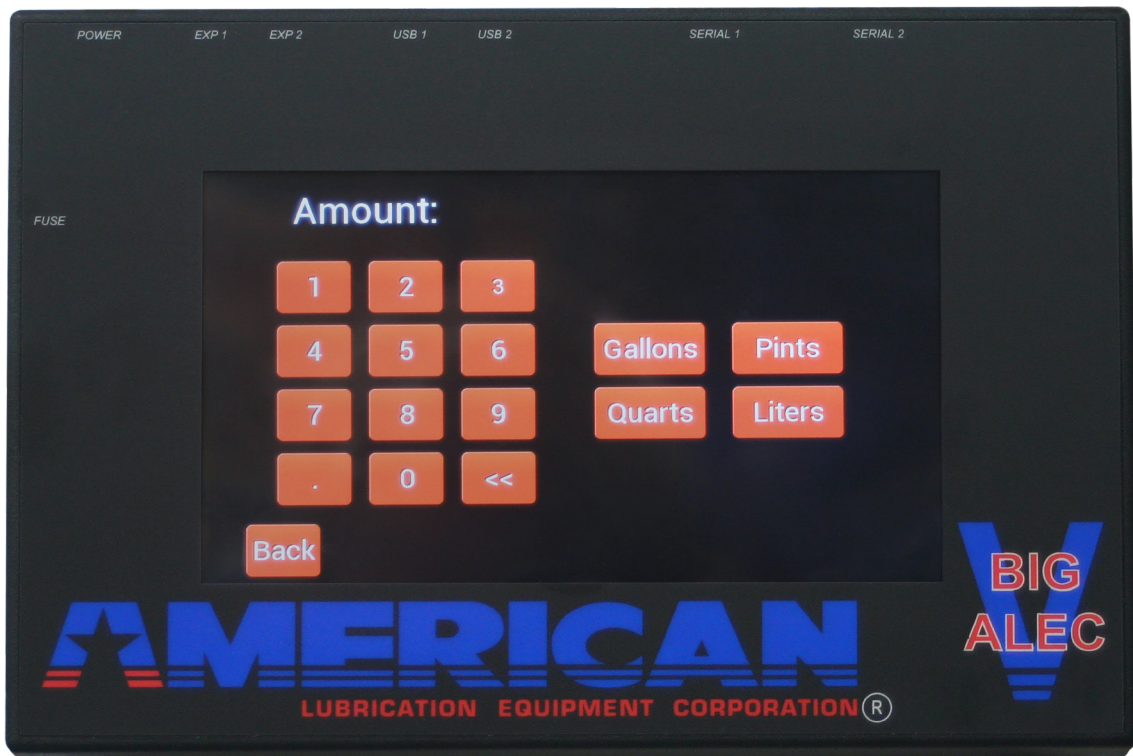




2003-INST Assembly Instruction

Big ALEC V Fluid Inventory Control System Installation and Operation Manual



1 Specifications

1.1 BIG ALEC V System

- Item code, 2003 (one [1] product system - 12 stations total-maximum)
 - Includes one (1) flow meter, one [1] fluid solenoid (enough for one [1] station per product)
 - For additional stations, order up to eleven (11) add-on station kits (TIM-2000-1)
- Item code, 2003-P2 (two [2] product system - six [6] stations maximum, per product)
 - Includes two (2) flow meters, two (2) fluid solenoids (enough for one [1] station per product)
 - For additional stations, order up to ten (10) add-on station kits (TIM-2000-1)
- Thermal Relief (**REQUIRED**):
 - 1:1 diaphragm pump use PR-100 (100 PSI)
 - 3:1, 5:1, 9:1 pumps use PR-750 (600 PSI)

1.2 Add-On Station Kit (TIM-2000-1)

- One (1) kit per station
- Kit includes one (1) each, TIM-1404-88 union, TIM-2000-36 ready light, TIM-2000-37 fluid solenoid

1.3 Power Supply (2000-24AC)

- *Input:* 120 VAC, 60 Hz, 70 VA
- *Output:* 24 VAC, 2500 mA
- *Cable Length:* approximately 10' end-to-end

