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INTEGRATED DESIGNS
INTEGRATED DISPENSE SYSTEM

U.S. PATENT No. 5,316,181

IDS300 FAMILY TECHNICAL REFERENCE MANUAL

Covering 6, 15, 25psi Models

REV G05

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CAUTION

THIS MANUAL COVERS IDS300 (CAPACITIVE LIQUID LEVEL SENSOR) AND IDS310 (FLOAT LIQUID LEVEL SENSOR) PRODUCT VERSIONS.

READ THIS MANUAL *COMPLETELY* BEFORE ATTEMPTING TO INSTALL, CALIBRATE OR OPERATE THE IDS300 FAMILY OF CHEMICAL DISPENSE SYSTEMS!

EACH IDS300 DISPENSE UNIT AND CONTROL BOARD ARE CALIBRATED TOGETHER AT THE FACTORY AND HAVE MATCHING SERIAL NUMBERS. *DO NOT* SUBSTITUTE DISPENSE UNIT CONTROL BOARDS!

IF THE DISPENSE UNIT NEEDS TO BE CALIBRATED, IT MUST BE *COMPLETELY* DRAINED, DRY AND ASSEMBLED WITHOUT A FILTER!

BE CERTAIN TO PROPERLY IDENTIFY THE PROPER DISPENSE UNIT TYPE BEFORE INSTALLING THE DISPENSE UNIT. CUSTOM IDS300 FAMILY PUMPS HAVE A "-J" ON THE HARDWARE INTERFACE CIRCUITBOARD.

IMPORTANT

THE IDS CONTROLLER HAS A PROTECTIVE CONDUCTOR FOR PROTECTION AGAINST ELECTRIC SHOCK IN CASE OF A FAULT. THE TERMINAL IS DESIGNATED BY THE SYMBOL IN FIGURE 1 AND IS LOCATED INSIDE THE ENCLOSURE, AT THE LEFT REAR, ABOVE THE POWER ENTRY MODULE.



FIGURE 1

I. OVERALL SYSTEM DESCRIPTION

The patented Integrated Dispense System is designed to dispense chemicals in very accurate and repeatable amounts. The dispense unit is compatible with a wide variety of chemicals. The Integrated Dispense Unit is controlled by sophisticated electronics, which is in turn driven by detailed software. The system is user friendly and will give the operator complete control of dispensing needs. The unit can be totally integrated to all commercially available process equipment.

Each Dispense Mother board is installed in a stainless steel enclosure capable of housing up to four (4) dispense unit controller boards and one serial communications board. It operates from 100-130 VAC 50/60 Hz. without the need for jumpers (higher voltage model is available). Power supply components have UL & CSA listings. The enclosure has direct ventilation with its installed fan. See the Cabinet Drawing in the Appendix B for configuration examples. With the optional RS232/RS485 serial communications board, the IDS controller can be placed into remote operation. While in the remote mode, controller keyboard entries can be disabled. All programmable features must then be accessed through the communications link. This is covered in detail in the IDS300 Family Controller Communications Protocol technical reference manual. An additional feature on this board is a relay that follows the operation of the audible alarm for activating remote audible or visual alarm indicators.

The Integrated Dispense System has been designed to integrate chemical source switching, liquid level detection, and chemical dispensing into one unit. Additionally the unit has been designed with flexibility of two reservoir sizes so it will adapt to a wide variety of chemical dispense applications. Depending on the chemicals used and the process demands, the unit will operate with or without filtration in the chemical reservoir. The system operation is as follows:

The dispense unit chemical reservoir is the heart of the Integrated Dispense System. If the process equipment calls for a dispense, the Chemical Reservoir has pressure applied on demand to it from a pulse width modulated pressure regulator consisting of a pressure application valve and pressure release valve. With the reservoir at atmospheric pressure, the pressure application valve is opened then closed rapidly to bring the pressure in the reservoir up to the programmed dispense pressure. As the pressure approaches the programmed pressure, the duration that the valve is opened is reduced. If the pressure overshoots the programmed pressure, the pressure release valve is opened and closed until the pressure stabilizes. The pressure must stabilize to the programmed output pressure before the Chemical Output Valve will open. The output pressure is programmed through the IDS controller. This allows for a stable dispense whether 1, 2, or 3 output valves are opened simultaneously or independently at random times. The regulator valves will adjust the reservoir pressure depending on the output load to keep programmed output pressure constant. This will also be the case as the chemical filter becomes “loaded” over time.

The user pre-programs the differential pressure into the IDS controller so when that set point is reached the controller will inform the user and give an indication on the alphanumeric display that it is time for a filter change. This set point will vary depending on the viscosity of the chemical that is being dispensed. The size of the output nozzle and dispense pressure determines the flow rate. The user programmed time for dispense will correlate to an exact amount dispensed. The programmed time for dispense does not start until the output valve opens after the pressure stabilizes. The maximum number of outputs per Integrated Dispense unit is three.

The IDS300 Family has a choice of three different standby modes. If the user selects "Vacuum", the vacuum venturi will turn on and remain on until the maximum programmed vacuum is reached on the reservoir. When the programmed vacuum is reached, the venturi will be turned off. A check valve isolates the reservoir from the atmosphere leaving the chemical in its own environment. The unit will maintain the programmed vacuum.

If the user selects the "Atmosphere" mode, the reservoir will be vented to atmosphere after each dispense cycle. After the reservoir is at atmospheric pressure, the check valve will seal the reservoir. This is the normal mode of operation for the dispense unit. If the user selects the "Pressure" mode the reservoir will remain at the programmed dispense pressure. The only time the pressure is released is during a refill operation.

Purge mode is a maintenance mode for purging air from the system after a filter change or starting the system. This mode opens the selected output valve and forces the chemistry through until a low level is detected in the Chemical Reservoir. At this point the reservoir refills to a high level, and the cycle starts again. Purge mode can be used to send chemical through the filter back to the source. This cycle of purging and filling will continue automatically until the process is terminated. This mode is set up through the IDS controller.

Drain mode is similar to the purge mode except it does not cycle automatically. In this mode the chemistry will drain through the selected output valve(s) or input valve until the Chemical Reservoir is empty or the operator terminates the drain. At this point the Chemical Reservoir is pressurized and will continue to purge air or nitrogen until the controller is manually stopped. This mode is set up through the IDS controller.

Note: Do not leave the unit unattended in drain mode!

The IDS controller allows the operator to select an input valve. This selection allows the Integrated Dispense Unit to cycle, and when used in conjunction with the Auto-Vent valve, the chemistry is sent back to the source selected. This mode is set up through the IDS controller.

Caution should be observed when sending chemical back to the source to avoid pressurizing the source container!

On IDS300 models, the capacitive liquid level sensor controls the filling. On IDS310 a float type sensor controls the filling. If the dispense unit is unable to dispense, the controller will send a shutdown signal to the process equipment. Under normal operating conditions, when the low level is detected it will start the fill cycle.

The Chemical Reservoir can be filled by pressure on demand or gravity feed systems. The most commonly used is the vacuum venturi method. The vacuum venturi will create a vacuum state in the Chemical Reservoir. The 3-way valve switches between pressure and vacuum depending on the cycle or state of the controller. The pressure side of the 3-way valve is for activating the on demand pressure dispense cycle. The vacuum side of the 3-way valve is opened when the reservoir is filling or the vacuum venturi is on. The vacuum created will pull the chemical from the input supply into the Chemical Reservoir. This filling action will continue until the liquid level sensor reaches a HI level or the programmable filling time expires.

Custom IDS

A special version of the IDS300 Family is available that allows the selection of one of three different dispense times via the hardware interface. The output for the three dispense times the first dispense valve only. The difference between the standard IDS300 Family and the custom IDS300 Family is in the hardware trigger board. All other features of the custom IDS300 Family are the same. See Appendix F for the special chemical interface board schematic.

II. CONTROLLER PROGRAMMING

The Integrated Dispense System controller is designed to control the operation of up to four dispense units. Each unit can operate up to three dispense points independently or simultaneously. Chemical is supplied to each unit from up to two sources, depending on user specification. The units may be programmed while the process equipment is running, except for the drain, purge, and calibrate modes. The alarm signal will be sent to the host equipment for these maintenance mode functions.

