ESDI Model 110400
MultiPrice Water Vending Machine Controller
Two - Four Vending Stations - One Pay Station
Uses NAMA MultiDrop Bus (MDB) Protocol

Operation and Installation Manual

(Also see Programming & Service Manual)

WARNING ! ELECTRICAL SHOCK HAZARD !

AUTHORIZED PERSONNEL ONLY.

EXPOSED 120 VAC ON CIRCUIT BOARD.

THE CIRCUIT BOARD HAS MANY EXPOSED AREAS THAT ARE AT 120 VAC. CONTACTING ANY OF THESE AREAS CAN CAUSE BODILY HARM OR DEATH.

DISCONNECT POWER BEFORE SERVICING AND MAKING ANY CONNECTIONS

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See separate ESDI Model 110100 Programming and Service Manual

Radiated Frequency Protection:

It is recommended that the controller board be shielded from radiated frequencies using a metal cover. It is further recommended that service personnel or persons gaining access to the internals of the machine, observe proper ESD control measures to prevent damage to the machine. It may be necessary for the OEM to place a line filter in the machine if external or internal sources cause conducted noise levels.

ESDI Model 110400 Water Vending Machine Controller
Two - Four Station - MDB - MultiPrice
Installation & Operation Manual

Operating Instructions & Features

1.0. General Description:

The ESDI Model 110400 is a Four Station MultiPrice Water Vending Machine Controller that controls all of the functions necessary to operate an unsupervised four station bulk water vending machine. It is designed to vend three volumes of water from each of four vending stations; twelve volumes total. Each of the twelve volumes is easily set by the technician during a calibration procedure. **Vend volumes can be any quantity limited only by the maximum vend time of 7 minutes, or a maximum flow sensor count of 65,535.**

The Model 110400 interfaces to any payment device that is in compliance with NAMA's "International Multi-Drop Bus Interface Standard" (October 19, 1993), such as the COINCO 9302-GX coin changer, bill acceptors, prepaid cards, and credit cards.

The Model 110400 has an optional dual flow rate, controlled by two vend valves. This will allow for a shorter vend time and a sharper turn off with no overflow. Both valves are open at first for a faster flow rate. When the water gets closer to the fill line, one valve will close, thus slowing down the flow rate and stopping without overflowing.

Visual information showing money deposited is provided by a four digit 7-segment LED display, and two discrete LED's that indicate "Use Correct Change", and "Sold Out". This display is on a stainless steel plate, separate from the circuit board, and mounts to the front of the machine. Additionally, four single digit displays, one for each station, and 17 single LED's are located on the ESDI 110400 control board providing feedback to the technician on the operation and status of the machine.

The maximum number of products is twelve (12). Please see data sheet or web site for a variety of vending possibilities & options. The ESDI 110400-XXX is available in the following configurations:

XXX	Vend Stations		Volumes Each		Total Products	
2X3	Two	(2)	Three	(3)	Six	(6)
2X4	Two	(2)	Four	(4)	Eight	(8)
3X3	Three	(3)	Three	(3)	Nine	(9)
3X4	Three	(3)	Four	(4)	Twelve	(12)
4X3	Four	(4)	Three	(3)	Twelve	(12)

2.0. Controller Features:

2.1. Selectable Single and Dual Flow Rate Vending Option:

The controller has a dual flow rate option to vend water using one or two vending valves. When using two vending valves, both valves will open at the beginning of the water vending. When the container is filled close to the top, one of the valves will close leaving only one valve open. This will slow down the water vending as it reaches the fill mark. This will allow for a faster vend cycle, with less chance for overfill.

If the dual flow rate is selected, then during calibration, two valves will open (Pump and Vend Valve Outputs). When the vend switch is released both valves will stop. Thereafter, pressing the vend switch will activate the Pump output only. Upon vending, the two valves will open, and will change to only one valve at the same point the vend switch was first released, during the calibration cycle.

If the single flow rate is selected, the vend cycle will be as follows. The vend valve will open at the same time the vend pump will turn On. At the end of the vend cycle, the vend pump will turn Off at the same time the vend valve will close.