1.4 Category 5 Ethernet Cable (2003-14CAT)

- Industry-standard CAT5 cable, 14' end-to-end length

1.5 Touchscreen (2003-CON)

- *Physical:*
 - *Mechanical:* 6.1" height, 9.3" length, 2.0" deep, 1.55 pounds
 - *Operating Temperature:* -10°C to +55°C non-condensing
 - *Storage Temperature:* -20°C to +70°C
 - *Wall Mount Hole Pattern:* 7.0" wide. Screw head diameter less than 3/8".
- *Passwords:*
 - *Technician:* up to ten (10) technician passwords can be assigned. The technician password must be entered to dispense product. The technician password appears along each product delivery in the history log (only the last 100 entries are preserved in the log). Optionally, the administrator can disable the requirement to enter a technician password before dispensing product.
 - *Administrator:* unlocks the SETUP menu for changing flow meter calibration, assigning product names, technician passwords, etc. Initial factory setting: 25325
- *Product(s) Versus Stations:*
 - 1 x 12 (product 1 to stations 1-12; order item: 2003)
 - 2 x 6 (product 1, stations 1-6; product 2, stations 1-6; order item: 2003-P2)

NOTE: It is not possible to dispense two (2) products simultaneously.

- *Clock:* real time clock for time/date stamped transactions
- USB 2.0 ports
 - Two (2) each, USB A-Type connector - Female
 - Use memory stick to download the transaction log or update software
- Serial (RS-232) Ports
 - Two (2) each, DB9M - Male, for printer e.g., Epson TM-T88V thermal printer
 - Use Serial 1 port for printing (must also connect USB1 port to thermal printer)
 - Use straight-through, 9-pin RS-232 cable and a 9-pin to 25-pin adapter or a straight-through 9-pin to 25-pin cable. Example: [Amazon.com: Your Cable Store 6 Foot DB9 Female / DB25 Male Serial Port Cable RS232 : Electronics](#)
- *Expander Ports:*
 - Two (2) each, CAT5 connector - Female
 - For communication between touchscreen and expander
- *Power:*
 - 24VAC
 - Touchscreen main unit fuse - 2.0Amp 3AG Slow-Blow
 - Expander unit fuse - 2.0Amp 3AG Slow Burn
- *Product:*
 - Factory preset or administrator defined description, e.g., synthetic oil 0W-20

- o Configurable for one (1) product (Figure 1) or two (2) products (Figure 2)