The dispense units are identified by a letter A-D. The dispense points are identified by the numbers 1-3 (See Appendix B). The chemical sources are identified by the numbers 1-2 (See Appendix D).

After power up and in normal operation the display will indicate which units are active.

```
INTEGRATED DESIGNS
MODEL 300 CONTROLLER
UNITS INSTALLED
<X X X X>
```

From this display the operator may select the unit and access code display by pressing (E) on the keypad (See front panel drawing in Appendix B).

```
UNIT SELECT <X> A-D
ENTER ACCESS CODE
<XXX>
E=ENTER F=EXIT
```

The unit is selected by entering A-D followed by (E). Then the access code is entered. This can be any number from 000-999 followed by (E). If the wrong code is entered the unit will go to the normal run mode with the active units display. The following screen will be displayed if the number is entered correctly. Pressing (E) will return to the installed units display. From this screen the user can select which operation is desired by pressing the appropriate button. Pressing (E) will return to the installed units display.

```
UNIT <X> EXIT = <E>
SET PROCESS = <A>
MAINTENENCE = <B>
UNIT SET UP = <C>
```

A. Process Setup

Pressing (A) will result in the following screen.

```
UNIT<X> T0=<XXX.XX>
DISPENSE 1=<XXX.XX>
DISPENSE 2=<XXX.XX>
DISPENSE 3=<XXX.XX>
```

The unit selected is displayed along with the of dispense time for each of the dispense points. To change the delay time (see Dispense Delay) or dispense time, enter the new time (dispense time is in seconds, the maximum amount to time is 655.35 seconds). For example: 003.00 seconds followed by (E). To select the next dispense point press (E). After the last point is selected and (E) is pressed the following screen is displayed. Press (F) to return to the active units display.

```
UNIT <X>  ##.# MAX.
 DISPENSE PRESSURE
   <XX.X> PSIG.
E=ENTER      F=QUIT
```

From this display the user programs the dispense pressure for the unit. The dispense pressure is displayed along with the maximum allowable pressure. This is the pressure of the chemical being dispensed. The very low pressure unit has a maximum allowable pressure of 6psig, the low pressure unit has a maximum allowable pressure of 15psig, and the high pressure unit has a maximum allowable pressure of 25psig. To change the dispense pressure enter the desired pressure followed by (E). After entering (E) the following screen will be displayed. Pressing (E) again will return to the active units display.

```
 UNIT <X>  <E>=ENTER
<A>=RESET  <C>=CHECK
 PEAK DIF PRES=<XX.X>
 DIF LIMIT=    <XX.X>
```

The peak differential pressure recorded and the current peak differential limit is displayed. The user may reset the peak differential pressure recorded across the filter by pressing (A). The differential limit is the entered followed by (E). After entering (E) the display returns to the installed units display. IDI recommends 8psi differential.

The differential pressure is the difference between the pressure applied to the input of the filter and the pressure at the output of the filter. The peak differential pressure is the highest difference calculated since the last reset. By pressing an (A) the unit resets the peak differential pressure to zero. This is usually done after a filter change (See maintenance section-filter change). The differential limit is user programmable to give a visual indication when this limit has been exceeded. This display will also allow the user to check the differential pressure of any dispense. The peak differential pressure should be reset by pressing an (A). Then press (C) after any dispense. The unit will then display the peak differential pressure for that dispense.

B. Maintenance Functions

```
 UNIT <X> EXIT = <E>
SET PROCESS = <A>
MAINTENENCE = <B>
UNIT SET UP = <C>
```

From the main menu press (B) to display the maintenance menu. In maintenance mode, the selected unit will not respond to any trigger signals. The alarm signal is active at this time

```
UNIT <X> EXIT=0 <X>
PURGE UNIT = <A>
DRAIN UNIT = <D>
 CALIBRATE = <C>
```

Selecting (0) while in the above display returns to the main menu select display.

Selecting an invalid unit or one that is not installed from the menu select display gives the following display.

```
UNIT <X> E=CONTINUE
   IS NOT ACTIVE
```

Selecting (E) returns to the main menu select display.

1. Purge /Dispense Mode

a. Purge

Selecting (A) displays the purge pressure/timer menu.

```
PURGE & DRAIN SET UP
PRESSURE  =  <XX.X>
PURGE TIMER=<XXX.XX>
E=ENTER       F=QUIT
```

If it is not already set up the purge pressure should be set. This pressure determines the rate of purge and is independent of the dispense pressure. The purge timer is used to set how long each purge dispense lasts. While in the purge mode, the unit will purge for the length of time set. At the end of that time it will check for a low level in the reservoir. If there is low, it will refill the reservoir, if it is not low it will dispense again. Pressing (E) will advance to the purge point/dispense screen. **Caution:** Too long of purge time may uncover the filter.

```
PURGE=A   D=DISPENSE
 F=EXIT  1=ON 0=OFF
S1^S2=<0>  DISP1=<0>
DISP2=<0>  DISP3=<0>
```

The alarm signal to the host system is active disabling dispense triggers. Likewise all communications link dispense and pre-trigger commands are ignored. The unit and dispense point selected is displayed. The user may select the points that are to be purged including the source. Either source may be selected by entering a <1> for source one or a <2> for source two. A <0> may be entered to turn off a particular point. More than one dispense point can be purged at the same time. Pressing (E) moves the cursor to the next point to select. Enter a (1) to enable that point. To begin purging, press (A). Press (F) to return to the active units display. On IDS310 models the capacitive sensor data is not displayed.

```
 UNIT <X> IS PURGING
   PWM SENSITIVITY
0-9=<X> SENSE=<XXXX>
       E=ABORT
```

IDS300

```
UNIT <X> IS PURGING
  PWM SENSITIVITY
0-9=<X>
       E=ABORT
```

IDS310

The unit is now purging. The unit applies pressure and opens the selected output valve(s) and/or source valve. If an output valve and a source are selected, the unit will purge through both valves. When the purge timer expires and a low level is detected, the unit closes the valve(s), applies vacuum to the reservoir, and opens the selected input valve. After the reservoir is full, the unit begins purging again for the programmed time. This is repeated until either the unit runs out of chemical or an (E) is pressed on the keyboard. When in the purge mode, it will not switch the input sources. If the chemical source is empty the unit will time out and close all valves. During the purge the liquid level sensor data is displayed. This is used to monitor the performance of the sensor.

b. Pressure Control Valves

The pressure control valves used in the IDS300 Family respond differently to variations in cable lengths. The standard maximum length is 25 feet. The PWM Sensitivity adjustment is to "tune" the performance of the pressure control valves to the cable length. This corresponds to a standard value of 5. If excessive jitter or oscillation is observed on the pressure gauge while the unit is purging, a PWM adjustment needs to be made. To set: Program the dispense unit for maximum dispense pressure. Set to purge mode with all points set to 0. Start the purge. The unit will not actually purge, but go to maximum pressure. Adjust the PWM value for a minimum of jitter on the pressure gauge. For lines longer than 15 feet, the PWM value should generally be greater than 5 and for shorter lines a value of less than 5.

c. Dispense

Each of the dispense times may be tested from the purge display. The enabled dispense points may be triggered by selecting (D). Press (F) to return to the active units display. **Note: Dispenses to the sources are not possible. If a low level is detected during a test dispense, the dispense is aborted immediately.**

```
PURGE=A   D=DISPENSE
 F=EXIT  1=ON 0=OFF
S1^S2=<0>  DISP1=<0>
DISP2=<0>  DISP3=<0>
```

Selecting (D) will give the following display. Pressing (E) will terminate the dispense cycle.

```
UNIT <X>
DISPENSE IN PROGRESS
     <E>=ABORT
```

2. Drain Mode

The dispense unit reservoir may be drained by selecting (D) from the maintenance menu. At this time the error signal to the host system is active.

```
UNIT <X> EXIT=0 <X>
PURGE UNIT = <A>
DRAIN UNIT = <D>
 CALIBRATE = <C>
```

Pressing (D) gives the drain point select display.

```
PURGE & DRAIN SET UP
PRESSURE  =  <XX.X>
PURGE TIMER=<XXX.XX>
E=ENTER       F=QUIT
```

If it is not already set up the drain pressure should be set. This pressure determines the rate of drain and is independent of the dispense pressure. Pressing (E) will advance to the drain point screen.

