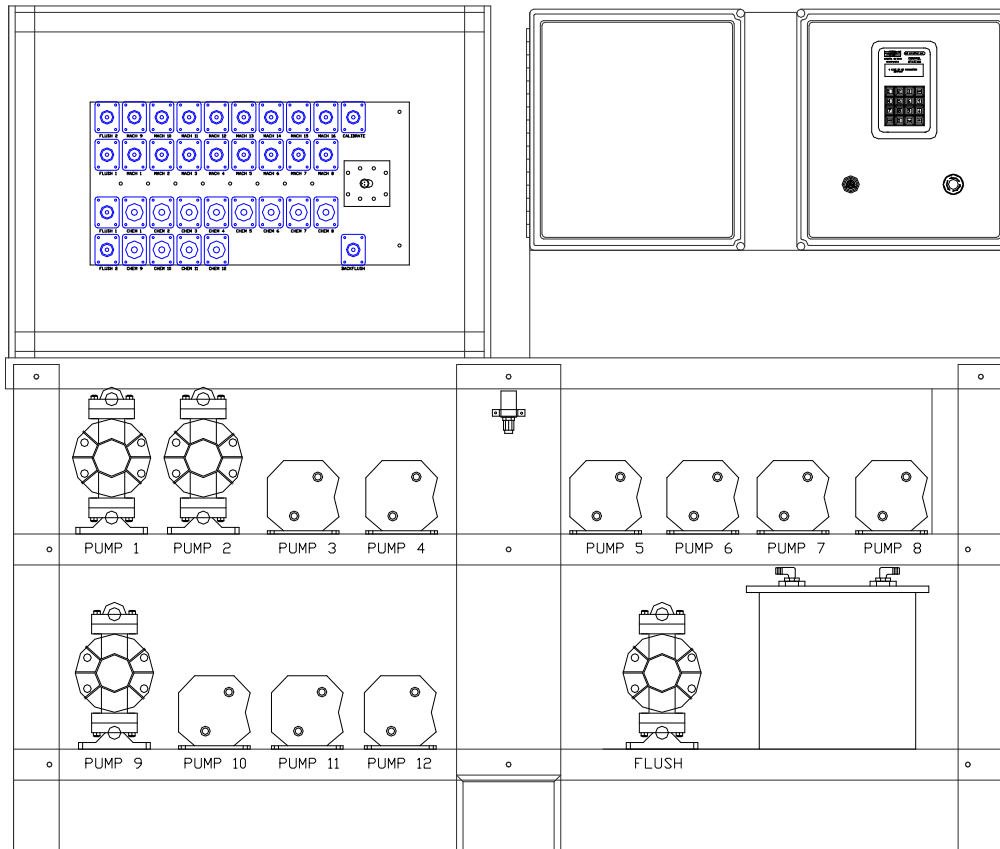


SOFTROL

Software & Control for Automation



CATALYST- Installation and Operation Manual

Softrol Systems Inc.
1100 North Point Parkway
Acworth, GA 30102
(770) 974-2700

Table of contents

Chapter	Description	Page
1	Introduction	5
2	Installation	15
	System Utilities	16
	System Configuration	21
	Interface Installation	24
	Network Installation	28
3	System Operation	31
	Passwords	34
	Priming the system	35
	Interface Operation	37
4	Calibration	39
	Flow meter Based Calibration	40
	H-Factor Calibrations	41
	Time Based Calibration	42
	Conversion Table	45
5	PulseNet Configuration	47
6	PulseNet Programming	49
7	Washer Programming	55
8	Maintenance and Troubleshooting	67
	Catalyst Alarms	68
	Interface Alarms	73
	Arcnet Troubleshooting	80
	Catalyst Electronics	86
	Catalyst Pneumatics	92
Appendix		
1	Pump Manual	A1
2	Catalyst Schematic	A2
3	Catapulse Schematic	A3