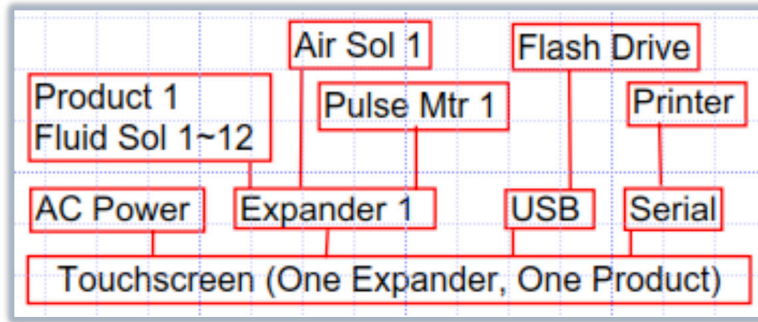


Figure 1, One Expander, One Product

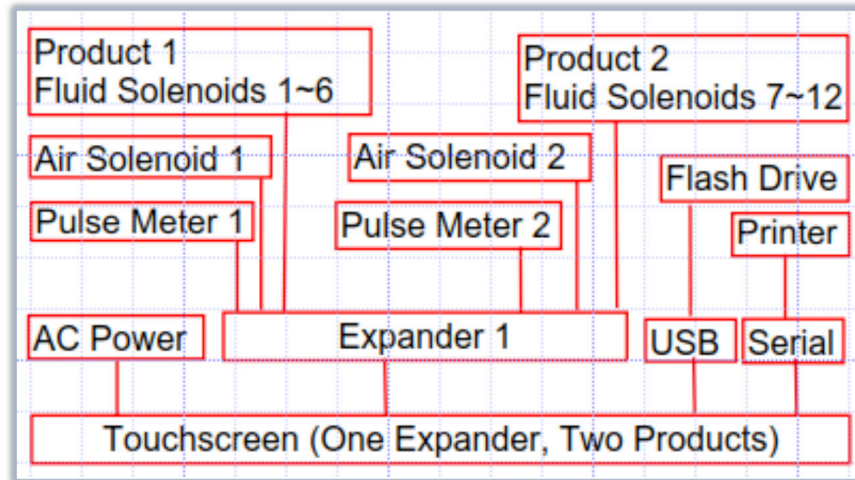


Figure 2, One Expander, Two Products

1.6 Expander (2003-BOX)

- Physical
 - o Mechanical: 4.5" (113 mm) wide, 6.5" (153 mm) long, 5 oz. (140 g)
 - o Operating Temperature: -10°C to +55°C non-condensing
 - o Storage Temperature: -20°C to +70°C
 - o Wall Mount Hole Pattern: 3.5" wide. Screw head diameter less than 3/8".
- Electrical
 - o Communications Interface: Category 5 cable
 - o Power: 24VAC (optional if Category 5 cable length is ≤50'; required if >50')
 - o "FLOW METER" Terminals (Figure 3)
 - Input for pulse meter signal
 - FLOW METER 1 (JP13) and FLOW METER 2 (JP14)
 - Connect flow meter wires into JP13 or JP14

NOTE: Do not put one (1) wire into JP13 and the other into JP14. See above and Figure 3.

- o Fluid Solenoid Valve Terminals (1~12 and "VALVE COMMON")
 - Output for fluid solenoid. Fluid solenoid valve is normally closed, application of 24VAC energizes the solenoid and opens the fluid passage.
 - Twelve (12) "Valve Common" and twelve (12) corresponding 24VAC terminals (24 total)

- Control (ON/OFF): Fluid solenoid valve and ready light
- o "AIR" Terminals (Figure 3)
 - Output for air solenoid. Air solenoid valve is normally closed, application of 24VAC energizes the solenoid and opens the air passage.
 - AIR1 (one [1] wire into AIR1, JP16 and second wire into corresponding valve common terminal, JP15)
 - AIR2 (one [1] wire into AIR2, JP16 and second wire in corresponding valve common terminal, JP15)

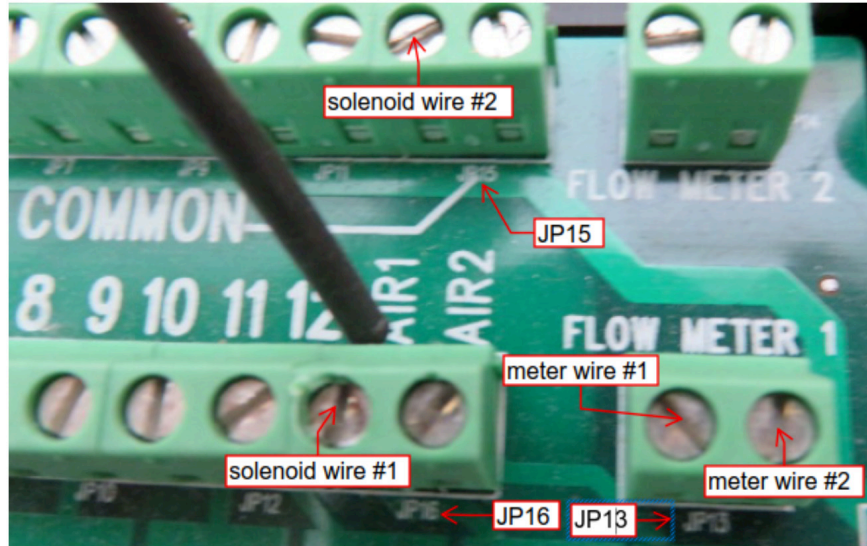


Figure 3, Air Solenoid and Flow Meter Wiring

- o Indicators (located on printed circuit board)
 - Flow In 1 and 2
 - o Continuous light when pulse meter is detected
 - o Light is OFF when disconnected from pulse meter
 - Status
 - o Blinking light when fluid solenoid is energized (dispensing)
 - o Light is OFF when fluid solenoid valve is de-energized
 - Link
 - o Continuous light when connected to an expander
 - o Light is OFF when disconnected from an expander