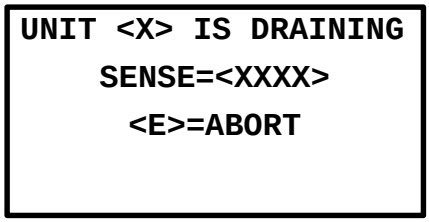
```
DRAIN=A  0=OFF 1=ON
 F=EXIT   1=ON 0=OFF
S1^S2=<0>  DISP1=<0>
DISP2=<0>  DISP3=<0>
```

The user may select the point(s) to drain the unit. More than one dispense point can be selected at the same time including the source. Each source may be selected by entering a <1> for source one or a <2> for source two. Pressing (E) moves the cursor to the next point to select. A <0> may be entered to turn off a particular point. Enter a (1) to enable that point. Selecting (A) drains the reservoir through the selected point(s). (E) may be

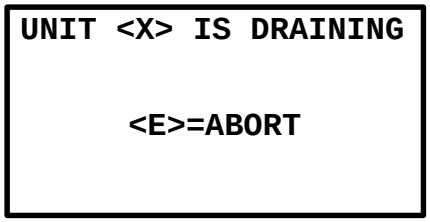
pressed to abort the drain when the reservoir is empty. **Note: The purge timer does not effect the drain mode.**

CAUTION:

If the source is used in drain mode and the pressure begins to rise above the dispense pressure, this indicates the reservoir is empty and N_2 is going to be forced through the filter. Stop draining by pressing (E). Failure to do this will result in N_2 being forced into the source container and pressurizing it. Some containers are not designed for pressure. After stopping in the source drain mode and if a filter is not installed, select one of the output valves to finish draining the system. Do not leave the unit unattended in drain mode.



IDS300



IDS310

The unit selected is displayed. The unit is now draining. The unit applies pressure and opens the selected output valve until the operator presses the (E) key to stop the drain. On IDS300 models, the liquid level sensor data is displayed during the drain process. This is used to monitor the performance of the sensor. On IDS310 models, the capacitive sensor data is not displayed.

3. Calibration Mode

a. Pressure Sensors

```
UNIT <X> EXIT=0 <X>
PURGE UNIT = <A>
DRAIN UNIT = <D>
 CALIBRATE = <C>
```

Selecting calibration mode (C) from the maintenance menu turns on the alarm light, sets the alarm signal to the host system to active and shows this display:

```
WARNING UNIT MUST BE
EMPTY,DRY, NO FILTER
    TO CALIBRATE
E=EXIT   C=CALIBRATE
```

Each dispense unit has its own control board. These are calibrated together at the factory and have matching serial numbers. Do not substitute control boards. **The dispense unit must be completely drained, dry and assembled with no filter to accurately calibrate the dispense unit pressure and liquid level sensors.**

Note: Performing calibration on the Model 300 resets the PWM to a default value of 5. Once calibration is complete the PWM value must be reset to the desired value.

Selecting (C) turns off the red alarm light and gives the following display:

```
UNIT <X> CALIBRATION
E=CONTINUE    F=DONE
ADJ <X1> FOR <00.0>
     1=<XX.X>
```

Adjust X1 (X=unit slot) on the dispense board through the front panel (See Appendix B) to give 00.0 on the display. When this is done press (E) to continue.

```
UNIT <X> CALIBRATION
  TESTING PRESSURE
      HIGH/LOW
      F=EXIT
```

At this time the unit is pressurized to maximum pressure. The controller then reads the absolute pressure sensor. If less than 10psi is read, the unit is a 6psi type. If 10-20psi the unit is a 15psi type. If greater than 20psi. then the unit is a 25psi type.

```
UNIT <X> CALIBRATION
E=COMPLETE   ADJ R22
ON DISPENSE UNIT FOR
<XX.X> PSI ON GUAGE
```

If the pressure gauge does not read the proper type, 6, 15 or 25psi, adjust R22 on the dispense unit interface circuit board (See schematic in Appendix E). Once the adjustment is complete press (E).

```
UNIT <X> CALIBRATION
     E=COMPLETE
 ADJ X2 FOR <XX.X>
    1=<+XX.X>
```

After this is complete, adjust X2 (X=unit slot) through front panel (See Appendix B) for the proper reading on the display. When this is complete press (E). This returns to the X1 display. The unit will now vent pressure to 00.0 indicated on the display. The unit must have adequate time for the pressure to settle, at least 30 seconds. If the display does not indicate 00.0psi on the display adjust X1 (X=unit slot) until it does. Adjustments of X1, X2 (X=unit slot) and R22 interact with each other, therefore the complete calibration process must be repeated until it can be completed without any further adjustments to consider the unit properly calibrated.

NOTE: On the final pass of the calibration there must be adequate time for the pressure to settle to 00.0 to accurately set the unit.

When this step is complete press (F). This stores the atmospheric pressure sensor value.

NOTE: If any 15psi dispense unit displays 25psi or 6psi dispense unit displays 15psi as its maximum pressure during the calibration procedure, all of the calibration potentiometers need to be placed in the center of their ranges then calibration needs to be started from the beginning.

b. Liquid Level Sensor Setup

All IDS300 pumps are equipped with capacitive type liquid level sensors. All IDS310 pumps are designed with a Teflon float to control the liquid level. The IDS310 float sensor requires no calibration. Exit calibration, allow the unit to fill. Adjust the PWM settings at this time. The controller knows what type of dispense unit is attached. The last step of the IDS300 calibration process is to adjust the potentiometer on the top of the capacitive liquid level sensor. The following screen will be displayed and only applies to capacitive type sensors. The following setup procedures are for capacitive sensors only.

```
UNIT <X> E=COMPLETE
 ADJUST CAP SENSOR
 FOR  <0725> +- 25
      <XXXX>
```

Note: To perform these calibration procedures, the IDS300 Family controllers must be using MB38CZ80 or later software. Each type of chemical has a specific setup procedure. Be certain the proper setup is used for the type of chemical used.

1. Developer Setup

A. Drain any chemical out of the unit.

B. Remove the top block assembly from the dispense unit by unscrewing the four long bolts running though it. Disconnect the Teflon tubing from the block. Leave the sensors connected.

Note: Check that the capacitive sensor is firmly screwed into the sensor well in the top block.

C. Clean and dry the inside of the top block. Place top block back on the cylinder and reattach the Teflon tubing. Reinstall the four long bolts.

D. Complete the calibration procedure for the pressure sensors.

E. While the dispense unit is assembled and empty, adjust the potentiometer setting on the top of the cap sensor for a sensor reading of < 725 +/-25 >. Keep hands away from the sensor while reading. Ignore the LED on the sensor.

Note: Turning the sensor potentiometer counter clockwise (CCW) increases the display reading, turning the sensor potentiometer clockwise (CW) decreases display reading.

F. Remove the top block assembly from the dispense unit by unscrewing the four long bolts running though it. Disconnect the Teflon tubing from the block. Leave the sensors plugged connected.
G. Place the top block face on the IDI cap sensor calibration fixture (P/N 2-107-011). Without adjusting the sensor, the display reading should be between <125> and <140 >. Keep hands away from the sensor when reading. If the reading is between < 125> and <140>, proceed to step K.
H. If the reading is above <140>, replace the sensor.
I. If the reading is below < 125 > adjust the screwdriver setting on the top of the cap sensor for a display number of < 125 >. Keep hands away from the sensor when reading.
J. The range of the potentiometer may not be enough to reach < 125 >. If this is the case, loosen the sensor locknut and unscrew the cap sensor part way out of the block until the display reads < 125-135 > then secure the locknut on the sensor. Readjust the potentiometer setting until the display reads < 125 > +/- <1>.

Note: Do not leave the screwdriver setting at the extreme end of its adjustment. If necessary unscrew the cap sensor more and readjust the screwdriver setting to get the proper display setting. Keep hands away from the sensor when reading.

K. Reassemble the dispense unit. After assembly, the display reading on the controller display should be greater than <700>. Allow the unit to fill, then perform the PWM setup procedure on page 14 section B.
L. When finished exit the calibration procedure.

2. Aquatar® type Anti-Reflective Coating Setup

Note: For the IDS unit to work properly with Aquatar® it must be used with an uninterrupted chemical source. The RFM module (P/N 5-200-001) in line and configured in the following way, will ensure the IDS has a continuous chemical supply.