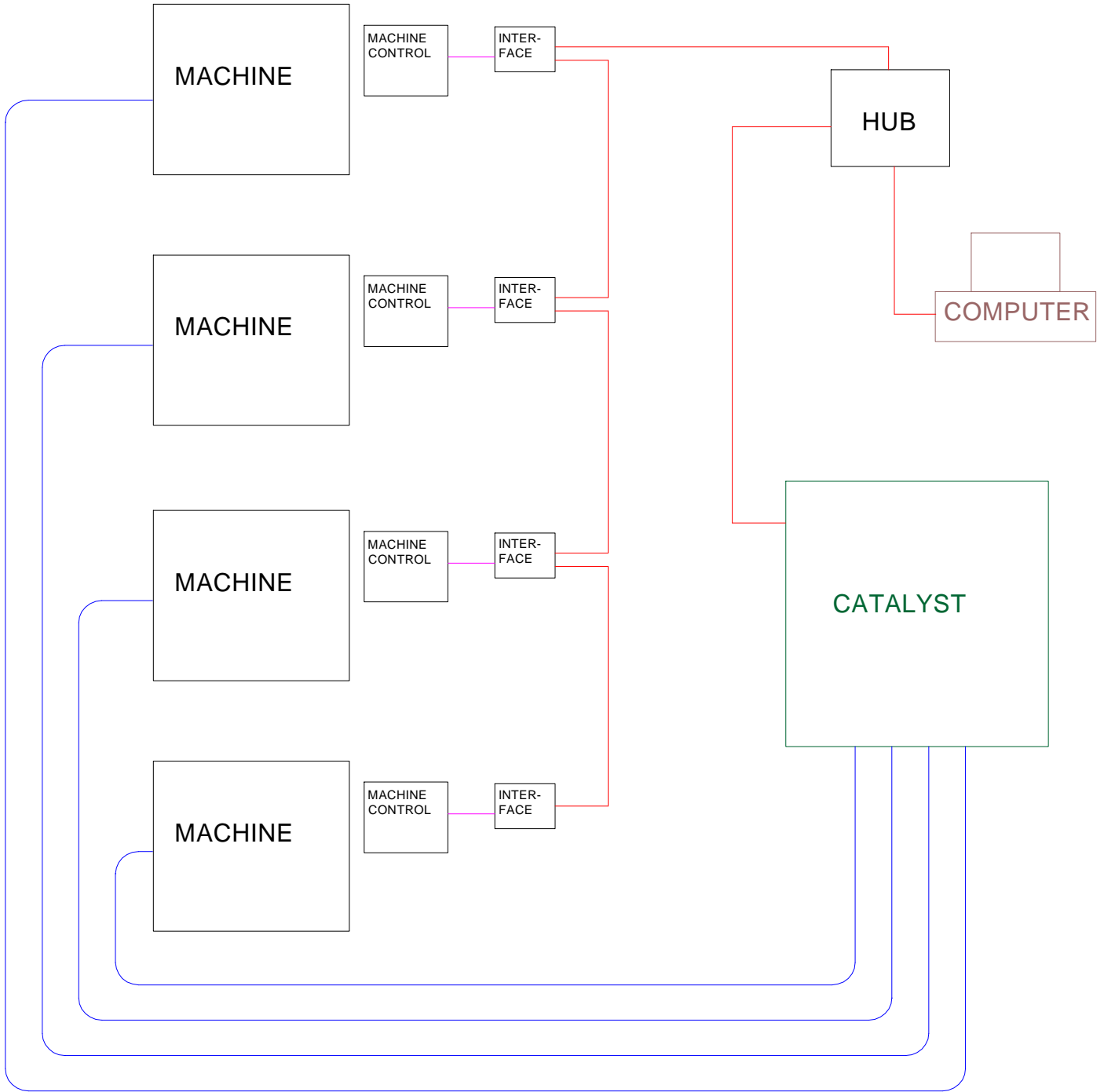
1. Introduction: The Catalyst System

The Catalyst System is a chemical metering and injection system that delivers liquid chemicals to multiple washers. The system is flexible and can be customized to serve up to twenty machines with a possible sixteen chemicals.

The Catalyst System offers precise chemical deliveries with consistent results. The system has the ability to interface with various types of controllers, and production data may be gathered for a variety of washers. Formula entry is simplified with a with the PulseNet PC software and all formulas are stored in the Interface Box or on the microPulse washer controller.

Typical System Layout

- COMMUNICATION LINE
- MULTI-CONDUCTOR LINE
- CHEMICAL DELIVERY LINE



The Softrol Catalyst Family

Softrol Systems, Inc. offers six types of Catalyst Chemical Dosing Systems to automatically deliver chemicals to wet processing equipment. All of the Catalyst Systems utilize specialized Windows® based software to allow user defined programming and process reporting. Softrol Catalyst Systems are built in non-corrosive enclosures with easy access to valves, pumps, and electronic parts. The Catalyst System uses flow meter based injection technology, providing volumetric injection and water flush verification. In combination with Softrol engineered electronics, flow meter, and alarms (watchdogs) the system measures and verifies each injection. With this combined technology, chemicals are injected quickly and accurately: no excess chemicals enter the machine(s).

Features of Softrol Catalyst Systems include:

- Connection with any type washer control
- Properly maintained chemical injections
- 128 programmable injection formulas
- User-friendly operation
- 16 user defined chemical names
- Corrosion resistant materials
- Control of flow rates from 0.2gpm to 10.0gpm
- Data recording and reports
- Programmable alarms
- 32 preventative maintenance prompts
- Accurate chemical injections over a wide range of viscosities
- Simple calibration procedures
- Modular design for simplified troubleshooting, repair and expansion



**Catalyst System
Machine Interface**

Types of Systems

Catalyst Lite



The Catalyst Lite System is a low cost flow metered chemical injection system capable of delivering up to eight (8) chemicals to a maximum of eight (8) washers in a compact all-inclusive chemical resistant enclosure. The Softrol designed and manufactured manifold systems, with built-in flow meter, assures that precise delivery of chemicals is maintained during formula execution. By using the standard Softrol Catalyst software package, this unit delivers many of the features of the Catalyst Classic. In order to provide a low cost solution for the automatic injection of chemicals, Softrol has been able to engineer a system with slightly less automation, primarily in the calibration of chemicals, which is more automated on the upper line systems. Additionally, the Catalyst Lite incorporates an integrated 6-gallon flush tank providing immediate water for flushing the manifold. **This model is available as a redundant system.**

Catalyst Classic



The Catalyst Classic System is the industry standard for effectively automating the delivery of up to sixteen (16) chemicals to a maximum of sixteen (20) washers. The freestanding, non-corrosive enclosure can be placed either in the chemical storage area, or on the washroom floor for easy access. By using multiple Softrol designed manifolds with built-in flow meters; this system is custom designed to deliver high flow, precisely calibrated chemical injections throughout the process formulation. This highly automated system incorporates a full featured, yet simple to operate, Softrol Catalyst Plus software to provide user defined programming and process reporting. All functions of this unit are automated including automated operation of calibration valves and a back flush valve for easy maintenance of the system. Additionally, the Catalyst Classic incorporates a larger integrated 7.5-gallon flush tank providing isolated and tempered water for flushing the injectors. This system has Redundancy capabilities. Please see below for additional descriptive information.

Catalyst Dual Inject



The Catalyst Dual Inject System has similar features of the Catalyst Classic, but offers dual injection capability during the delivery of chemicals to washers. For high production facilities this unit can deliver chemicals to two (2) machines simultaneously while ensuring minimum formula hold times, thus increasing productivity. The Catalyst Dual Inject System does not require any additional chemical pumps to provide multiple machine injections. In addition, the system incorporates a large integrated 15-gallon flush tank with an additional flush pump (2) to ensure proper flushing during simultaneous chemical injections. This Dual Inject System also has redundancy capabilities. Please see below for additional descriptive information.

Catalyst Tunnel



The Catalyst Tunnel System operates in the same method as other Catalyst Systems, including features to ensure superior precision and accuracy for delivering chemicals to a continuous batch washer. The Catalyst Tunnel System has the capability to simultaneously deliver up to sixteen (16) chemicals to eight (8) individual modules of a continuous batch washer. The unique Softrol Catalyst Tunnel System design allows each continuous batch washer module receiving chemicals to be matched with its own chemical manifold with built-in flow meter and flush pump. This ensures quick chemical injections with precise volumetric accuracy. This design allows simultaneous injection of chemicals to separate continuous batch washer modules without initiating production delays. Softrol designed Tunnel Interface Hardware and Catalyst Software is provided with each system which offers user defined programming, data collection, and report generation.