1.7 Pulse Meter

- TIM-2000-5 (standard issue when ordering the 2003 or 2003-P2)
 - o 1/2" NPT (F), 1,000 PSI maximum working pressure, fluid flow is *not* directional
 - o *Electrical*: Voltage 28V, current 100 mA, load 3W, (two [2] wire, non-polarized)
 - o 378 pulses per gallon (pulses are open/short, resistive pulses)
 - o **Not compatible** with antifreeze mixtures

WARNING: To prevent cracking of the aluminum pulse meter body, put wrench on the pulse meter fitting. For stress relief, connect one side of the pulse meter via a rubber hose.

- TIM-365-5S (Optional)
 - o 1/2" NPT (F), 1,000 PSI maximum working pressure, fluid flow is *not* directional
 - o *Electrical*: Two (2), non-polarized pigtail wires

- o 40 pulses per gallon (pulses *are* open/short, resistive pulses)
- o **Compatible** with antifreeze mixtures. Use copper tubing for antifreeze.

1.8 Fluid Solenoid Valve (TIM-2000-37)

- **Compatible:** Antifreeze mixtures, ATF, gear oil, hydraulic oil, motor oil, synthetic oil
- 1/2" NPT (F), 3,000 PSI maximum working pressure, fluid flow *is* directional (see Figure 4)
- 24VAC (two [2] wire, non-polarized), **NOTE:** gets warm to the touch when energized

1.9 Ready Light (TIM-2000-36)

- 24VAC, red light (two [2] pigtail wires, non-polarized)

1.10 Air Solenoid Valve

- TIM-2000-2
 - o 1/4" NPT (F), 145 PSI maximum working pressure
 - o 24VAC, 10W (two [2] wire, non-polarized), **NOTE:** gets warm to the touch
- TIM-2000-2A
 - o 1/2" NPT (F), 145 PSI maximum working pressure
 - o 24VAC, 10W (two [2] wire, non-polarized), **NOTE:** gets warm to the touch

1.11 Tubing, Hoses, Reels, Control Handles

Select system components compatible with pump working pressure and local requirements

2 Installation Instructions

2.1 Mounting Locations

The touchscreen comes with rubber feet for desktop mounting and has "keyholes" in the back for wall mounting. Consider the AC power supply and the expander mounting locations.

WARNING: The mounting screws must not protrude more than 1/4" from the wall when wall mounting the touchscreen or the expander. Exceeding this measurement may cause damage.

NOTE: Expanders are designed to be hidden out of the way in ceilings or other remote locations. For CAT5 cable lengths greater than 50', the expander must have its own power supply.

2.2 Fluid Solenoid Valve & Ready Light Installation & Wiring

Place the fluid solenoid valve as close as possible to the dispensing reel or the oil bar. Mount the ready light where it can be easily seen by the operator, e.g., reel support bracket.

Splice one (1) ready light wire to one of the fluid solenoid wires. Splice the other ready light wire to the other fluid solenoid valve wire (Figure 4). Run each spliced wire to the expander and connect one (1) spliced wire into a valve terminal (labeled 1-12) and the other spliced wire into a valve common terminal (labeled "VALVE COMMON").

WARNING: Attach only one (1) fluid solenoid valve/ready light per valve terminal. Attaching multiple solenoid valves to a single valve terminal will permanently damage the expander.

NOTE: The fluid solenoid valve inlet port is depicted as "2 inlet" in the picture below. The valve is directional.

