Manual

Water Vend Controller & Slave Unit Model ESDI 050300

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.

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Water Vend Controller & Slave Unit
ESDI Model 050300

1.0. General Description:

The ESDI Model 050300 Water Vend Controller and Slave Unit is an electronic assembly that controls all of the functions necessary to operate a bulk water vending system without any payment device. It is designed to vend three volumes of water. The volumes are factory set to 1, 3, and 5 gallons in a single vend. Consult factory for special settings.

The ESDI Model 050300 controller can be used alone, or as a slave unit with the Model 050200 MultiVend Controller. The use of these boards can expand the Model 050200 to control up to four vend stations, or one vend station selling four different types of water, such as drinking water, de-ionized water, fluoridated water, and sports water. The board can operate without a payment device, or one payment device for all four stations. Please see additional information for a variety of vending possibilities.

2.0. Features:

2.1. Maximum Run Timer:

The controller has an internal maximum run timer that monitors the vend time for each gallon. The maximum run time is approx. 90 seconds per gallon. If this time is exceeded, the controller will stop vending, go "Sold Out", and will no longer vend until reset manually. (See Note 1) The Status Display will indicate "E". A manual reset is required to restart the controller.

2.2. Metered or Time Controlled Vend:

This controller allows you the option of using either an in line water flow sensor, or an internal timer to accurately control the amount of water during vending. The board can accommodate flow sensors with high, or low pulse counts per gallon.

The best method for achieving a repeatable, accurate vend is with an in line water flow sensor, however, It is possible to get an accurate vend using the internal timer, if the water flow remains constant.

2.3. UV Flush Option:

An optional flush cycle is provided to periodically refresh the vending system by discarding hot water that is left standing in the UV lamp assembly. This water is discharged out the vend nozzle and down the drain. When enabled, the flush cycle will run for 3 seconds, as follows:

Upon each power-up and manual reset.
Upon returning from a Low Water condition.
Upon returning from a Lockout condition.
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, during a Lockout, a Low Water condition, or a UV Lamp failure. During the flush cycle, the controller will go "Sold Out" until completed. The Status Display will indicate "F" during the flush cycle.

4.0. Inputs and Outputs:

4.1. Flow Meter Input:

This input connects to an external in line water flow meter. As water passes through the flow sensor it sends out pulses. The controller counts these pulses and compares it to the number of pulses set by the calibration switches. (The calibration switches must be preset to exactly one gallon of water.) The controller can accommodate two types of water meters, a high count, high flow rate water meter such as the GEMS Turbine Flow Sensor, FT-110 Series, or a low count, low flow water meter, such as the AMCO C700, with 200 pulses per gallon. Power, +5VDC, is provided for the flow meter.

4.2. Low Water (Low Pressure) Input:

This input is connected to a water level sensor located at the lowest level of the reservoir. There must be at least 5 gallons of water left in order to complete any vend in progress. If a low water condition is detected when the controller is idle, the controller will go to "Sold Out". The System Status display will indicate "L". If a low water condition is detected while vending, the controller will complete the vend and then go "Sold Out". The controller will automatically reset when the low water condition is no longer present. An open circuit on this input indicates a low water condition.

4.3. Lockout Input (UV Shut Down):

The lockout input allows an external device to disable the controller, such as an external water purity monitor, a flood switch, UV lamp, 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, place a jumper between Lockout and Common. When the controller is in lockout, the System Status display will indicate "U".

The Option-1 switch controls how this input will operate.

In the OFF position: If a lockout condition occurs while the controller is vending, it will first complete the vend and then go to lockout. If a lockout condition occurs when the controller is idle, it will lockout immediately. The controller will automatically reset and be ready to vend when the lockout is no longer present.

In the ON Position: If a lockout condition occurs, it will stop any vend immediately and go to lockout. The controller will NOT automatically reset and will require a manual reset. This is normally the setting when a UV Lamp, or Flood Switch controls lockout.

For UV lamp monitoring, choose a UV lamp assembly that has an internal circuit for monitoring the lamp, with an isolated relay output to indicate a failure. This relay output should be connected to the Lockout Input. In the case of multiple lockout devices, connect the contacts of all devices in series to this input. In this way any single device failure will stop the system. Be certain all contacts are isolated.