2.2. UV Flush Option (Hot Water Removal) Option:

An optional UV flush cycle is provided to periodically discard hot water that is left standing in the UV lamp assembly, and refresh the vending system in general. This water is discharged out the vend nozzle and into the drain. The flush cycle runs for a period of 3 seconds. When enabled, a flush cycle will occur as follows:

Upon each power-up and manual reset.
Periodically, every 30 minutes after the last vend.

The flush cycle will not run if there is credit pending, if the system is in the process of vending water, during a Lockout condition, a Low Water condition, or a UV Lamp failure. During the flush cycle, the controller will go "Sold Out" and will not accept any coins. The Status Display will indicate "F" during the flush cycle. The flush cycle runs for a period of 3 seconds. DIP switch 4 enables the Flush cycle option. When this switch is ON, the flush cycle will be enabled.

2.3. Selectable Flow Meter, or Internal Timer Controlled Vending Option:

This controller allows the option of using either an inline water flow sensor, or an on-board timer to accurately control the amount of water. The board can accommodate many types of flow sensors, however, the maximum pulse count for a single vend is 65,535 counts, and the maximum vend time is 7 minutes. By far the best method for achieving accurate vending is to use an inline water flow sensor. However, it is possible to get accurate vending using the internal timer, as long as the water flow remains constant throughout the entire vending cycle.

DIP switch 3 controls how the water is metered during the vending cycle. In the OFF position the water is metered through an in-line water flow sensor that sends out pulses related to water flow. The pulses are counted and calibrated and provide a precise and repeatable vending quantity. In the ON position, water vending is controlled by an on board timer and no flow sensor is required.

2.4. Selectable Vend Switch, or Vend Upon Selection Option:

The controller has the option to begin vending upon pressing the selection switch, or waiting for a separate "Vend" switch to be activated before vending. A separate "Vend" switch allows the customer time to make his payment and then walk over to the vend station and place his container before the vending begins. Without this "Vend" switch, the container will need to be in place first, prior to making a selection. DIP switch 2 & 8 determines if the vend switch will be used. In the OFF position, a vend switch is not used and vending will begin upon activating the Selection switch. If a vend switch is used, place the two switches to the ON position.

2.5. Maximum Vend Run Timer:

The controller has an internal maximum run timer for the water vending only. It is factory set to approx. 90 seconds beyond the normal vending time. If this time is exceeded, the controller will stop vending, go "Sold Out", and will not accept coins. The Status Display will indicate "E". A manual reset (power off, wait 5 seconds, then power on) will restart the controller. If the Maximum run time is exceeded, and the Low Water switch is active at that time, the controller will reset itself automatically after 60 minutes if the Low Water switch has become inactive.

2.6. No Lockout Option:

If the lockout inputs are not used, set the options DIP switch 7 to the ON position to disable these inputs. In the OFF position, the lockout input will be monitored. See section 6.4 for more information.

3.0. Water Vending Machine – The Basic Machine:

1. Customer deposits money.
2. Customer presses Selection Switch, selecting vend station, water volume and price.
3. Money balance is shown on display.
4. The “Credit Lamp” will illuminate at the appropriate vend station.
5. Customer presses the “Start Vend” switch at the vend station. (Without the vend switch, vending will begin upon making selection.)

6. The “Credit lamp” will turn off.
7. The Vend Valve & Pump will turn on and run until the proper amount of water has vended.
8. If there is still a money balance, an additional selection can be made, or the coin return button can return the balance in coins.

4.0. Payment Transaction:

4.1. Credit Accumulation:

Credit may be accumulated through a coin changer, bill acceptor or card reader mechanism. Card reader credit cannot be mixed with coin and bill credit during a single transaction or vend. Credit acceptance will be disabled when the accumulated credit equals or exceeds the highest priced item. Cash box coins and bills are enabled on an individual basis according to the inventory coins available. Cash box coins and bills will be enabled if the coinage currently held in the changer's inventory tubes is greater than the coin or bill to be accepted, plus the credit currently accumulated by the controller.

If all of the configured selections are sold out, credit acceptance will be disabled, “No Sale” will flash on the display. If the amount of card credit available exceeds the maximum displayable credit (dependent on the scale factor), the maximum credit will be displayed.

4.2. Display Activity:

4.2.1. Idle State:

The display will show “0000” when no switch or vend activity is present. **Program switch must be ON for coins to be manually ejected from changer tubes.**

4.2.2. Switch Echo:

When a selection switch is pressed the display will show the price of the selected item.