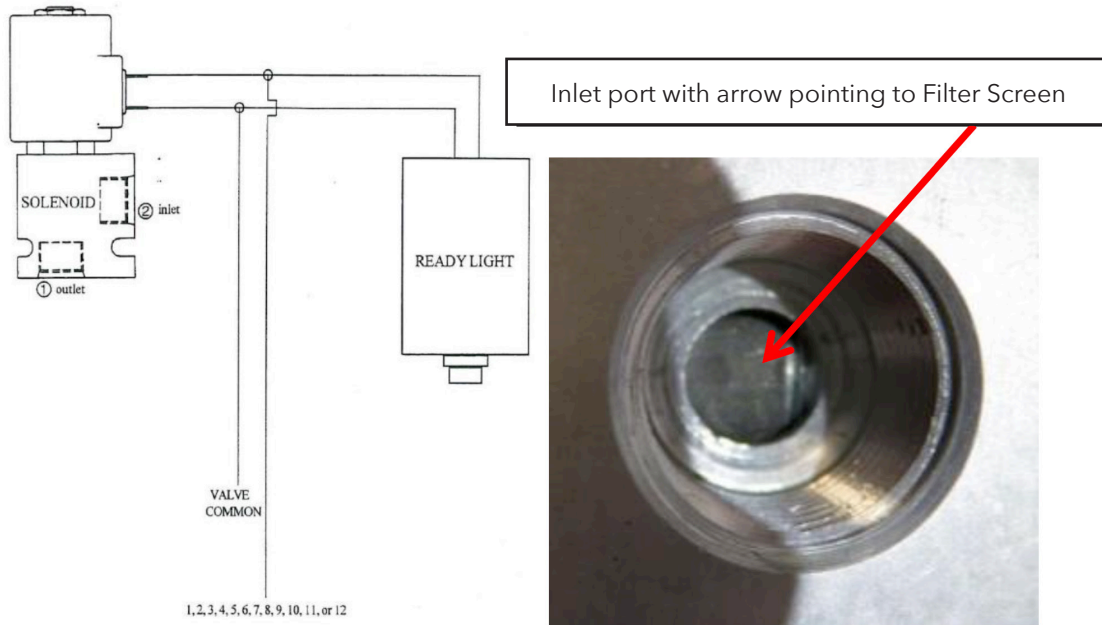


Figure 4, Fluid Solenoid Valve and Ready Light Wiring Diagram

Wire Gauge	Maximum Wire Length (ft)		
	Oil Solenoid	Air Solenoid	Pulse Meter (use shielded cable)
24	Do Not Use	100	200
22	75	150	300
20	125	250	500
18	200	400	800
16	300	600	1,000

Figure 5, Wiring Guide (24VAC)

NOTE: Do not use single-conductor copper wire (can cause intermittent problems). Use shielded cable for pulse meter (run cable separate from high current and/or high frequency signals).

2.3 Pressure Relief Kit Installation

Install the pressure relief kit on the outlet side of the pump between the pulse meter and the pump. A properly sized pressure relief kit is required.

WARNING: Pressure relief kit prevents damage caused by thermal expansion of the fluids in the system. Thermal expansion can cause pressure build-up greater than the rated working pressure of the system's components. Return line must be plumbed back to oil supply tank.

* 1:1 diaphragm pumps use PR-100 (100 PSI)

* 3:1, 5:1, 9:1 pumps use PR-750 (750 PSI)