A low current +5VDC output is provided. If you are not certain how to use this, consult the factory to prevent damage to the board.

4.5. Start Vend Input:

This input connects to the "Start Vend" Switch. This switch needs to be a momentary pushbutton type suitable for low current operation. Connect switch between Start Vend and Common.

4.6. Power Input:

This input should be connected to a 24 VAC transformer. Operating voltage range is 22 VAC - 32 VAC, 50/60 Hz, 1.0A nominal.

4.7. Pump Power Output:

This is an isolated relay output. This output will connect to either a vend pump or a vend valve, or both. It will turn on at the beginning of a vend and turn off when the vend is completed. A separate and isolated power input is provided for the pump. This circuit is rated for 120VAC, 3 amps maximum.

5.0. Switches & Indicators:

5.1. Reset Switch:

This miniature pushbutton switch is used to reset the controller, similar to a power-up condition. When pressed, vending will stop, all errors will be reset and all pending vends will be erased.

5.2. One Gallon Calibration DIP Switch:

An 8 bit DIP switch is provided to accurately calibrate a one gallon vend. Multiple gallons will use this same calibration. This calibration is used for setting both the metered and timed vend, whichever is selected. The switch represents an 8 bit binary number. Switch number 1 is the most significant bit and switch number 8 is the least significant bit. Each switch doubles the amount of water of the next higher numbered switch.

1-Gallon Calibration DIP Switch

Switch No.	Binary Weight
Switch Bit 8:	1
Switch Bit 7:	2
Switch Bit 6:	4
Switch Bit 5:	8
Switch Bit 4:	16
Switch Bit 3:	32
Switch Bit 2:	64
Switch Bit 1:	128

A suggested method for calibrating a one gallon vend:

5.2.1. Start with all switches off. Beginning with switch number 1 and working up from there, vend one gallon of water into a calibrated container.

5.2.2. Find the first single switch that will vend the most amount of water, and still be less than one gallon without overflowing. Leave that switch on.

5.2.3. Now continue with the next switch in sequence. Find all switches that can be turned on without overflowing the container.

5.2.4. Continue until you find the combination of switches that will vend exactly one gallon. In the future, begin with this setting, and modify it as required.

5.3. System Status Display:

This is a single digit 7 segment LED that displays system status and any error messages, as follows:

Display " 0 "	=	Power is ON, Waiting for customer.
Display " 1 "	=	Vend 1 gallon.
Display " 3 "	=	Vend 3 gallons.
Display " 5 "	=	Vend 5 gallons.
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.

5.4. Credit Lamp Output:

The Credit Lamp will turn ON when a selection has been made. It will remain ON until the vending is completed. Connect any LED, or bulb rated for 5VDC operation. Maximum current is 200ma. Note polarity.

6.0. Connectors:

All four 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. For convenience, the pluggable terminal blocks can be oriented either parallel or perpendicular to the circuit board headers. 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.

6.1. TB1 Inputs:

All inputs are low voltage (+5VDC). Signals are either open, or closed. We recommend twisted pair shielded wire be used for the Flow Meter wires, with GND connected to the shield.

DO NOT APPLY ANY VOLTAGES TO THESE INPUTS, OR CIRCUIT BOARD MAY BE DAMAGED.

TB1-1	Flow Meter Input (+5VDC)
TB1-2	Flow Meter Input (Signal)
TB1-3	Flow Meter Input (Common)
TB1-4	Low Water Input (Signal)
TB1-5	Low Water Input (Common)
TB1-6	Lockout Input (+5VDC)
TB1-7	Lockout Input (Signal)
TB1-8	Lockout Input (Common)
TB1-9	Start Vend Input (Signal)
TB1-10	Start Vend Input (Common)
TB1-11	Credit Lamp +
TB1-12	Credit Lamp –

6.2. TB2 Pump Power Input and Output:

All output and power inputs may be at high voltage (120VAC). Disconnect power before handling this connector. Contacting any of these areas can cause bodily harm or death.

TB2-1	Pump (or Valve) Power Output (Hot)
TB2-2	Pump (or Valve) Power Output (Neutral)
TB2-3	Pump (or Valve) Power Input (24-120VAC Neutral)
TB2-4	Pump (or Valve) Power Input (24-120VAC Hot)

6.3. TB3 Circuit Board Power Input 24 VAC:

This circuit board operates from an external 24 VAC power source, and requires less than 1 Amp. 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.