The unit must be empty and dry to setup for Aquatar®.

A. Remove the cap sensor for the top block of the unit.
B. Insert the Teflon shim (P/N 1-140-122) into the cap sensor cavity.
C. Replace the cap sensor in the top block assembly. Take caution not to over tighten the sensor in the block. This could cause unstable sensor reading.
D. Calibrate the IDS unit as stated in the reference manual.
E. When you reach the cap sensor adjustment step, do not adjust for <750>, follow these steps instead.
F. Remove the top block assembly from the unit.
G. Place the steel calibration fixture (P/N 2-107-011) against the face of the top block/sensor. The fixture must be touching the sensor face for proper reading.

H. Adjust the sensor reading for <250> +/- < 5> on the display screen.
I. Install the new fill tube (P/N 1-140-125) in the top block at this time. This will be a press fit in the fill port of the top block. The side opening of the tube should be facing the cylinder wall when assembled.
J. Reassemble the unit with a filter. Allow the unit to fill, then perform the PWM setup procedure on page 14 section B.
K. The unit is now ready to purge and place in production. Do not purge back to the source when installing a new filter in an Aquatar unit.

Note: If the unit is re-calibrated, the cap sensor must be re-adjusted. This setup will only work with Aquatar® and water. Do not use this setup with other chemicals.

3. Other chemicals (Photo-Resist, EBR, etc.)

Note: The unit must have the FEP (translucent Teflon) cylinder installed in the unit. The reference line closest to the end of the cylinder should be at the top of the unit. The bottom line marks the top of the filter.

A. Drain any chemical out of the unit.
B. Remove the top block assembly from the dispense unit by unscrewing the four long bolts running though it. Disconnect the Teflon tubing from the block. Leave the sensors plugged connected.

Note: Check that the capacitive sensor is firmly screwed into the sensor well in the top block.

C. Clean and dry the inside of the top block. Place top block back on the cylinder and reattach the Teflon tubing. Reinstall the four long bolts.
D. Using the step of the calibration procedure for the pressure sensors.
E. While the dispense unit is assembled and empty, adjust the potentiometer setting on the top of the cap sensor for a sensor reading of < 725 +/-25 > on the controller display. Keep hands away from the sensor while reading. Ignore the LED on the sensor.

Note: Turning the sensor potentiometer counter clockwise (CCW) increases the display reading, turning the sensor potentiometer clockwise (CW) decreases display reading.

F. Set source to normal supply.
G. In purge mode, allow the dispense unit to fill until reaching the line at the top of the cylinder.

H. If necessary, enter drain mode to drain the unit so that the liquid is level with the mark at the top of the cylinder.
I. Place the dispense unit in drain mode. Set all drain points to 0.
J. Press (A) on the drain screen. Begin drain. This will not actually drain the unit but give the liquid level sensor reading.
K. Gently agitate the dispense unit to get the face of the sensor wet. **Do not invert the dispense unit to do this.**
L. Adjust the potentiometer adjustment so that the sensor reading is approximately <0450> +/- <25> on the controller display. The numbers will vary due to the liquid movement of the fluid in the reservoir, so this is approximate. Keep hands away from the sensor while reading.

Note: Turning the sensor potentiometer counter clockwise (CCW) increases the display reading, turning the sensor potentiometer clockwise (CW) decreases display reading.

M. Place the dispense unit in purge mode. Initially set the purge timer to about 20 seconds. Set purge pressure to 3psi.
N. Select a purge point and begin purging to that point.
O. Watch cycle to insure level does not drop to the filter level line. If it does, adjust the purge time and pressure to correct this.
P. Observe the liquid in the reservoir. Be certain that, as the liquid level changes, the sensor reading changes as well. The number should be greater than or equal to <600> when the level is approximately 1 inch down from the top line on the cylinder.
Q**.** If, as the liquid level drops, the sensor reading does not change or does not reach <600>, stop the purge and repeat step 3 and following. If the sensor can not be set according to this procedure, replace sensor. Allow the unit to fill, then perform the PWM setup procedure on page 14 section B.
R. When finished exit the calibration procedure.

Note: Recalibration of the liquid level sensor should not be done each time a filter is changed. The only time the sensor should be recalibrated is when the type of chemical used in that dispense unit or major component is changed.

Each unit is calibrated to match the installed pressure gauge and liquid level sensor. The dispense unit is calibrated at the factory and under normal operating conditions should not require another calibration. If the unit dispenses at the proper pressure (on the gauge + differential pressure), calibration is not required. Calibration will be required for one or more of the following reasons:
1) After changing critical parts (dispense unit controller P.C. board or pressure sensors).
2) Anytime the program pressure does not match the gauge pressure plus any differential pressure.

C. Unit Setup

```
 UNIT (X) EXIT = <E>
SET PROCESS = <A>
 MAINTENENCE = <B>
UNIT SET UP = <C>
```

Pressing (C) gives the program reservoir refill parameters.

```
 UNIT (X) 1=ON 0=OFF
 SOURCES 1=<X>  2=<X>
 SOURCE SELECT    <X>
 SWITCH TIME <XXX.XX>
```

By pressing (E), the cursor advances to the number of sources entry. This is the number of input sources the unit may switch between. Each unit can have up to two sources. Enter a (1) to enable that source. Pressing (E) moves the cursor to the next source. Enter a (1) to enable that source. Pressing (E) moves the cursor to the selected source. Enter a (1) or (2) to select the source the unit is refilling from at this particular time. Any of these parameters can be changed by entering new parameters. The user can now enter the time it takes to refill the reservoir. This time determines when the unit will switch sources. Refill time depends on location of the sources and the type of chemistry involved. To store the information and continue, press (E). The unit will then display the vacuum and end-of-dispense selection. Press (F) to return to the active units display.

This display allows the user to set the vacuum and idle state operation.

```
 UNIT (X)   0-26inHg
 MAX. VACUUM <XX>inHg
  0=VAC 1=ATM 2=PRES
  IDLE STATE <X> ATM
```

The user then enters the maximum vacuum that is allowed on the reservoir. The range is 0-26” Hg. Pressing (E) stores the information and advances to the idle state selection. Press (F) to return to the active units display.

Pressing (0) for the idle state gives this display. The idle state of the reservoir is vacuum.

```
UNIT (X)   0-26inHg
MAX. VACUUM <XX>inHg
 0=VAC 1=ATM 2=PRES
 IDLE STATE <0> VAC
```

Pressing (1) for the idle state gives this display. The idle state of the reservoir is atmosphere.

```
UNIT (X)   0-26inHg
MAX. VACUUM <XX>inHg
 0=VAC 1=ATM 2=PRES
 IDLE STATE <1> ATM
```

Pressing (2) for the idle state gives this display. The idle state of the reservoir is pressure.

```
UNIT (X)   0-26inHg
MAX. VACUUM <XX>inHg
 0=VAC 1=ATM 2=PRES
IDLE STATE <2> PRES
```

If vacuum is selected, the vacuum venturi will place a vacuum on the reservoir following each dispense. If atmosphere is selected the reservoir will vent to atmospheric pressure after each dispense. If pressure is selected the reservoir will remain at the dispense pressure after each dispense. The normal idle state operating mode is atmosphere. This allows the nitrogen pressure to be vented off between dispenses.

Press (E) to store the idle state and continue to the EOD signal display. Press (F) to return to the active units display.

```
UNIT (X)   INTERFACE
 E.O.D. 1-4 (X) XXXX
ERROR SIGNAL STATE
0=OFF 1=ON  (X) OFF
```

Each dispense unit has the ability to interface to different types of process equipment. The end of dispense signal (EOD) interface signal is a hardware handshake signal used by the host equipment to insure a dispense is in progress or has occurred, depending on the type of equipment. For detailed information see IDS Dispense Unit Interface & Handshaking starting on page 37.