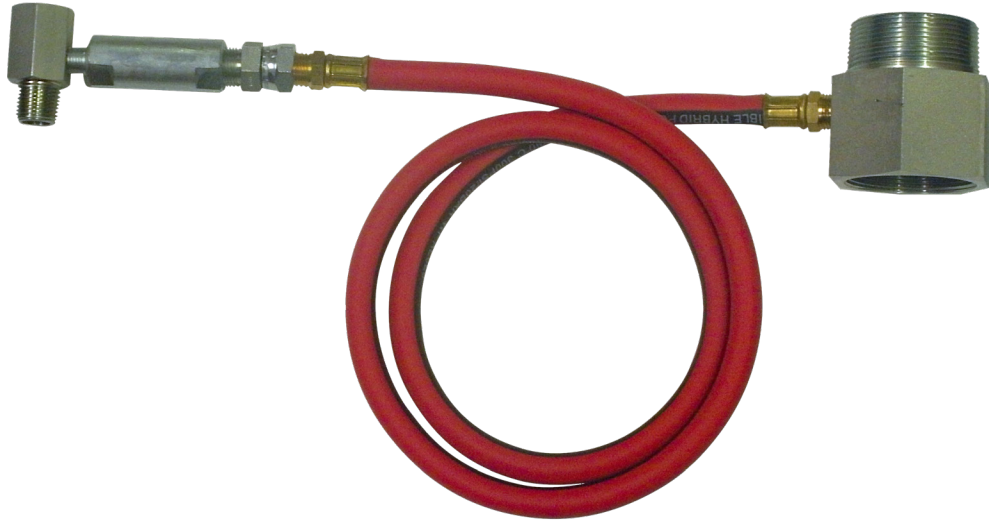


Figure 6, Pressure Relief Kit Installation

2.4 Pulse Meter Installation

Install the pulse meter (TIM-2000-5) on the fluid outlet side of the pump (after the pressure relief kit). Connect the pulse meter wires to the "FLOW METER 1" terminals (both wires into terminal block JP13) on the expander.

2.5 Air Solenoid Valve Safety Kit Installation

The Big ALEC V is designed to work with an optional air solenoid valve safety kit (TIM-2000-2 or TIM-2000-2A). If used, place the air solenoid between the air pressure regulator and the pump. Run the air solenoid wires to the expander, placing one (1) wire in the air terminal (labeled "AIR") attach the other wire into a valve common terminal, JP15.

- * TIM-2000-2 (1/4") air valve, air inlet is marked "1" and the air outlet is marked "2". This is the opposite of the fluid solenoid valve. NOTE: this is the opposite of the fluid solenoid valve.
- * TIM-2000-2A (1/2") air valve flow direction is indicated by an arrow on the valve body

3 System Setup Instructions

The initial display features three large red icons

- START (icon is only present when a solenoid valve is detected)
- HISTORY
- SETUP

3.1 START Icon

Pressing the START icon accesses the Tech Name (a numeric name \geq four [4] characters in length). Example:

- Enter *Tech Name* "1234"
- Touch OK icon
- Touch STATION 1
- Touch NEXT icon
- Enter *Amount* and *Unit of Measure (UoM)*, 1.0 quarts
- Touch NEXT icon
- Delivery display
 - o Station 1

- o *Product*: Oil 10W-30
- o *Amount Dispensed*: 0.00 quarts (counts up from 0.00)
- o *Amount Requested*: 1.00
- Touch START icon
- Dispense fluid
- Touch RESET icon to stop delivery

3.2 HISTORY Icon

Touching the HISTORY icon displays the Big ALEC V dispense history (six [6] rows, six [6] dispense events displayed per page) which includes the following columns

- *Date/Time* (mm/dd/yy 11:11 _m) (can be set for 24 Hour format)
- *Product*
- *Station*
- *Tech* (e.g., 1234)
- *Amount* (e.g., 2.2222 gallons; four [4] places to the right of the decimal point)
- *Status* (Complete, Canceled)

There are four (4) icons on the History display

- BACK (return to previous)
- NEXT (displays prior dispenses)
- PRINT (last 100 entries) or Weekly Totals (last 100 entries)
- ADMIN

3.3 SETUP Icon (Administrative Password Required)

Touching the SETUP icon displays the *Enter Password* display

- Enter *Administrative Passcode* (25325)
- Touch OK icon
- Lower right-hand corner of the display contains the following data,
 - o Console Rev_
 - o Expander 1 version_
 - o Expander 2 not present_
- Setup display
 - o *Set Date/Time*
 - Year/Month/Day/Hour/Minute (can be set for 24 Hour format)
 - Touch BACK icon to save
 - o Product Setup
 - 1 Product, 12 Bays (aka Stations)
 - 2 Prod, 6 Bay
 - 2 Prod, 12 Bay (not implemented)
 - Touch CANCEL icon or SET icon as appropriate
 - o Product Names
 - Touch icon to choose between 22 preconfigured product names
 - Five (5) spare name icons are available editing via the EDIT icon (25 character length max.; only the first five (5) characters are displayed)
 - Touch MORE icon for additional choices
 - Touch OK icon to save product name
 - o Passwords
 - Administrative Password
 - o Touch EDIT icon to edit administrative password (**CAUTION: retain factory preset code 25325 until software updates are implemented**)
 - o Touch OK icon to save password