Many installations may require the additional performance of fully redundant chemical injection systems. Softrol also offers their Catalyst Classic and Catalyst Dual Inject systems in fully redundant configurations that provide the unique capabilities of delivering chemicals to 2, 3 or 4 machines simultaneously. They also can provide the unique capability of delivering chemicals to machines while one of the systems is shut down for preventative maintenance

For Washrooms Requiring Redundant Chemical Injections

Catalyst Classic Redundant



The Catalyst Classic Redundant System can utilize two or more Catalyst Classic Systems to achieve complete redundancy for chemical injection. The system utilizes all of the features of the standard Catalyst Classic for effectively automating the delivery of up to sixteen (16) chemicals to a maximum of sixteen (16) washers. The Catalyst Classic Redundant System consists of two complete Catalyst Classic Systems which includes complete replication of valves, pumps, flow meters, calibration components, and software capable of delivering chemicals to two or more machines simultaneously (one machine injection from each system) or have the capability to deliver chemicals to machines while one of the units is shut down for preventative maintenance.

Catalyst Dual Inject Redundant

The Catalyst Dual Inject Redundant System utilizes two Catalyst Dual Inject Systems to achieve complete redundancy for chemical injection. Utilizing all of the features of the Catalyst Dual Redundant for effectively automating the delivery of up to sixteen (16) chemicals to a maximum of sixteen (16) washers. The Catalyst Dual Inject Redundant System consists of two complete Catalyst Dual Inject Systems which includes complete replication of valves, pumps, flow meters, calibration components, and software capable of delivering chemicals to four (4) machines simultaneously (two (2) machines simultaneously injections from each system) or have the capability to deliver chemicals to machines while one of the units is shut down for preventative maintenance.

For Washrooms Requiring Single Machine Chemical Injections ChemPulse Express

The ChemPulse Express flow metered system is an automated chemical injection system for *individual* machines. This system does not employ a Queued, First In - First Out (FIFO operation) as in the ChemPulse Catalyst small systems, but instead the ChemPulse Express system supplies chemicals immediately upon demand from the control. The ChemPulse Express interfaces to a MicroPulse Machine Control or MicroPulse Machine Interface, and allows the control of up to 32 chemicals per machine.

The system is completely modular, so that maintenance or repairs may be completed for specific parts of the system without having to shut down an entire operation. Chemicals are delivered to the ChemPulse Express system by either pressurized chemical headers or a Softrol engineered pump system. After every injection, the system is flushed with water to ensure the system's longevity and to guarantee complete injection of required volumes.

The unique feature of the ChemPulse Express is the feedback which it supplies to the MicroPulse controller. In addition to monitoring volumes, the controller uses the feedback received from the ChemPulse Express to obtain proof of injection and proof of flush. The MicroPulse will alert operators if there are any problems with any part of the injection process. These safeguards prevent chemical waste and costly errors due to improper processing of valuable goods.

2. Catalyst Installation & Configuration

Several weeks prior to the installation, an on site survey should be conducted to determine the best location in the plant for the Catalyst system. Consideration should be given to the location of the chemicals in relation to the washroom and the length of the run from the chemical storage area to the washers. The shorter the length of the Catalyst to the machines, the faster the injection times will be. This is **very** important with the Catalyst Tunnel system. A plant layout with the proposed location for the Catalyst along with the list of chemical and typical injection amounts should be sent to Softrol when the system is ordered. Also include a list of machines and their controller types with the chemical output voltage. This will help ensure that the configuration and layout of the system is optimal.

Before beginning the installation, Softrol Systems recommends that plant personnel be familiar with the types of chemicals they will be working with and the potential hazards that are associated with the chemicals (this information must be supplied in the form of a Material Safety Data Sheet, or MSDS.)

Softrol Systems also recommends that, at the very minimum, plant personnel be required to wear all protective equipment suggested in the MSDS. Extreme care should be taken when working with a pressurized chemical system. Ensure that all pressure has been removed from the system and that all power to the machine is turned off before undergoing maintenance.

Injection Unit

Remove the equipment from the shipping packages. Check the system carefully to assure that no damage occurred in shipment. If any damage from shipment is apparent call Softrol Systems immediately at (770) 974-2700.

Clear the area in which it is to be placed. This should have already been determined in the Site Survey. Uncrate and stand the Catalyst Injection System in the position where it is to be located. Be careful in transporting the Catalyst- it **is** heavy.

Utility Connections

Make all the electrical, air and water connections as explained below.

Water Connections:

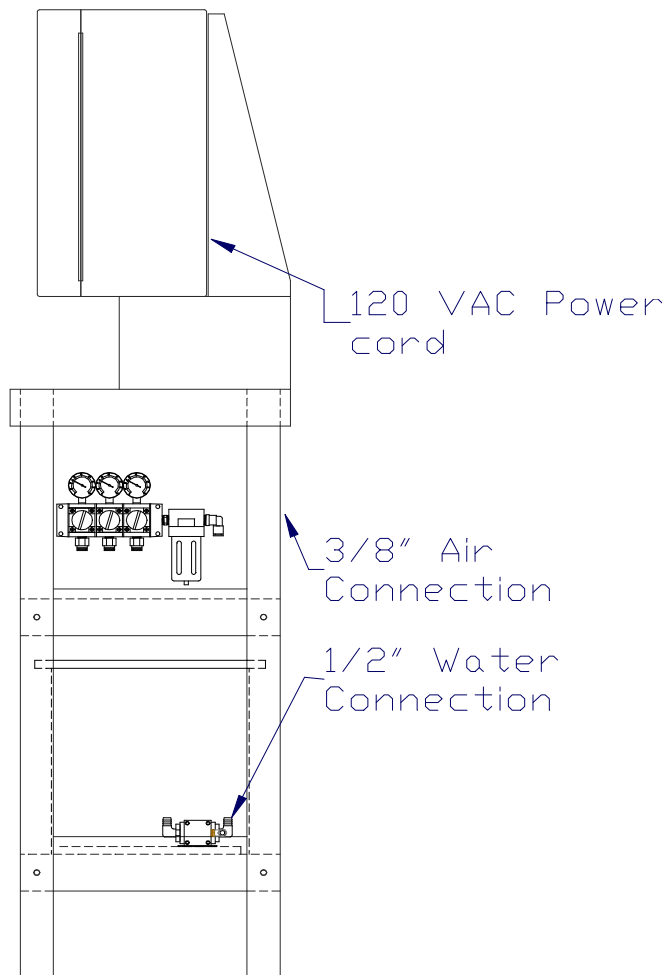
The Catalyst requires water > 3 GPM at a temperature no greater than 110°F or less than 80°F. (This can be either tempered water, or hot and cold with a mixing valve- valve is not supplied) The supply line should have shut-off valves and stubbed to a 1/2" barb. Flexible tubing should be used to connect the water supply line to the fill valve for the flush tank on the Catalyst System. The unit has a 1/2" barb connection. (Tubing not supplied) *Water pressure should be no more than 45 psi.*