4.2.3. Vend Process:

After a switch entry is made the controller will determine if sufficient credit is available and the status of the selection. If the accumulated credit is greater than or equal to the selection price and the selection is available, a selection attempt will be made for that selection. If credit is less than the selection price, the price will be displayed for 3 seconds or until a new selection switch is pressed. If the selection is not available “No Sale” will flash for 2 seconds along with the "Make Alternative Selection" LED, or until a new selection is made.

4.2.4. Change Payment:

A least coin payout algorithm will be implemented. Program switch must be ON for coins to be manually ejected from changer tubes.

4.2.5. Use Correct Change LED:

If the level of the changer's least value coin tube is below the lowest sensor, the "Use Correct Change" LED will be illuminated continuously.

4.2.6. Power-Up and Reset Initialization:

Following a power-up, or reset condition, the display will test all of the LED segments by displaying patterns. This will continue until the peripherals and controller have been initialized.

4.3. Internal Vend and Cash Counters:

Following a successful vend, the vend counter will be incremented by one and the cash counter will be incremented by the price of the selection vended. Counter rollover occurs at 99,999,999 and $999,999.99 respectively. (Note: Test vends are not included in the counter totals.)

4.4. Free Vend:

The "free vend" option allows the customer to free vend items in the machine with no credit input. The message "FrEE" will be shown on the display and all credit acceptance will be disabled whenever the "free vend" option is enabled. Disabling the "free vend" option will return the controller to the normal sales mode. The controller will automatically go into the free vend mode during calibration.

Installation & Wiring

5.0 Electrical Specifications:

5.1. Coin / Bill Acceptor Interface:	NAMA (MDB) Multi-Drop Bus Protocol COINCO 9302-GX, or equal
5.2. Relay Outputs (All):	Any Voltage up to 230 VAC, 3 Amps Max.
5.3. Water Sensor Interface:	GEMS Turbine Flow Sensor, FT-110, Part No. 173935 (3800 Pulses per Gallon). Or similar type (See 5.1.1)
5.4. Vend Accuracy / Repeatability:	± 0.5 %.
5.5. Power Requirements:	
Board & MDB Peripheral:	24 VAC, 60/50 Hz, 2.0 Amp Nominal. (Note some MDB peripherals may require more current, up to 4 Amps max)
Vend Pump & Valves:	24-120 VAC 60/50 Hz, 3 Amps Max.
Operating Voltage Range:	22 VAC - 32 VAC, 50/60 Hz.
Power Transformer:	120VAC, 60/50 Hz Input, 24VAC Output Internally fused (Not replaceable)
5.6. Enclosure Size:	8" X 11" X 6".
5.7. Operating Temperature:	32° F to 150° F (0° to 65° C)
5.8. Storage Temperature:	-22° F to 167° F (-30° to 75° C)
5.9. Relative Humidity:	20% to 95% non-condensing

6.0. Input Connectors:

The terminal blocks on the board are pluggable and can be pulled from the board without having to remove the individual wires from the terminal block. It is recommended that all wiring be UL type 1015, 20 AWG, minimum. The power input and pump output should be 18 AWG minimum. The terminal blocks will accommodate up to a 16 AWG wire. The maximum current rating for the connector is 8 Amps.

6.1. TB1 Control Inputs:

All inputs must be isolated contact closures. DO NOT APPLY ANY EXTERNAL VOLTAGES TO INPUTS, OR BOARD MAY BE DAMAGED.

6.1.1. Flood Switch Input:

This input should be connected to a Flood Switch. The Flood switch is usually a float type switch that is placed at a low level in the cabinet, such that if there is a flood in the machine, the float switch will activate. Upon activation, the controller will shut down the vending machine and show "No Sale". An open circuit on this input indicates a flood condition. A contact closure on this input will indicate there

is no flood. If the flood switch should again becomes inactive, the vending machine will reset itself after a 1 minute delay. A manual reset, power off and on, will reset controller. If input not used, Jumper to Common.