Pressing (1) for the EOD operation gives this display.

```
UNIT (X)   INTERFACE
 E.O.D. 1-4 <1> -EOD
ERROR SIGNAL STATE
0=OFF 1=ON  <X> OFF
```

Pressing (2) for the EOD operation gives this display.

```
UNIT (X)   INTERFACE
 E.O.D. 1-4 <2> +DIS
ERROR SIGNAL STATE
0=OFF 1=ON  <X> OFF
```

Pressing (3) for the EOD operation gives this display.

```
UNIT (X)   INTERFACE
 E.O.D. 1-4 <3> +EOD
ERROR SIGNAL STATE
0=OFF 1=ON  <X> OFF
```

Pressing (4) for the EOD operation gives this display.

```
UNIT (X)   INTERFACE
E.O.D. 1-4 <4> SYNC2
ERROR SIGNAL STATE
0=OFF 1=ON  <X> OFF
```

Pressing (E) stores the EOD signal operation and advances to the error signal state selection. Press (F) to return to the active units display.

```
UNIT (X)   INTERFACE
E.O.D. 1-4 <4> SYNC2
ERROR SIGNAL STATE
0=OFF 1=ON  <X> OFF
```

The alarm signal interface active level is programmed from this display. By entering a (0) the signal will turn off when a dispense is not possible. If a (1) is entered, the signal will turn on when a dispense is not possible.

Pressing (E) will advance to the vent valve display. Press (F) to return to the active units display.

```
UNIT (X) AUTOMATIC
VENT VALVE OPERATION
 0=OFF 1=ON <X>
VENT TIME    <X.XX>
```

The auto-vent option display allows the user to turn off the auto-venting feature. The filter is vented by a tube that is inserted inside the filter (See Appendix C). This tube is at the highest point in the filter.

The vent valve has a programmable timer with it. This allows the unit to vent the filter of accumulated bubbles as needed up to 2.55 seconds or until T0 expires (see Dispense Delay). When a dispense is requested from the host equipment the dispense unit monitors the pressure in the reservoir. When the pressure is approximately 25% of the dispense pressure and the auto-vent is enabled, the unit will open the selected input valve and start the vent timer. When the vent timer expires, the input valve is closed then the dispense valve is opened. If delay timer T0 should expire before the vent timer, the input valve is closed and the dispense valve is opened. If the delay timer T0 is set to 000.00 the input valve will open at 25% of dispense pressure and close at 100% dispense pressure.

All of this allows the timing of the vent valve to vary on an as needed basis. If the vent valve is not enabled, the vent valve function will not operate. The vent valve function should be turned off if an internal filter is not used.

Pressing (E) advances to the empty counts display. Press (F) to return to the active units display.

```
UNIT (X) EMPTY COUNT
ENTER          0-255
       <XXX>
```

After each dispense, the unit checks the liquid level sensor. If a low level is detected (approximately 25cc from full and varies with the density of the dispense chemical), the unit will increment the empty count. When the count exceeds the value programmed above, the unit will alarm. See Alarm Conditions, RESERVOIR EMPTY. The empty count is reset whenever a low has not been detected. The standard unit reservoir contains approximately 100 cc from the low level to the top of the filter. The 500 cc model (extended cylinder) has 500 cc from the low level sensor to the top of the filter. From the dispense volume and volume of the reservoir, the number of empty counts can be calculated and programmed into the IDS controller. The range is 0-255.

To calculate the minimum empty count value to use this formula.

```
Empty Count =  Throughput (wafers per minute) X Number of Outputs (1-3)
               X Source Switching Time X Number of Sources (1-2)
```

The maximum empty count is the limiting factor. To calculate the maximum empty count value to use this formula.

```
Standard Model        Empty Count =  100cc / dispense shot size
Large Capacity Model  Empty Count =  500cc / dispense shot size
```

Pressing (E) advances to the buffer tank display. Press (F) to return to the active units display. The buffer tank is a separate tank from which the dispense unit receives chemical. This tank is usually at atmosphere.

```
UNIT (X) BUFFER TANK
<0>=NO  <1>=YES AUTO
  <2>=YES MANUAL
  <0> NOT INSTALLED
```

If a (0) is entered the system does not monitor the buffer tank.

```
UNIT (X) BUFFER TANK
<0>=NO  <1>=YES AUTO
  <2>=YES MANUAL
  <1> YES AUTO
```

If (1) is entered the system will monitor the buffer tank liquid level sensor and the exhaust sensor.

```
UNIT (X) BUFFER TANK
<0>=NO  <1>=YES AUTO
  <2>=YES MANUAL
  <2>=YES MANUAL
```

If (2) is entered, (manual mode), the unit does not monitor the exhaust sensor.

Because the controller has the capability of running four dispense units and some may or may not have buffer tanks the user has the option of selecting the units that do. If the user selects automatic mode (1), when a low level is detected, the unit will activate a pneumatic signal that opens a valve allowing the buffer tank to fill from a bulk chemical supply system. The unit will fill until it detects a high level in the reservoir. At this time it will turn off the pneumatic signal closing the bulk supply valve. In the automatic mode of operation the unit also monitors an exhaust sensor. This sensor must be connected to operate in the automatic mode. The exhaust sensor monitors the exhaust gases expelled from the tank during an auto-fill operation. If the sensor detects any liquid it will terminate the auto-fill and sound an alarm. The exhaust sensor must be physically drained before the unit will allow another auto-fill.

If the user selects the manual mode (2), the system will alarm when the buffer tank's low level is detected. When the tank is filled, the high level sensor becomes active. This will turn off the red light and return the display to the normal state.

III. TYPICAL OPERATION

A. Dispense Override of Fill Operation

If the IDS System is in the middle of a fill cycle and the process equipment calls for a dispense, the fill cycle will be terminated and the Dispense cycle activated. The user programmed time for fill is terminated at this point, and the time left for the refill is stored by the IDS controller. Once the refill is resumed, the refill time is continued from the point of termination. The Dispense Cycle will override all Chemical Reservoir fill cycles. When filling, the vacuum venturi is on, producing chemical vapors that need to be routed to a compatible House Exhaust system.

B. Input Switching Option

If the HI level is not detected in the user programmed amount of time, the input selection will automatically switch from #1 chemical input to #2 chemical input. The switching will only occur after the user programmed time has elapsed on each input. The controller software has the capability to check previously used chemical inputs until the Chemical Reservoir has reached a HI level. Example: Chemical Input #2 has timed out and has not reached a HI level after the user programmed time. The chemical input will then switch to #1 and try to reach the HI level in the user programmed amount of time.

C. Status, Alarms, and Shutdown

With a switch between Chemical inputs, the controller remembers which input(s) is (are) empty and gives to the user the status of the inputs through the display or through the optional serial port. The controller will indicate if there are empty supplies. If all supplies are full, there will be no empty status indication on the IDS controller. If the Chemical Inputs are empty, and the switching cycle has been completed the IDS controller will give both the visual red light and audible alarms.
The standard reservoir has approximately 100ml of chemical between the low level and the top of the filter. The 500ml reservoir has approximately 500ml of chemical between the low level and the top of the filter. If the Chemical Inputs are not changed after the alarms and the reserve dispense is all used, then a reservoir empty alarm will be given and the alarm signal will be sent to the associated process equipment. All hardware and communications link dispense triggers are ignored.

D. Liquid level sensor

On IDS300 type pumps, a liquid level sensor tolerance alarm will be given if the capacitive sensor is operating outside its normal operating range of 4-20 mA. High level current for the sensor is approximately 9.5 mA and a low level is approximately 12mA. Less than 2.5mA or greater than 22.9mA is a fault condition. On IDS310 float models, an exhaust interlock alarm will be given if the float sensor fails and the unit tries to overfill.

IV. SPECIAL FUNCTIONS

```
 INTEGRATED DESIGNS
MODEL 300 CONTROLLER
  UNITS INSTALLED
    <X X X X>
```

Pressing (A) from the units installed display will give the current firmware operation display.

```
 INTEGRATED DESIGNS
MODEL 300 CONTROLLER
 FIRMWARE REVISION
    <XXXXXXXX>
```

Pressing (E) will advance to the controller address display.

```
 INTEGRATED DESIGNS
MODEL 300 CONTROLLER
ADDRESS 1-64 <XX>
A=SET COMM   E=ENTER
```

The present address will be displayed. The user should enter a number to designate the controller. This number will be used by the host system to identify the controller. If no change is desired, press (F) to return to the installed units display or press (E) to advance to the access code display. Press (A) to set communications parameters.

```
 INTEGRATED DESIGNS
MODEL 300 CONTROLLER
ENTER CODE   E=ENTER
ACCESS CODE = <XXX>
```

The present access code will be displayed. If no change is desired, press (F) to return to the active units display. To enter new code, type in a new three digit code and press (E). The user will then have to enter this code before being allowed access to the main select menu display.