- Require Log On Before Dispense
 - o Touch EDIT icon to choose between Yes or No
 - o Touch SET icon to set mode
 - Technician ID's (Number of possible techs = 10)
 - o Touch EDIT icon to revise Tech ID
 - o Touch NEW icon to create new ID
 - 8-character maximum
 - Only four (4) characters display
 - o Touch DELETE icon to delete ID
 - o Calibrate
 - Current setting: 378 pulses per gallon
 - Calibrate Dispenser display
 - o *Pulses Per UoM*
 - Calibration
 - o Enter *Pulses Per Unit of Measure* (UoM)
 - o Enter *UoM* (gallon, quart, pint, liter)
 - o Touch OK icon to save calibration factor
 - o Certified Measure
 - Station 1
 - Touch STATION 1 icon
 - Touch NEXT icon
 - Enter numerical amount of fluid to be dispensed, e.g., 1.00
 - Enter *UoM*, e.g., gallons
 - Touch NEXT icon
 - Measured Amount: _ Gallons
 - Calibration _ Pulses
 - Dispense fluid to be dispensed
 - Touch SAVE icon or CANCEL icon as appropriate
- o Printer Setup
 - Set Baud Rate: 1200/2400/4800/.../115200 (Typical: Baud Rate is 9600)
 - Touch OK icon to save or CANCEL icon as appropriate
- o Reset
 - Reset Totals
 - o *Are you sure? Reset Tools*
 - o Touch OK icon to reset totals
 - Clear Logs
 - o *Are you sure? Clear Delivery Logs*
 - o Touch OK icon to clear logs
 - Factory Reset
 - o *Are you sure? Factory Reset Restore Original Settings*
 - o Touch OK icon to factory reset

4 Calibration

NOTE: Big ALEC V is factory set to 378 pulses per gallon (matches the *TIM-2000-5* pulse meter)

For best calibration accuracy, calibrate the longest product run (greatest distance between pump and fluid solenoid valve)

The two (2) possible calibration methods,

- 1) Pulses per unit of measure calibration
- 2) Certified measure calibration, are discussed below

NOTE: Calibration can be performed using any station for the associated product. The calibration applies to all stations for that product.

4.1 Pulses Per Unit of Measure (UoM) Calibration

If you know the pulse meter's pulses per unit of measure,

- 1) Enter the calibration mode via the *Setup* menu
- 2) Touch PULSES PER UoM icon
- 3) Enter the number of pulses and the *UoM*
- 4) Touch OK icon
- 5) You will now be back at the *Administrative Setup* screen. If you are done touch the BACK icon to return to the *Home* screen.

4.2 Certified Measure Calibration

You will need a certified 1-gallon measuring container (four [4] liters for certifying liters)

- 1) Enter the calibration mode via the SETUP menu
- 2) Touch CERTIFIED MEASURE icon
- 3) Touch the appropriate STATION icon
- 4) Touch NEXT icon
- 5) Enter the *Volume* and *UoM* of your certified container

NOTE: Dispense exactly 1.0 gallon (4.0 liters for liter measuring) of product into a certified measuring container. Do not trickle the flow while dispensing.