Air Connections:

A 1/2" line of clean, dry air at 90 PSI minimum is required for the system. The system uses about 8 SCFM maximum (12 SCFM for the Catalyst DI) at 90 PSI. For multiple or redundant systems, the supply line should be upsized accordingly. The unit has a 3/8" OD flexible tubing connection. (Tubing not supplied)

Electrical Connections:

The Catalyst requires 120 VAC at 5 Amps. The unit is supplied with a 15' US power cord. The Active Hub (not used on the Catalyst Lite) also requires 120 VAC at 5 Amps. These circuits should be dedicated for the chemical system use only.



Chemical Connections

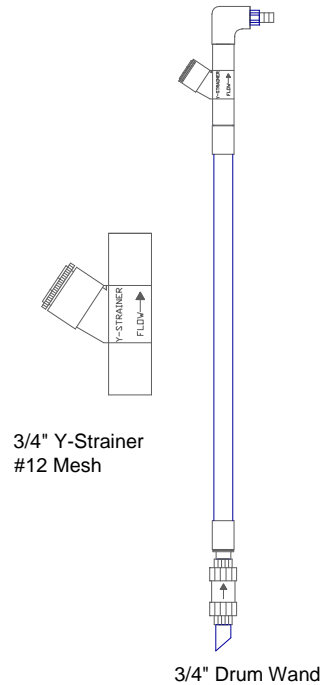
chemical feed lines should be run from the

The

source (Tank, Drum, Tote, etc...) and connected to the appropriate pump. The pump's inlet is at the bottom and the outlet (to the chemical valves) is at the top. On the inlet of the pump, use ½" tubing for the small pump and ¾" tubing for the large pump. It might be necessary to use reinforced tubing on some of the inlets if chemical is being drawn a long distance and/or uphill.

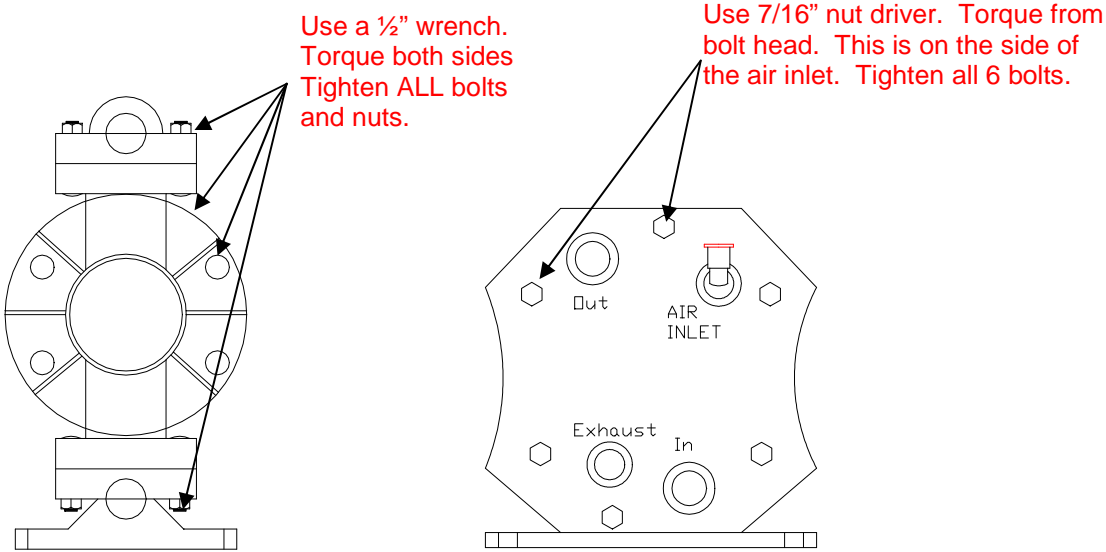
The maximum distance for the pumps to draw depends on the chemical viscosity and the elevation that it must overcome. Viscous chemicals should be kept as close to the unit as possible. Also, avoid running the suction tubes over an elevation of 6 ft.

The inlet lines to the pumps **must** have adequate strainers (#12 Mesh minimum). These may be incorporated with drum wands (available from Softrol) or can be piped inline. It is recommended that if the strainers are piped inline, a shutoff valve be located on either side as to allow for easier cleaning.



Chemical Pumps

The chemical pumps should be tightened to the proper torque range before use. The proper torque is 70 in.-lbs.

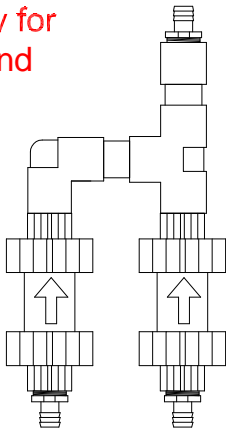


CATALYST

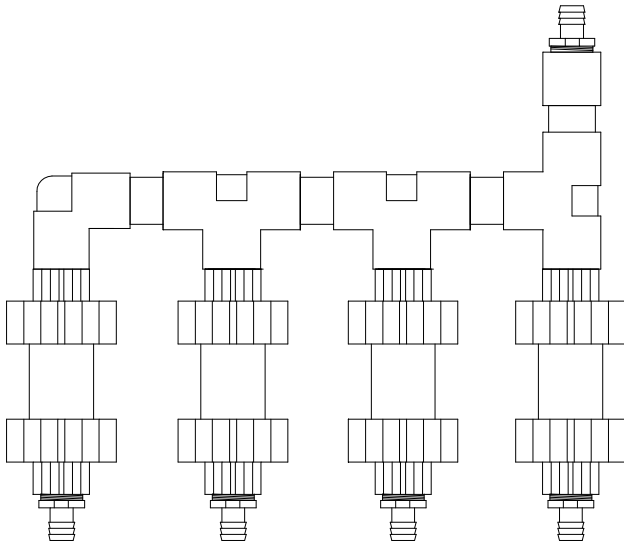
Machine Connections

The Catalyst has 3/4" hose barb (1/2" for the Catalyst Tunnel) connections for the machine delivery lines. A minimum of 5' of tubing should be used even if the machine lines are hard piped. For a redundant Catalyst setup or a Catalyst DI, there should be multiple lines to each washer or the lines should be connected together with check valves to form a single line to the washer. These connectors are not included but can be ordered from Softrol. See drawing below.