Via the optional communications board, each dispense unit can individually be placed into remote operation. In this mode controller keyboard entries for that unit are not allowed. Attempts made to access the menu select display by entering the access code with the keyboard disabled from the host system will generate the following display response.

```
UNIT <X> EXIT = <E>
KEYBOARD ENTRIES ARE
 DISABLED FROM HOST
       SYSTEM
```

All programmable features must be accessed through the communications port. See Overall Description, Remote Operation. Pressing (E) will return to the units installed display. Access to the controller may be restored by turning off power and the turning it on.

```
 INTEGRATED DESIGNS
MODEL 300 CONTROLLER
ADDRESS 1-64 <XX>
A=SET COMM   E=ENTER
```

Pressing (A) from this screen gives access to the serial communications screens.

```
  SERIAL CHAR ( )
  0=7 BIT  1=8 BIT
 PARITY ( ) 0=NONE
1=ODD 2=EVEN E=ENTER
```

Pressing (E) in the parity field advances to the next screen.

```
STOP BITS 1=1 2=2( )
SERIAL BAUD RATE ( )
   0=2400 1=4800
   2=9600 E=ENTER
```

Pressing (E) in the baud rate field advances to installed units screen.

V. ALARM CONDITIONS

NOTE: Pressing any key will silence the audible alarm. Access to program menus may gained by pressing (C).

```
DISPENSE UNITS
<A B C D>
INVALID DATA
REPAIR CODE 01
```

Communication from the mother board and dispense unit boards have resulted in invalid data being sent to an installed board. This is most often seen on new units. Reprogram the unit parameters and/or step through calibration without making any changes.

```
DISPENSE UNITS
<A B C D>
COMMUNICATION FAILED
REPAIR CODE 02
```

The controller does not detect any unit I/O cards. Check the controller. Communication between the mother board of the controller and the dispense unit boards has failed. This is from no dispense unit boards being installed or a hard failure from an installed board. The display will give the unit(s) that is (are) at fault.

```
DISPENSE UNIT <X>
LIQUID LEVEL SENSOR
OUT OF TOLERANCE
REPAIR CODE 03
```

IDS300 models

```
DISPENSE UNIT <X>
EXHAUST FLOAT SENSOR
OUT OF TOLERANCE
REPAIR CODE 03
```

IDS310 models

The IDS300 capacitive liquid level sensor that maintains the dispense unit reservoir liquid level has failed or is out of its proper operating range. The alarm signal to the host system is active. The liquid level sensor needs to be calibrated. (SEE CALIBRATION MODE) If this can not be done, replace the sensor and recalibrate. This alarm does not apply to the IDS310 float type sensors.

```
DISPENSE UNIT <X>
 MAX DIFFERENTIAL
PRESSURE DETECTED
 REPAIR CODE 04
```

The unit has exceeded the maximum differential pressure allowed across the filter. The unit is still operational. If this alarm is reset by pressing (E), it will return when the differential pressure has been exceeded again. The red light will be extinguished when the display is returned to the active units display. SEE CONTROLLER PROGRAMMING, PROCESS SETUP, DIFFERENTIAL PRESSURE.

```
DISPENSE UNIT <X>
 12 VOLT FAILURE
    DETECTED
 REPAIR CODE 05
```

The dispense unit has detected a blown fuse (F1) in the 12 volt power supply on the controller board. This is due probably to a failure of a valve solenoid.

```
DISPENSE UNIT <X>
 15 VOLT FAILURE
    DETECTED
 REPAIR CODE 06
```

The 15 volt power supply for the liquid level sensor has failed. Check the capacitive liquid level sensor if the dispense unit is equipped with one. IDS310 float type sensors will not cause this failure.

```
DISPENSE UNIT <X>
BUFFER TANK EXHAUST
 CHEMICAL DETECTED
 REPAIR CODE 07
```

The buffer tank sensor associated with the unit has either detected chemical or is disconnected. The buffer tank is kept from filling when the sensor detects chemical. To clear the alarm, drain the liquid level sensor housing and determine why the failure occurred. (Check the liquid level sensor for proper operation.) The alarm will clear when the sensor becomes active. The buffer tank operation mode is automatic. If no buffer tank is in operation, turn it off by entering a (0) on the buffer tank option display. If tank is in operation and is being manually filled, place the mode of operation to manual by entering (2) on the buffer tank option display.

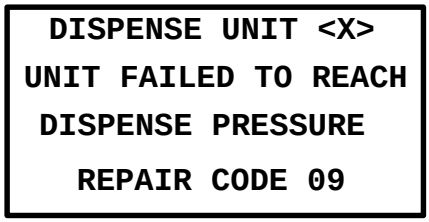
The buffer tank associated with the unit designation has detected a low level condition. The unit is in the manual mode of operation. To silence the audible portion of the alarm, press any key. The buffer tank should be refilled at this time. The tank is equipped with a high level sensor. The alarm will automatically reset when the high level is detected.

```
DISPENSE UNIT <X>
  ANALOG POWER
 SUPPLY FAILURE
 REPAIR CODE 08
```

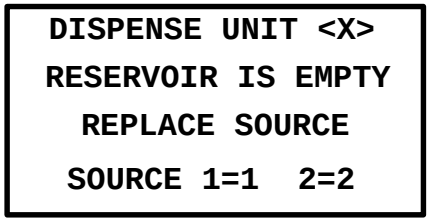
The analog power supply to the pressure sensors has failed. Probable cause is a failure of a pressure sensor. The unit will not dispense.

```
!! EMPTY SOURCES !!
 SOURCE SELECT <XX>
      <S1,S2>
0=NEXT    1=REPLACED
```

The chemical sources empty display will appear when the current source becomes empty. The IDS300 controller has the capability to control four dispense units. Each dispense unit can have up to two sources assigned to it. The dispense unit is designated by the letters A-D. The source is designated by the number 1-2. The SOURCE (##) serves as a pointer to the source for the user to update. The pointer can be changed to the next source without updating the present source by pressing the <0> key. Once the pointer indicates the source the user is updating the <1> key should be pressed. The sources empty will indicate that the source has been updated and the pointer will show the first empty source. If all the sources assigned to a dispense unit were empty at the time the user updated the controller. The dispense unit will begin to fill from the first updated source.



The dispense unit began to dispense before the dispense pressure was stable. This because T0 was set to a time that was too short and timed out before the dispense pressure was reached. Set T0 to 0 or set T0 to a longer value. Press (C) to clear this alarm.



The dispense unit has no chemical available to dispense. The unit has exceeded the programmed empty counts, which is the number of dispenses allowed from the low reservoir level. The alarm signal to the host system is active at this time. The unit will not dispense. To resume operation, press (1) if source one is replaced (2) if source two is replaced. The unit will then fill the reservoir. Once the reservoir is full it will resume operation.

VI. INSTALLATION OF MODEL 300 SERIES DISPENSE UNITS

The size and length of line used plays a major role in the operation of the dispense unit. Smaller diameter lines increase velocity and have greater pressure drops across them. The larger diameter lines decrease velocity and lower the pressure drop across them. If the lines are too small, the pressure required to dispense at a suitable rate becomes impossible for the unit. If the size is too large compared to the dispense volume, any air trapped in the lines is very difficult to purge.

The IDS300 family of dispense units incorporate a rate adjustment that allows the user to use large diameter lines. The recommended size for the dispense unit to the point of dispense is 1/4 inch OD tubing with 5/32 inch ID. Using the flow rate adjustment on the output valve and the programmable pressure allows the user to adjust a wide range of flow rates.

Installation Procedure & Identification Facilities Requirements
(See Appendix B thru E for location of connectors.)