- 6) Touch NEXT icon
- 7) Touch START MEASURE icon (opens fluid solenoid for dispensing and lights the ready light)
- 8) When container is filled to the certified measure volume, stop dispensing fluid
- 9) Touch STOP MEASURE icon
- 10) Touch SAVE icon (returns of the SETUP menu)
- 11) Press *Back* to return to the *Home* screen
- 12) Repeat the above if the system is configured for two products

5 Operating Instructions

There are two (2) possible modes of operation

5.1 Technician Password Enabled

If the administrator enabled the technician password before dispensing, operator must:

- 1) Touch START icon
- 2) Enter *Tech* password
- 3) Touch OK icon
- 4) Touch STATION icon
- 5) Touch NEXT icon
- 6) Enter the dispense amount and the unit of measure
- 7) Touch NEXT icon
- 8) Touch START icon (opens the fluid solenoid and illuminates the ready light)
- 9) Tech dispenses fluid (when preset quantity is dispensed, returns to the *Home* screen)

NOTE: Touch STOP icon to stop dispensing. Touch START icon to start dispensing. Touch RESET icon to cancel dispensing and return to the *Home* screen.

5.2 Technician Password Disabled

If the administrator disabled the technician password, operator must:

- 1) Touch START icon
- 2) Touch STATION icon
- 3) Touch NEXT icon
- 4) Enter the dispense amount and the unit of measure
- 5) Touch NEXT icon
- 6) Touch START icon (opens the appropriate fluid solenoid and illuminates the corresponding ready light)
- 7) Tech dispenses fluid (when preset quantity is dispensed the touchscreen returns to the *Home* screen)

NOTE: Touch STOP icon to stop dispensing. Touch START icon to start dispensing. Touch RESET icon to cancel dispensing and return to the *Home* screen.

6 Troubleshooting

The tests below require a new, good pulse meter, fluid solenoid valve, air solenoid valve and an Ohm meter. A new, good spool of wire can be used to run a temporary wire run (across the shop floor) to a pulse meter, fluid solenoid valve or an air solenoid valve.

6.1 Divide the System for Efficient Troubleshooting

When a system problem occurs we recommend that you split the system in half (Big ALEC/pulse meter)

1. Wire a new, clean *TIM-2000-5* pulse meter directly into the expander (e.g., Station 1)
2. Set the touchscreen to 1.0 quarts and blow through the pulse meter to rotate the gears
3. If the touchscreen counts up to 1.0 quart, de-energizes (closes) the station's fluid solenoid valve and returns to the *Home* screen, you know that the touchscreen, CAT5 cable, AC power supply, and expander station are good. Repeat as required.

NOTE: To verify the fluid solenoid valve and air solenoid valve circuitry:

- 1) Wire a new air or fluid valve into the expander (e.g., Station 1)
- 2) Touch the START icon
- 3) Verify you can blow through the new air or fluid valve (from inlet to outlet)

* *TIM-2000-2* air valve, air inlet is marked "1" and the air outlet is marked "2"

* *TIM-2000-2A* air valve, the flow direction is indicated by an arrow on the valve body

* *TIM-2000-37* fluid solenoid valve inlet is marked "2" and the outlet is marked "1"

6.2 Pulse Meter Wiring

To validate the pulse meter wiring (the wire run between the expander and the pulse meter),

1. Disconnect the installed pulse meter
2. Wire a new, clean *TIM-2000-5* pulse meter in place of the installed pulse meter
3. Set the touchscreen to dispense 1.0 quarts and blow through the pulse meter
4. If the touchscreen counts up to 1.0 quart, de-energizes (closes) the fluid solenoid valve and returns to the *Home* screen you know that the pulse meter wiring is good

NOTE: Use multi-strand conductors. Single-strand copper wire causes intermittent problems.

6.3 Pulse Meter

HAZARD: Disconnect the air supply from the oil pump and bleed off oil pressure in the delivery line prior to opening the pulse meter

To validate the installed pulse meter,

1. Remove the pulse meter rear cover and look for misaligned gears and dirt in the gears
2. Verify that both axle shafts are pressed tightly into the pulse meter body (if axle shafts are loose, replace pulse meter; do not attempt to repair)
3. Connect an Ohm meter to the pulse meter wires (disconnected from wire run), rotate the pulse meter gears by hand and verify that the Ohm meter detects open/short pulses

NOTE: The pulse meter acts as a simple on/off switch. A small current is passed through the pulse meter and the system detects when the switch opens and closes (a.k.a. dry contact circuit).