Check Valve Assembly for Catalyst DI Systems and Redundant Systems



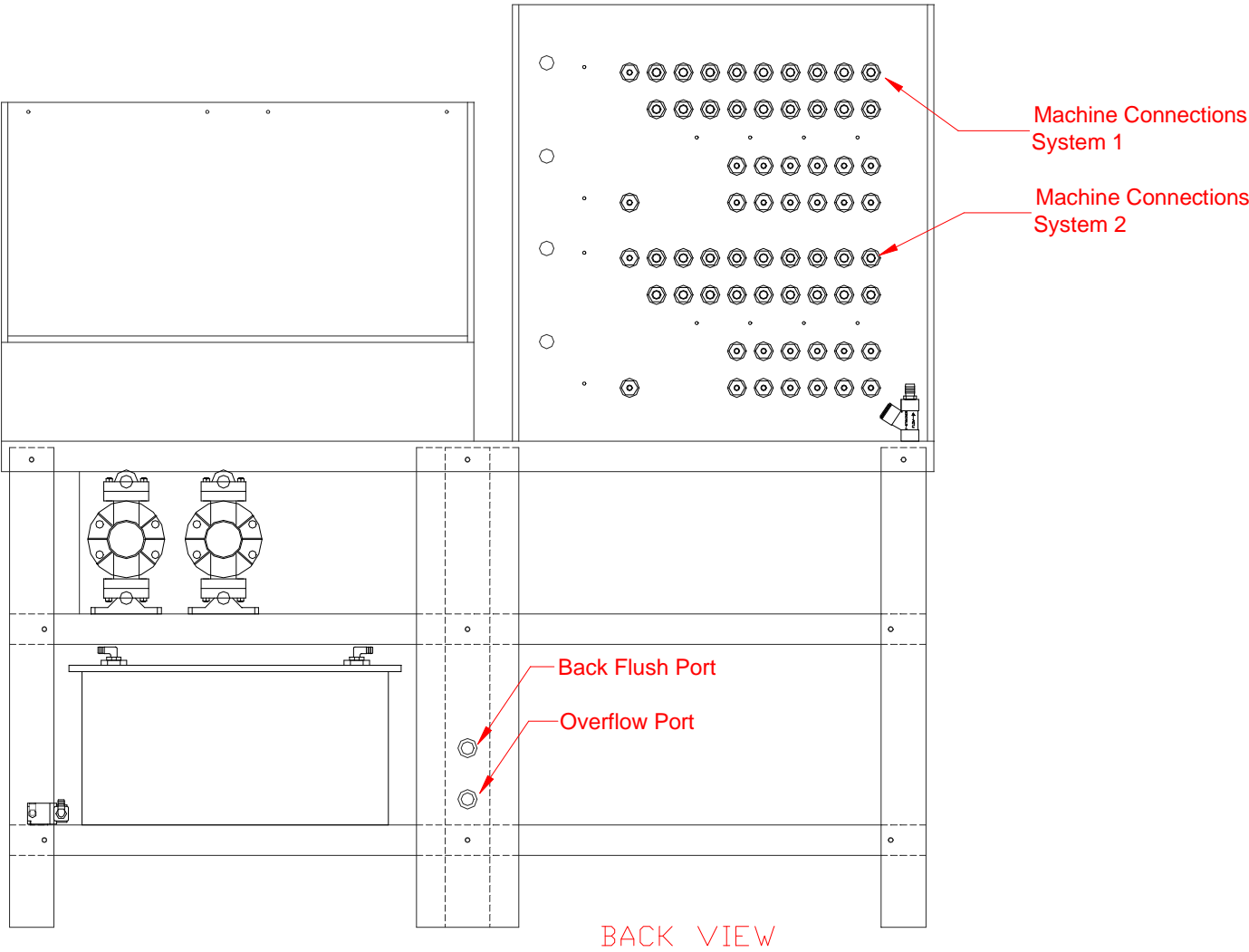
Check Valve Assembly for multiple DI systems or more than 2 redundant Catalyst systems.



CATALYST

Drain Connection

There are 2 drain connections for the Catalyst with 1/2 " NPT connections. The back-flush outlet **MUST** be plumbed to an applicable drain. Since this outlet can be pressurized, the drain line does not have to be a gravity drain. The overflow is for the flush tank and cannot be run any higher than the top of the tank. It is not necessary to hook up the overflow line, however, if the level switch fails in the tank, water will be forced out this outlet.



Configuration: Injection Controller

The Catalyst machine setups tailor the operation to suit individual preferences and applications. These parameters are global meaning they effect all formulas. Some of these parameters (AutoChem Flush, for example) can also be set on the machine and override the global parameters and only effect the current injection. Use the following sequence to set up the user programmable features.

From the “Waiting for Chemical Injection Request!” display, enter a valid level 7 password (please refer to Passwords).

1=Setup 2=Program
3=Maint. 4=Calib.
5=Totals 6=Clock
Selection? 0=exit

Select 1=Setups

1=Watchdogs/Setups
2=Chemical Setups

Select 1=Watchdogs/Setups

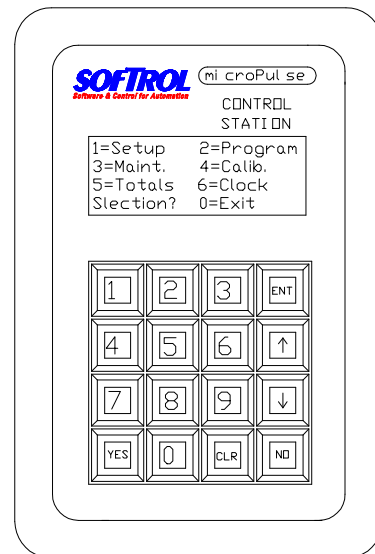
1=Machine Setup
2=Maintenance Setup
3=Clear Ram Vocab
4=Passwords 0=exit

Select 1=Machine Setup

The current setting is shown on the display. The Programmable Functions section describes all of the questions in detail.