1. Mount unit vertically in a location that makes it accessible for maintenance and/or adjustment.

2. Connect N2 supply. 70 psi (4.8 Bar), 1 scfm (26.8 L/M), 1/4" tube. (1 regulator per dispense unit)

3. Connect purge supply (optional). 10 psi (0.7 Bar), 1/8" tube.

4. Connect Bulkfill Signal (optional). 1/8" tube.

5. Connect exhaust. 1cfm, 1/4" tube.

6. Connect output tubing to output valve.

7. Connect source lines. 1/4" tube, 5/32" id to pump, but **Do Not** connect to chemical containers.

8. Install trigger cables from track to dispense unit.

9. Mount controller so that it is within reach of the 50 conductor cable(s) from the dispense unit(s).

10. Install dispense unit control board in controller so that its serial # matches the one on the unit that it will be connected to. Additional cards may be installed after the complete installation of previous unit.

11. Connect 50 conductor cable from pump to its corresponding control board.

12. Set the Voltage Selector Switch on the rear of the controller to A115" or A230", dependent on which voltage level you plan to use, and then plug into proper power outlet.

WARNING: Powering up the controller with the Voltage Selector Switch setting not matching the input supply voltage can cause damage. Units are shipped from IDI factory in the A230" position.

13. Calibrate unit. The proper calibration range for pressure will be dependent on model of pressure sensor installed.

WARNING: Do not calibrate for wrong pressure. Inspect pressure sensor on bottom of unit to determine proper calibration pressure of 6, 15, or 25 PSI.

14. Set AUnit Set Up≅ and AProcess≅ parameters.

15. Install filter if applicable. (Pre-Wetted if necessary)

16. Connect source lines to source containers and allow unit to fill.

17. Purge output(s) and source lines.

18. Calibrate Liquid Level Sensor for the correct chemical settings. (Float type sensors do not apply)

19. Setup sensitivity of pressure control valves. (PWM x in Purge Mode)

20. Test signals to and from host system.

21. Adjust suckback and do final process setup of parameters.

22. Install next dispense unit control card in controller if applicable.

23. Release unit(s) to Engineering for qualification.

Dispense Unit Setup

The dispense unit has three manual adjustments. The rate of dispense, the amount of suck-back, and the rate of suck-back. The shut-off valves have a rapid turn off rate. Under certain conditions (high flow rates), this can cause some chemicals to cavitate and give the appearance of suck-back. Smaller diameter dispense line will allow higher flow rates to be achieved without cavitation.

1) Make sure all the air is purged from the system tubing. Air in the system will cause inconsistent suck-back.
2) Turn the suck-back valves fully closed (clockwise).
3) Set the dispense pressure for mid range.
4) Set the desired flow rate with the rate adjustment on the output two way valve.
5) Adjust the desired amount of suck-back by turning the suck-back adjustment located on the suck-back valve.
6) Adjust the needle-check valve located on the dispense valve for the desired suck-back rate. (See Appendix D for valve locations.)

Dispense Rate Adjustment Example

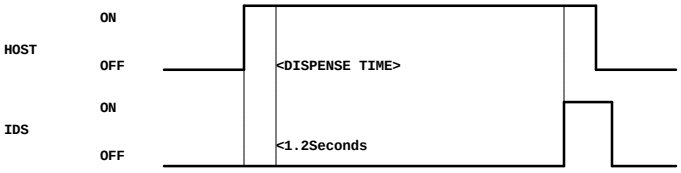
Desired dispense rate: 1.5cc/sec Desired dispense volume: 3cc.

1. Set pressure to 7.5 psi.
2. Set dispense time to 1 sec.
3. Dispense chemistry into graduated cylinder for measurement.
4. Take measurement and calculate rate.
   If 2cc were dispensed
   and 7.5psi=2cc/sec
   then the estimated pressure to dispense for 1.5cc/sec may be calculated this way: $\frac{(7.5\text{psi})(1.5\text{cc/sec})}{2\text{cc/sec}} = 5.6\text{psi}$
5. Set pressure to 5.6psi.
6. Set time to 2sec.
7. Take measurement again and recalculate rate.
8. Repeat these steps until the desired rate is reached (2-3 times).

VII. INTERFACE & HANDSHAKING

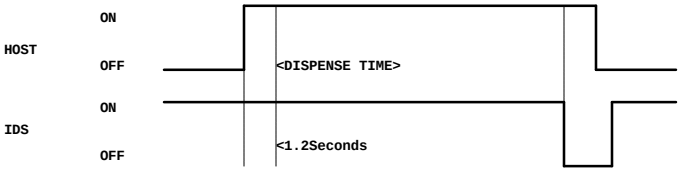
Each dispense unit interface signal is isolated electrically by an optically coupled phototransistor type isolator. Each output can switch a maximum of 30VDC @ 10.0mA. Each input operates from 5-30VDC with a maximum of 1.6mA input current. NOTE: Signal inputs and outputs are polarity sensitive. A single normally open and normally closed relay contact is also available on the optional communications board. Its operation follows that of the audible alarm. When the audible alarm is active, the relay is energized. When it is silent, the relay is idle. Maximum ratings: switched power 30W or 62VA Resistive; voltage 110VDC or 125VAC; switched current 1A. (See Appendix E for Interface Board schematic and connector pinouts and Appendix D for male DB-9 connector locations). The interface handshaking for the IDS dispense unit is programmable with four (4) possibilities. They are -EOD, +EOD, +DIS, and SYNC 2.

-EOD



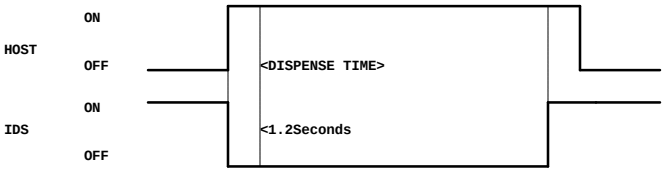
1) IDS system has the EOD signal off.
2) Host system sends the trigger signal.
3) IDS system dispenses for programmed time.
4) IDS closes output valve and turns on EOD signal (output optoisolator on).
5) Host equipment removes trigger signal.
6) IDS unit turns off EOD signal.

+EOD



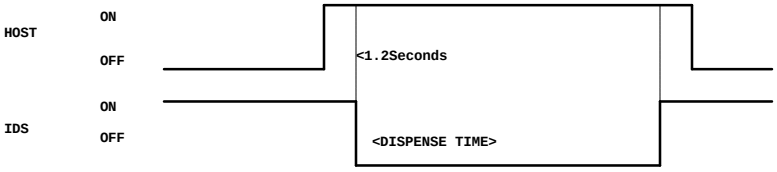
1) IDS unit has the EOD signal on (output optoisolator on).
2) Host system sends the trigger signal.
3) IDS system dispenses for programmed time.
4) IDS closes the output valve and turns off EOD signal (output optoisolator off).
5) Host system removes trigger signal.
6) IDS unit turns on EOD signal (output optoisolator on).

+DIS



1) The IDS unit has the EOD signal turned on (output optoisolator on).
2) Host system sends the trigger signal.
3) IDS unit turns off EOD signal (output opto isolator off).
4) IDS unit dispenses for programmed time.
5) IDS unit closes output valve and turns on EOD signal (output optoisolator off).
6) Host system removes the trigger signal.

SYNC 2



1) The IDS unit has the EOD signal turned on (output optoisolator on).
2) Host system sends trigger signal.
3) IDS unit brings unit to pressure.
4) When the output valve is opened, the EOD signal is turned off (output optoisolator off).
5) The IDS unit dispenses for programmed time.
6) The IDS unit turns on EOD signal when closing output valve.
7) Host system removes the trigger signal.

NOTE: In all four EOD modes, if the trigger signal is removed before the IDS dispense timer has expired, the dispense will be aborted and the EOD signal will go to the initial state.

