-2004.

Rev 3: Changed the error code section to reflect the "F" and "E" types of errors. 4-28-2006.

Rev 4: Added section 13.1, 13.2, and 13.3 Keypad diagnostic functions. Display pictures added. 12-12-2006.

Rev 5: Added Sale Preset Operation section.

Rev 6: Added new fault/event description for E12, was undefined.

Rev 7: Added new fault/evens F29, F30, F31, and F32. (EXCO) 4-14-2009

Rev 8: Added descriptions of new event "words" "OvEr", "Undr", and "PloS". E1 not defined for revs 3.961. Added example of parameter number being displayed as group/item in the audit trail display for revs $\geq$ 3.960.