Note: Use the [YES] or [NO] keys and the numbers on the keypad to change the answer to the setup questions. Some questions require the operator to enter a value.

- Press the [ENT] key to accept the answer.
- Press only the [ENT] key to accept the default or keep the previously programmed value.
- You cannot go backwards through the questions. If you need to change the answer to a previous question, press the [ENT] key to accept the current values to the remaining questions then restart the procedure.



CATALYST

- Press the [CLR] key to clear the numeric value of the current question.

After all setups are complete pressing the [CLR] key will accept the changes. The Catalyst does not store any of the changes in memory until the last setup question is answered and the [CLR] key is pressed. If the power is lost during the setup procedure, the changes will not take effect.

- **AutoChem Flush**

This setup answered in seconds is the amount of time the Catalyst will flush the system with water after each chemical injection. The Catalyst will read the time on the machine and use the time that is the greatest.

- **Chems 9-12 Auto**

If answered YES, the Catalyst will turn on the chemical outputs for chemicals 9 through 12.

- **Chems 13-16 Auto**

If answered YES, the Catalyst will turn on the chemical outputs for chemicals 13 through 16.

- **Flow Sensors**

This setup tells the Catalyst to use the flow sensor input. This should be set to YES.

- **Chemical Watchdog**

This is the time in mm:ss the user defines is the maximum Catalyst inject time.

- **Prompt Weight**

This indicates whether the operator wishes to prompt the weight of the load before the start of each manual formula. This will most likely be set to NO.

- **Signal Mute Time**

This is the time in mm:ss the user defines how long a signal will be ignored when pressing the CLR key.

- **First Washer ID**

This setup informs the Catalyst the ArcNet networking ID of the first washer to be serviced.

- **Last Washer ID**

This setup informs the Catalyst the ArcNet networking ID of the last washer to be serviced.

- **Preferred ID Lo**

Used for a redundant system. This setup is used to assign the highest ArcNet networking ID that determines the preferable range for the Catalyst to inject chemicals. Decisions by the Catalyst will be given preference according to the programmed range.

- **Preferred ID Hi**

This setup is used to assign the highest ArcNet networking ID that determines the preferable range for the Catalyst to inject chemicals. Decisions by the Catalyst will be given preference according to the programmed range.

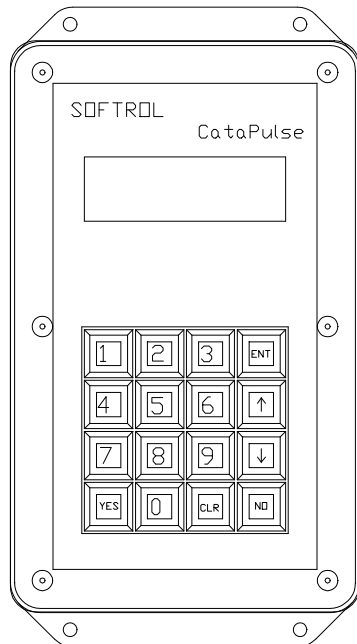
Installation: Machine Interface

Mount the Machine Interface Boxes on or near each washer. Use nuts and bolts for a machine mount, and screws for a wall mount. The interface should be connected to the washer controller with 15-conductor wire. 24 VDC will be supplied from the Catalyst for the power. Refer to the interface schematic for specific wiring instructions.

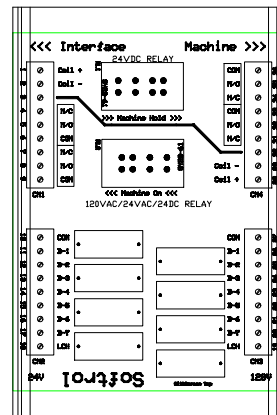
Once the interface is powered, the setups may be entered. The setups in the interface are accessed in the same manner as the setups in the podium.

Wiring-

The interface comes pre-wired with a 20' length of 15 conductor 18 gauge wire. This wire should be cut to length and wired to the input converter. The illustration above shows three "Daisy Chains" from the Catalyst. The first one is machines 1-4 the second daisy chain covers machines 5-9. The third daisy chain is from the communication card of the Catalyst to the computer. Machines 4 and 9 and the computer should have terminators. If there are multiple Catalysts, then the network will be wired in a similar fashion, but a Hub will be used for communications. Refer to the Catalyst manual for this layout.



CATAPULSE INTERFACE



INPUT CONVERTER

CATALYST

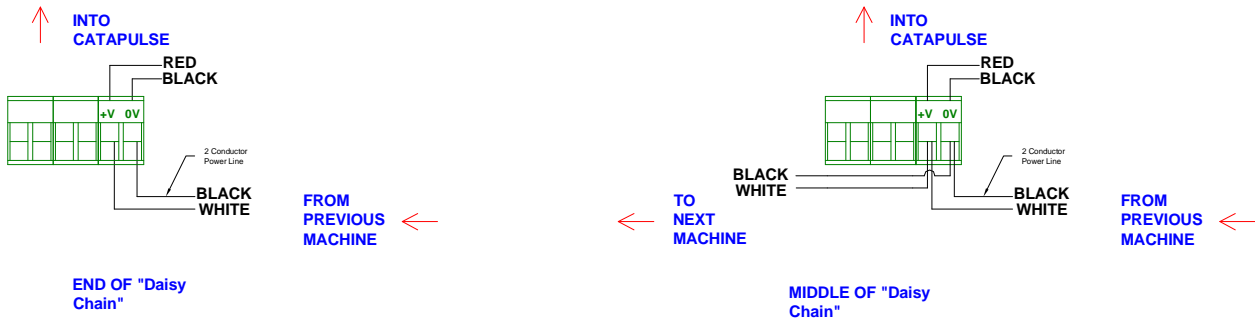
The input converter should be wired on the interface side. The wires should be as follows:

Fig.2

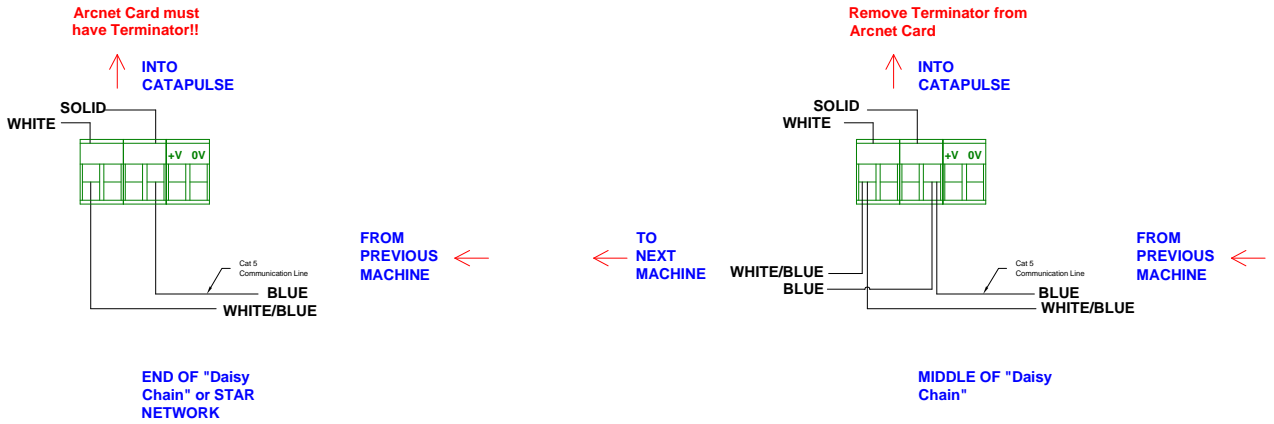
Terminal	Wire Color
1	Orange
2	White
5	Blue/Black
6	Jump to #2
10	Black
11	Blue
12	Blue/White
13	Green
14	Green/White
15	Red
16	Red/White
17	Black/White
18	White/Black

Once the connections are made, the power and the Arcnet communications must be connected to the interface. The Arcnet runs on stranded Cat 5 twisted pair wire. The power line is a two conductor 18 ga. Wire. To access these connections, remove the small box at the base of the interface.

The power is 24 VDC. The black wire is the 0V and connects to the terminal that is connected to the black wire that enters the CataPulse. The white wire is +24VDC and should be connected to the terminal that connects to the red wire.



**CATALYST
Arcnet
Connections**



The communication cable uses the Blue pair. The Blue wire should connect to the terminal on the right side and the Blue/White wire should connect to the left side of the terminal. If there is another machine on the daisy chain, then the 2 conductor power wire should be connected parallel to the +V and 0V and run to the next machine. Also, a Cat 5 cable should run in parallel to incoming communications cable to the next interface. If this is the last machine in the daisy chain, then only two lines will enter the interface, one for power and one for communications. The arcnet card in the Catapulse should have the terminating jumper.

Configuration: Machine Interface

From the "Waiting for Chemical Injection Request!" display, enter a valid level 7 password (please refer to Passwords).

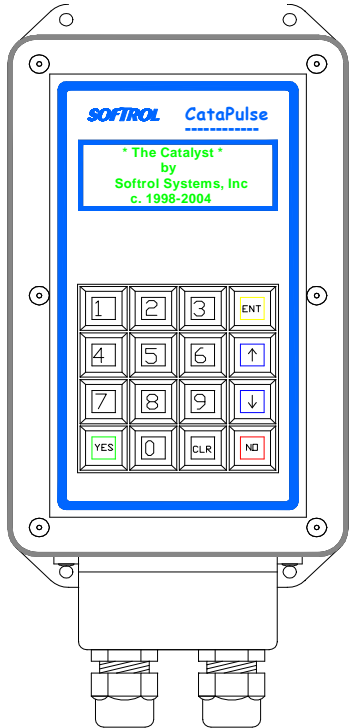
- 1=Setups 2=Program
- 3=Maint. 4=Calibrate
- 5=Totals 6=Clock
- Selection? 0=exit

Select 1=Setups

- 1=Watchdogs/Setups
- 2=Chemical Setups

Select 1=Watchdogs/Setups

- 1=Machine Setup
- 2=Maintenance Setup
- 3=Clear Ram Vocabs



CATALYST**4=Passwords 0=exit****Select 1=Machine Setup****The setups are:**

- **AutoChem Flush-** (5-99 sec) This setup tells the Catalyst how long to flush the chemical to the machine. The further away from the Catalyst the machine is, the longer the flush time.
- **Chemical Watchdog-** (0:00- 99:00) This a timer that will alarm if the Catalyst does not answer the chemical request in the specified time.
- **Prompt Weight-** (YES or NO) This will allow an operator to enter the weight at the beginning of the formula for reporting or ratiometric chemical addition purposes.
- **Signal Mute Time-** (0:00- 5:00) This is the amount of time that the alarm will be silenced by pressing the CLR button.

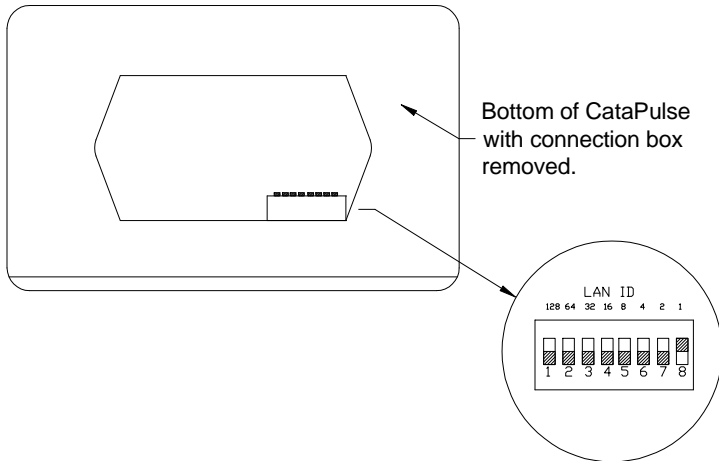
Latch Delay

The latch time for the interface will also need to be set. To set this time, first exit to the waiting for formula screen. Then enter 273685. This will take you to the main menu. Then enter 1 for the setup mode. Then enter 935483. This will take you to the EEPROM setups. Enter through the setups until you reach Latch Delay. This time is noted on the schematic notes for the specific machines. This time should never be less than 1 second. For machines that can turn on all of their chemical signals at once, this time should be 1 second. If the machine cannot give multiple signals at once, (for example a Braun or Milnor EP+) the latch time will be longer. (About 30 seconds for a Braun and 20 seconds for a Milnor EP+) Refer to the Catalyst manual for more programming information as well as the interface schematic.