6.1.2. Low Water (Low Pressure) Input:

Is there water to vend? This input is connected to a water level sensor located at the lowest level of the reservoir. We recommend that the level sensor be placed such that there is at least 5 gallons of water remaining. If a low water condition is detected when the controller is idle, the controller will go to "No Sale", and will not accept coins. If a low water condition is detected while vending, the controller will complete the vending and go "No Sale". The controller will automatically reset 5 minutes after the low water condition is no longer present. An open circuit on this input indicates a low water condition. A contact closure on this input will indicate the water level is good. If not used, Jumper input to Common.

6.1.3. UV Good Input (UV Shut Down):

The UV Good input monitors the relay output from a UV lamp. Choose a UV lamp assembly with an internal circuit that monitors the lamp and has an isolated relay output to indicate a failure. An open circuit will indicate a bad UV lamp and the controller will shut down. A contact closure on this input will allow the controller to operate normally. If this input is not used, place a jumper between UV Status Input and Common. A manual reset, power off and on, will reset controller.

TB1-1	Spare Input	TB1-4	Flood Input
TB1-2	Low Water Input	TB1-5	Signal Ground
TB1-3	UV Status Input		

6.2. TB2 Flow Sensor Inputs

Used for metered vend only, not used for a timed vend. This input is for an external inline water flow sensor. As water passes through the flow sensor it sends out pulses. The controller counts these pulses and compares it to the calibrated amount predetermined in memory. The controller can accommodate many different types of water meters, however, the maximum count per a single vend is 65,535 counts. One that works very well is the GEMS Turbine Flow Sensor, FT-110 Series, P/N 173935 (3800 Pulses per Gallon max). Power in the form of +5VDC is provided to power the flow sensors. For each input, connect the Flow Sensor output to the appropriate input (V1 - V4), the Flow Sensor Power to "+5V OUT", and the Common to "GROUND".

TB2-1	Flow sensor input for Vend Station 4
TB2-2	Flow sensor input for Vend Station 3
TB2-3	Flow sensor input for Vend Station 2
TB2-4	Flow sensor input for Vend Station 1
TB2-5	Signal Ground Connect to each Flow Sensor
TB2-6	+5VDC Output Connect to each Flow Sensor

6.3. TB3 Vend Switch Inputs:

An Optional Vend Switch can be used to hold off the water vending, allowing the customer time to walk over to the vend station and place their bottle under the nozzle. This switch becomes enabled after money is placed in the machine, and the selection has been made. This input should be normally open. A contact closure will start the vending.

If the vend switch is not used, the vending will begin immediately upon making the selection. If the vend switch is not used, then turn OFF Option switches 2 and 8. Without the vend switch, during calibration the selection switch will act as the vend switch and vending will begin upon making a selection.

All inputs are low voltage (+5VDC). Signals are either open, or closed. DO NOT APPLY ANY VOLTAGES TO THESE INPUTS, OR CIRCUIT BOARD MAY BE DAMAGED.

TB3-1	Vend switch input for Vend Station 4
TB3-2	Vend switch input for Vend Station 3

TB3-3	Vend switch input for Vend Station 2
TB3-4	Vend switch input for Vend Station 1
TB3-5	Signal Ground Connect to each Vend Switch

6.4. TB4 LockOut Inputs:

The Lockout Input allows an external device to disable the controller. Any external device such as a UV lamp monitor, or any other device supervising the controller operation. A contact closure on this input will allow the controller to operate normally and an open will disable the controller. If this input is not used, set the OPTIONS switch 7 to the On position and it will follow the common UV Lamp input. If a lockout condition occurs, it will stop any vending immediately and go to lockout. The controller will NOT automatically reset and requires a manual reset from a technician. When a vend station is in lockout, that vend station will go "Sold Out" and will not allow any vending. The Status Display will indicate "U" when in lockout.

All inputs are low voltage (+5VDC). Signals are either open, or closed. DO NOT APPLY ANY VOLTAGES TO THESE INPUTS, OR CIRCUIT BOARD MAY BE DAMAGED.

TB4-1	Lockout Input for Vend Station 4
TB4-2	Lockout Input for Vend Station 3
TB4-3	Lockout Input for Vend Station 2
TB4-4	Lockout Input for Vend Station 1
TB4-5	Signal Ground Connect to each lockout switch.

6.5. P15 Circuit Board Power Input 24 VAC:

This input should be connected to a 24 VAC transformer. Operating voltage range is 22 VAC - 32 VAC, 2.0A Minimum, 50/60 Hz. The transformer should be mounted outside the enclosure to prevent excess heat inside the enclosure.