Dispense Delay Time

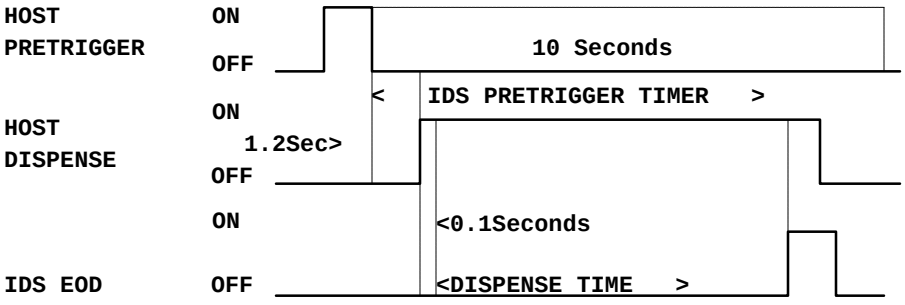
Under the main setup menu select process setup. This will give access to the delay timer T0. T0 is a programmable delay from receiving a dispense trigger to actually opening the dispense valve. It has a 1.2 second minimum to a maximum of 655.35 seconds. If T0 is set to 000.00 the delay will only be as long as the unit takes to reach dispense pressure.

```
UNIT<X> T0=<XXX.XX>
DISPENSE 1=<XXX.XX>
DISPENSE 2=<XXX.XX>
DISPENSE 3=<XXX.XX>
```

Pre-trigger

Pre-trigger may be used in all four EOD modes. This signal is used when dispense timing is critical to the process. The host sends the pre-trigger signal to bring the IDS unit to pressure before an actual dispense is activated. The IDS unit is at pressure approximately 1.2 seconds, (worst case) after the on to off transition of the input optoisolator. The process system then issues a trigger signal, then the dispense will occur in <.1 second. The IDS unit will remain at pressure for ten seconds after the falling edge of the pre-trigger input. This allows for multiple dispenses if desired.

EXAMPLE: -EOD WITH PRETRIGGER



1) The host equipment sends a pre-trigger signal for 0.1 second.
2) On the on to off transition of the pre-trigger signal, the IDS system brings the reservoir to pressure in approximately 1.2 seconds (worst case). The IDS unit will remain at pressure for ten seconds after the on to off transition of the pre-trigger signal.
3) Host system sends trigger signal to dispense 1.2 seconds after pre-trigger on to off transition.

4) IDS system opens the output valve <0.1second after the trigger.
5) The host system has the option of multiple dispenses by turning the trigger signal on and off during the 8.8 seconds of the remaining pre-trigger duration.
6) After the trigger signal is removed and the 10 sec. pre-trigger time elapses, the IDS will resume normal operation. The pre-trigger can be re-triggered at any time.
7) The EOD signal will operate normally independent of the pre-trigger. If the IDS timer expires and terminates a dispense, the EOD will operate in its pre-programmed mode. If the host system terminates the dispense by removing the trigger signal, the EOD signal will go to the ready state at that time (signal condition depends on mode).

Alarm Signal

The alarm signal will become active whenever the system is unable to dispense, (reservoir empty, capacitive liquid level sensor out of tolerance, IDS310 float type liquid level sensor has failed, chemical has been detected in the unit exhaust path or the dispense unit is in one of the maintenance modes)

VIII. MAINTENANCE

Recommended Spares Description	IDI Part #	Qty
IDS300 Family		
Mother Board Assy	1-139-020	1
IDS300 Family Serial Com. CE PCB	1-139-033	1
Absolute Pressure Sensor Assy 0-50psia (M6)*	2-103-003	1
Absolute Pressure Sensor Assy 0-50psia (M8)*	2-103-015	1
Input Valve Assy	1-140-043	1
Dispense Suckback Valve Combo*	1-140-159	1
Dispense Valve No Suckback*	1-140-045	1
Elbow & Plate*	1-140-046	1
Input Elbow	1-105-067	1
Pressure Sensor Assy 0-6psi*	2-103-017	1
O-Ring, 6psi pressure sensor Chemraz*	1-124-028	2
Pressure Sensor Assy 0-15psi*	2-103-001	1
Pressure Sensor Assy 0-25psi*	2-103-002	1
O-Ring, IDS Block Assembly FEP/VITON	1-124-014	2
Pilot Valve, Low Power/Speed	1-110-040	1
Pilot Valve, High Power/Speed	1-110-041	1
Pilot Valve, Medium Power High Flow	1-110-050	1
3-way valve, dual pilot	1-110-036	1
Filter N_2	1-111-513	1
IDS300		
IDS300 Liquid Level Sensor Assy (M6)*	2-103-004	1
IDS300 Liquid Level Sensor Assy (M8)*	2-103-016	1
IDS310		
IDS310 Control PCB Assembly	1-139-030	1
IDS310 O-Ring Exhaust Chamber	1-124-026	1
IDS310 O-Ring IDS310 Liquid Level Sensor	1-124-027	1
IDS310 Exhaust Float Sensor	2-108-105	1
IDS310 Liquid Sensor Assembly 16+500mL	2-108-027	1

*Parts specific to dispenses unit type.

Filter Change

1) Place a container under the dispense points, or re-route the dispense points to drain.
2) Drain the reservoir (SEE DRAIN MODE).
3) Remove the four long bolts on top of the reservoir.
4) Remove the top block and cylinder from the unit and wipeout any residue.
5) Remove the old filter.
6) Install a new filter.
7) Re-assemble the unit.
8) Place input source in chemical.
9) Purge the unit (SEE PURGE MODE).

NOTE: SOME CHEMICALS MAY REQUIRE THE FILTER TO BE PRE-WETTED BEFORE INSTALLATION.

Liquid Level Sensor

When equipped, the capacitive liquid level sensor on the IDS300 dispense unit is set at the factory. The normal High level current for the sensor is approximately 9.5mA and a low level is approximately 12mA If it should require any adjustment, use the following procedure:

1) Drain & dry the reservoir completely and remove the filter then reassemble.
2) Follow the steps in the calibration mode in the maintenance menu.
3) The last step of the calibration process is to adjust the potentiometer on the sensor until the unit display reads 0725 +/- 25 on the display. Turning the sensor potentiometer counter clockwise raises the display reading and turning it clockwise lowers the display reading.
4) If this can not be done, replace the sensor.
5) After installing filter and purging see calibration section for correct adjustment (fine tuning) of liquid level sensor. Based on chemical in use.

IDS310 Float type sensors do not require this type of maintenance.

Test Points

System voltage test points are available on the optional Communications Board.

Repair Codes

Code, condition, possible cause and possible remedy. See Appendix A for display screen flow.

01. Invalid data: The master controller has received invalid data from dispense unit controller board(s). Unit(s) has (have) wrong programming. Reprogram dispense unit parameters and recalibrate the unit.

02. Communication Failed: Communication between the master controller and one or more individual dispense unit boards have failed. Component failure on dispense unit or master controller board. Replace board(s).

03. Liquid Level Sensor Out Of Tolerance (less than 2.5mA or greater than 22.9mA): On older IDS300 Family pumps, the capacitive liquid level sensor is not operating in its normal operating range. This is due to it not being properly calibrated, not installed or it has failed. Recalibrate the unit and sensor, plug in or replace the sensor unit.

03. IDS310 Exhaust Float Sensor Out Of Tolerance: IDS310 Family pumps equipped with float liquid level sensors, the high level sensor has failed allowing liquid to enter the exhaust cavity. Repair or replace the float liquid level sensor. Clean the exhaust chamber.

04. Maximum Differential Pressure Detected: The differential pressure across the filter (input to output) has exceeded the programmed limit. Either the differential pressure is set too low or the filter is dirty and needs to be replaced.

05. 12 Volt Failure Detected: The dispense unit 12 volt power supply is not working. Fuse on controller card (F1) blown. See IDS control board component placement drawing for location) Faulty valve solenoid(s), component failure or foreign object on dispense unit circuit board. Remove object, replace fuse or board.

06. 15 Volt Failure Detected: The dispense unit 15 volt power supply is not working. The dispense unit liquid level sensor has failed or there is a foreign object on the dispense unit circuit board. Remove object, replace liquid level sensor or circuit board.

07. Buffer Tank Exhaust Chemical Detected: Overfill condition. Liquid level sensor not working/not connected, or valve failure. Verify operation of liquid level sensor and sensor circuit. Verify operation of buffer tank valves and control lines (electric/pneumatic).

08. Analog Power Supply Failure Detected: The dispense unit analog power supply is not working. The pressure sensor(s) or board component(s) has (have) failed or there is a foreign object on dispense unit circuit board. Remove object, replace sensor(s) or circuit board.

09. Unit Failed To Reach Dispense Pressure: The dispense unit began to dispense before the dispense pressure was stable. Verify correct N_2 pressure and flow, check dispense system for N_2 or resist leaks. Verify proper operation of exhaust solenoid (PWM1). Verify PWM settings for correct operation.

For additional technical information, please contact your representative, or call IDI at (972) 466-2323 8am – 5pm CST

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