TB3-1	Power Input (24VAC)
TB3-2	Power Input (24VAC)
TB3-3	Power Input (Chassis Ground)

6.4. TB4 Selector Switch Inputs:

Normally open, SPST momentary switches control these inputs. Individual switches, or a membrane overlay switch panel may be used. Signals are either open, or closed. DO NOT APPLY ANY VOLTAGES TO THESE INPUTS, OR CIRCUIT BOARD MAY BE DAMAGED.

TB4-1	SW1	Main board	Vend 1 Gallon
TB4-2	SW2	Main board	Vend 3 Gallon
TB4-3	SW3	Main board	Vend 5 Gallon
TB4-4	COMMON	Switch Common	

6.5. J1 Comm. Port Interface (Optional Feature):

This is an optional feature that is not currently available.

6.6. J2 System Status Connector:

If required, this is used to connect to a remote LED display. When the remote display is used, it is recommended that the display be removed from J5. If both are used, there may be interference with the brightness of the display segments.

6.7. J3 Test Connector (Do not use):

This is for factory use only.

6.8. J4 Connection to Master Controller:

When used as a slave unit, connector J4 can facilitate connection to the 050200 master controller. This uses a special modular connector cable.

6.9. J5 System Status LED Connector:

For onboard LED display.

6.10. J6 Master/Slave Selection Jumper:

Jumper pins 1 and 2 to set the board as a slave unit to a master control board.
Jumper pins 2 and 3 to set the board as a stand-alone vend controller.

7.0. Options (DIP Switch Selectable):

7.1. OP-1:

The Option-1 switch controls the operation of the Lockout Input. See section 2.3 for further details.

7.2. MTR / TIMER Option:

This switch selects the method used to control the quantity of water vended. In the OFF position the water is metered through an in-line water flow sensor that sends pulses related to water flow. The pulses are counted and calibrated using S3 for a precise one gallon vend.

In the ON position, water vending is controlled by an on board timer and no flow sensor is required. In order for the time vend to be accurate, however, the water flow must be constant. The timer is calibrated using DIP switches S3 for a precise one gallon vend.

7.3. WM HI / LO Option:

This option allows the user to select between two different types of water flow sensors, high count or low count. When the switch is OFF the controller will interface with a high pulse count, high flow rate water sensor such as the GEMS Turbine Flow Sensor, FT-110 Series. When the switch is ON the controller will interface with a low pulse count, low flow water meter, such as the AMCO C700 Flow meter with a 200 ppg output.

7.4. UV Flush Option:

An optional flush cycle is provided to periodically refresh the vending system by discarding hot water that is left standing in the UV lamp assembly. This water is discharged out the vend nozzle and down the drain. When enabled, the flush cycle will run for 3 seconds. See section 2.3. When this switch is ON, the flush cycle is enabled.

8.0 Specifications:

8.1. Pump / Valve Interface:	Any Voltage up to 120 VAC, 5 Amps Max.
8.2. Water Sensor Interface:	GEMS Turbine Flow Sensor, FT-110, Part No. 173935 (3800 PPG). Or AMCO #C700 (200 PPG).
8.3. Vend Accuracy / Repeatability:	± 0.5 %.
8.4. Power Requirements:	
Board:	24 VAC, 60/50 Hz, 1 Amp Nominal.
Vend Pump & Valve:	24-120 VAC 60/50 Hz, 3 Amps Max.
Operating Voltage Range:	22 VAC - 32 VAC, 50/60 Hz.
8.5. Circuit Board Assembly Size:	6.0" X 6.75".
8.6. Operating Temperature:	32° F to 150° F (0° to 65° C)
8.7. Storage Temperature:	-22° F to 167° F (-30° to 75° C)
8.8. Relative Humidity:	20% to 95% non-condensing

9.0. 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.

10.0. Fuses:

F1 Board Fuse, 1 Amp SloBlo, 24VAC, Type 5X20 mm.
F2 Pump Fuse, 3 Amp, SloBlo, 120VAC, Type 5X20 mm.