This circuit board operates from an external 24 VAC power source, and requires less than 1 Amp. The current requirement of the power source, however, depends largely on the MDB peripherals that are used and powered by this board. Therefore, to size the transformer, one must total up the current requirement for all 24VAC devices driven by this board. In most cases, a 24VAC transformer with a 40VA rating should work. P15 is located on the back of the board.

P15-1	Power Input (24VAC)
P15-2	Power Input (24VAC_Ret)

6.6. TB 10 Selector Switch Inputs:

The product selector switch inputs are located on the back of the control board, connector TB10. The selector switch inputs select the water product and volume for vending. A contact closure to “SW COM V1,2,3,4", to any of these inputs will select that product. Note: "COM V1" is the common for vend station 1 selection switches. "COM V2" connects to vend station 2, and so on. These "SWCOM V" signals are only active when that vend station is available. Otherwise when the station is busy, the SWCOM will be Off and will not make the selection. It is important not to mix these signals with any selection switches of other vend stations, or problems will occur.

The ESDI 110400 is available in either of the following configurations:

ESDI 110400-2X4: Two vend stations, Four (4) volumes each:

Selection Sw:	Conn-Pin	Description:	
Item 1	TB10-1	Station 1	Vend Volume 1
Item 2	TB10-2	Station 1	Vend Volume 2
Item 3	TB10-3	Station 1	Vend Volume 3
SWCOMV1	TB10-4	Station 1	Station 1 Switch Common
Item 4	TB10-5	Station 1	Vend Volume 4
Item 5	TB10-6	Station 2	Vend Volume 5
Item 6	TB10-7	Station 2	Vend Volume 6

SWCOMV2	TB10-8	Station 2	Station 2 Switch Common
Item 7	TB10-9	Station 2	Vend Volume 7
Item 8	TB10-10	Station 2	Vend Volume 8

ESDI 110400-4X3: Four vend stations, Three (3) volumes each:

Selection Sw:	Conn-Pin	Description:	
Item 1	TB10-1	Station 1	Vend Volume 1
Item 2	TB10-2	Station 1	Vend Volume 2
Item 3	TB10-3	Station 1	Vend Volume 3
SWCOMV1	TB10-4	Station 1	Station 1 Switch Common
Item 4	TB10-5	Station 2	Vend Volume 1
Item 5	TB10-6	Station 2	Vend Volume 2
Item 6	TB10-7	Station 2	Vend Volume 3
SWCOMV2	TB10-8	Station 2	Station 2 Switch Common
Item 7	TB10-9	Station 3	Vend Volume 1
Item 8	TB10-10	Station 3	Vend Volume 2
Item 9	TB10-11	Station 3	Vend Volume 3
SWCOMV3	TB10-12	Station 3	Station 3 Switch Common
Item 10	TB10-13	Station 4	Vend Volume 1
Item 11	TB10-14	Station 4	Vend Volume 2
Item 12	TB10-15	Station 4	Vend Volume 3
SWCOMV4	TB10-16	Station 4	Station 4 Switch Common

*Do not connect any of these switches to the “Common” terminal. Each switch must be an isolated momentary pushbutton type, suitable for low current operation.

7.0. Output Connectors:

All outputs are grouped by function. All outputs are controlled by normally open relays. Each group of relay outputs has one common input marked "IN", and outputs for each vend station (V1,V2,V3,V4). Connect the power source HOT to the relay output "IN" terminal. This is the power that will be switched to each of the vend outputs (V1,V2,V3,V4). Connect the power source NEUTRAL directly to each item. A "Power Neutral Distribution Bus" at TB9 is provided if all outputs use the same power neutral. Do not mix output voltages on this Bus. The relays are rated for 230VAC, 3 amps maximum.

7.1. TB-5 Sold Out Relay Output:

TB5-1	Sold Out Relay Contact NO
TB5-2	Sold Out Relay Contact COM

7.2. TB6 Credit Lamp Relay Output:

This output will turn ON at the selected vend station after the board has received money and a selection has been made. This lamp output indicates that credit has been accepted and vending will proceed upon activation of the Vend Switch. This output will remain ON until a vend cycle begins then it will turn OFF. This output can be used to illuminate the Vend switch, or a lamp over the vend station.

TB6-1	Credit lamp output for Vend Station 4
TB6-2	Credit lamp output for Vend Station 3
TB6-3	Credit lamp output for Vend Station 2
TB6-4	Credit lamp output for Vend Station 1
TB6-5	Relay Common Power Input

7.3. TB7 Vend Valve (2) Relay Output:

This output is used to control a Vend Valve. The function of this valve is selected by the OPTIONS "Valve 1-2" switch 1. In the OFF position, only one valve and/or pump will be used to vend the water,

and this valve will work as follows: This valve will open at the same time the pump output turns ON, and will turn off the same time the pump output turns OFF.

If the OPTIONS "Valve 1-2" switch 1 is in the ON position, two vend valves, or pumps, will be used for a two valve vending operation. This output will connect to either a vend pump, or a vend valve, or both. The output will turn ON at the beginning of vending. It will turn OFF, when the vending time for this valve is completed.

TB7-1	Vend valve output for Vend Station 4
TB7-2	Vend valve output for Vend Station 3
TB7-3	Vend valve output for Vend Station 2
TB7-4	Vend valve output for Vend Station 1
TB7-5	Relay Common Power Input

7.4. TB8 Pump (Valve 1) Relay Output:

This output will connect to either a vend pump, or a vend valve, or both. The output will turn ON, allowing power to pass, at the beginning of vending, or flush cycle. It will turn OFF, terminating power, when the vending, or flush cycle is completed.

TB8-1	Pump output for Vend Station 4
TB8-2	Pump output for Vend Station 3
TB8-3	Pump output for Vend Station 2
TB8-4	Pump output for Vend Station 1
TB8-5	Relay Common Power Input

7.5. TB9 Power Neutral Distribution Bus:

Connect the power source NEUTRAL directly to each output item. Do not mix voltages on this Bus.

TB8-1	Vend Station 4
TB8-2	Vend Station 3
TB8-3	Vend Station 2
TB8-4	Vend Station 1
TB8-5	Power Source Neutral Input

7.6. P1 Display Output:

The display board mounts on the front of the vending machine to communicate vending information to the customer. It is also used in programming the MDB controller. The display board connects directly to the display output connector P1 located on the back of the board.

7.7. P3 Multi-Drop Bus - Coin/Bill Acceptor Interface:

This 7-pin connector (.1" centers) interfaces to the MDB compatible peripherals. The protocol is in compliance with NAMA's "International Multi-Drop Bus Interface Standard". This connects directly to connector P3 located on the back of the board.

Setup & Programming

8.0. Switches & Indicators:

8.1. Clear Errors Pushbutton Switch:

This switch will temporarily place the vend board in the Sales Programming mode. This will reset any Sold Out errors. Press and hold button for at least 3 seconds then release.

8.2. Free Vend Switch:

This switch will place the controller into the Free Vend mode where all items are free. In the Free Vend mode the controller will vend any item selected without requiring deposit of any money. The

Free Vend is automatically set during the calibration mode when calibrating the vending volumes for each item.

8.3. Program Switch:

This switch places the vend board in the Sales Programming mode. The Program switch must be ON for coins to be manually ejected from changer tubes. This switch will also reset any sold out items, turn ON for 3 seconds. The program switch places the controller into the programming mode for price setting, access to all sales information, or to eject coins manually from the changer. Set Program Mode Switch ON (up) to start the programming mode.

Selector switch 1 is used to move up the program menu

Selector switch 2 is used to move down the program menu.

Selector switch 3 is used to enter the selection when pressed for less than 2 seconds. Pressed for 2 seconds or longer can take the controller out of the programming mode. The controller will not return to the program mode until the Program switch is first returned to the OFF position. This is because the off position is how the program mode is reset.

Menu System: When programming you must first use the first 3 selector switches listed above to maneuver through menus and sub-menus before you will be allowed to accomplish your task. Each menu consists of various items or modes. There are currently two different main menus available. See further for more details on programming.

8.4. Calibrate Switch:

This switch will place the controller into the Calibration mode. In the Calibration mode the operator can set all of the vend quantities and store them in memory. See calibration procedure that follows.

Vend Volume Calibration Procedure:

The calibration procedure allows the board to be programmed to dispense any twelve volumes of water, and not just limited to 1, 3 and 5 Gallons. When using a water flow sensor, the maximum count for a single vend is 65,535 counts. This allows a wide variety of flow sensors to be used. When using the Internal Vend Timer, the maximum vending time is limited to approx. 7 minutes maximum with a .2 second resolution. If vend time is exceeded the Status Display will show “E”.

In the calibration mode, the vend switch is used to start and stop the water dispensing. If the vend switch is not used, then the selector switch will act as the vend switch. The vend switch can be pressed and released multiple times to add water while adjusting the vend volume. If the vend switch remains idle for longer than 8 seconds, the calibration for that item will terminate, and the data will be stored in memory. At this time the Status display will show C and the next item can be selected for calibration.

How Two Valve Operation Works: During calibration the 2 valves to 1 valve scheme will work the same as described above. The first Selector switch release will end the 2 valves, and subsequent dispensing will be done with one valve. This will allow the calibration to be more easily accomplished from the front of the machine using only the selection switches. During the calibration process, the Money display will say "No Sale". If the selection switch is idle for 8 seconds or more, the calibration of that item will end and the Money display will no longer say "No Sale". The next item can then be selected and calibrated.

The Calibration procedure is performed as follows:

1. Move “Calibrate Switch” to the ON position.

2. Display will show “C” indicating the calibration mode.

3. Set “Free Switch” ON and activate the selection switch to select vend quantity 1. Indicator will show “1”.

4. Place a calibrated measuring container in the vend chamber.

5. Activate and hold the “Vend” switch on until the desired amount of water has vended. Release the Vend switch and the vending will stop. The display will show “C” indicating completion. The calibration information will be stored in non-volatile memory. Repeat, or go on to next switch.

6. Activate the selection switch to select vend quantity 2. Indicator will show “2”. Repeat steps 4 & 5.

7. Activate the selection switch to select vend quantity 3. Indicator will show “3”. Repeat steps 4 & 5

8. Activate the selection switch to select vend quantity 4. Indicator will show “4”. Repeat steps 4 & 5.

9. When calibration is completed move “Calibrate Switch” to the OFF position. The controller will reset and start up in the vend mode.

10. Test all vend quantities for accuracy. The calibration is stored in a non-volatile memory that will not change until the calibration procedure is again performed.

8.5. Options Switches / Mode Selections:

DIP SW 1	Number of vend valves	Off = 1 valve	On = 2 valves
DIP SW 2	Vend Switch Present?	Off = No	On = Yes
DIP SW 3	Flow meter, or timed vend	Off = Metered vend	On = Timed vend
DIP SW 4	UV flush	Off = No UV flush	On = UV flush On
DIP SW 5	Option A	(Not assigned)	
DIP SW 6	Option B	(Not assigned)	
DIP SW 7	No lockout	Off = Lockout Enabled	On = No Lockout
DIP SW 8	Vend switch Present?	Off = No	On = Yes

8.6. Common LED Indicators:

Power:	This LED will illuminate when power is applied to the circuit board.
Program:	This LED will illuminate when programming mode is active.
Low Water:	This LED will illuminate when Low Water level is reached.
UV Bad:	This LED will illuminate when the UV lamp is bad.
Flood:	This LED will illuminate when the Flood switch is active.

8.7. Vend Station LED Indicators:

There are four sets of these indicators, one for each vend station. These report the status of each individual vend station.

Credit:	This LED will illuminate when the credit lamp output is active.
Valve:	This LED will illuminate when the vend valve output is active.
Pump:	The LED will illuminate when the pump output is active.

8.8. Vend Station Status Display:

There is one Status display for each vend station. The Status display is a single digit 7 segment LED that displays the vend station status and any error messages, as follows:

Display " 0 "	=	Waiting for customer.
Display " 1 "	=	Item 1 Selected.
Display " 2 "	=	Item 2 Selected.
Display " 3 "	=	Item 3 Selected.
Display " 4 "	=	Item 4 Selected.
Display " 8 "	=	Tests all segments at start up & reset.
Display " E "	=	Excessive vend time.
Display " F "	=	Flush cycle in progress.
Display " L "	=	Low Water.
Display " U "	=	System is in Lockout. (UV Bad)
Display " C "	=	Calibration mode