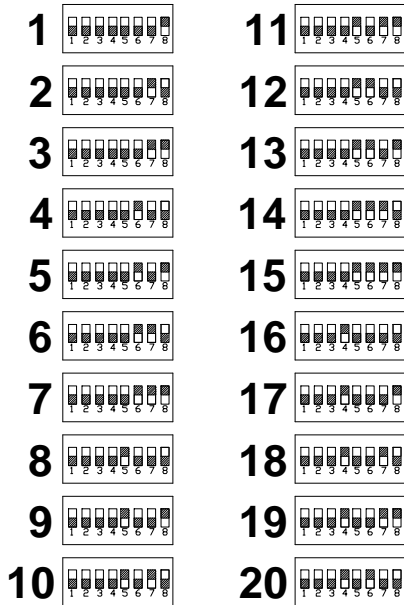
Node ID-

The LAN ID on the CataPulse is set via a set of dip switches. This located in the bottom of the interface and is accessed via the small box on the bottom interface. The dip switches give the interface a binary code for the LAN ID. This LAN ID should be set the same as the machine number. This is very important since the interface communicates this ID and the Catalyst will dispense chemical out the valve associated with this machine ID. The ID goes from right to left. When the switch is in the up position, it is on. See figure on the next page for the proper configuration.

CATALYST

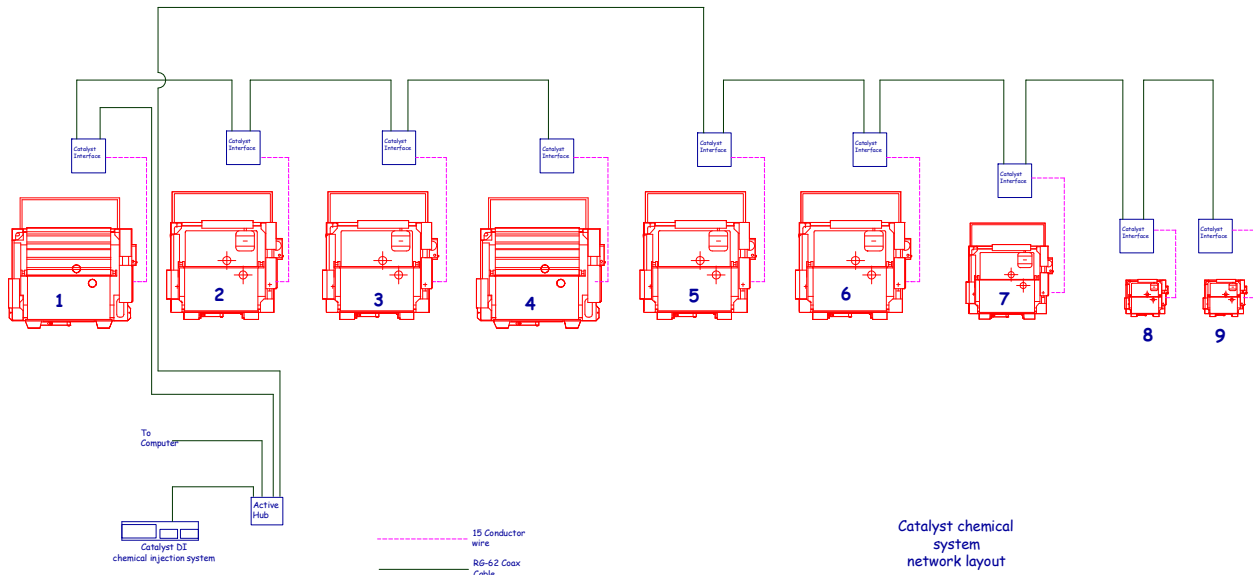


Dipswitch settings for Ids 1-20



CATALYST

Installation: ArcNet Network



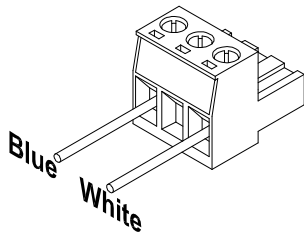
- If it is a single system, the hub card will be in the Catalyst control. If there are multiple systems, then there will be a separately powered hub.
- The ArcNet cable is run as a bus system with the lines from an active hub run in a daisy chain fashion.
- The maximum number of nodes (machines, interface, computer, or Catalyst) on one line from the hub is 8.
- The last node on a line should have a 93-ohm terminator.
- The cable should be installed to avoid coming in close contact with high voltage lines (do not attach cable to incoming power to a machine) and variable speed drives for motors. If you must cross a high voltage line, run the communication cable perpendicular to it.

The arcnet layout varies with each plant, but a typical layout is as shown above:

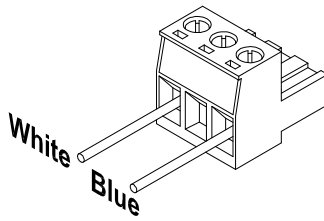
Note: The Catalyst Lite system has a maximum of 8 machines and does not use an active hub. All the nodes on the network are in one daisy chain.

Once the network is functional, communications can be tested from the PC. Formulas should be downloaded to the Catalyst and the machines/interfaces. This will load the proper chemical names into the Catalyst for priming and calibration.

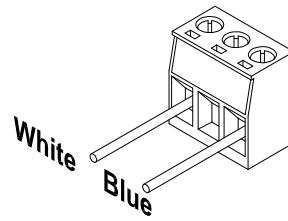
ARCNET TWISTED PAIR POLARITY GUIDE FOR THE CATALYST



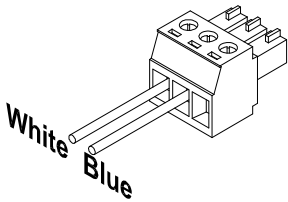
**ARCFIBER
(CATALYST)**



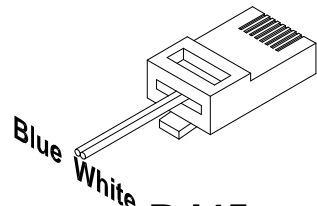
**HYHUB
(HUB)**



**OPTARC
(INTERFACE)**



**PCI20
(COMPUTER)**



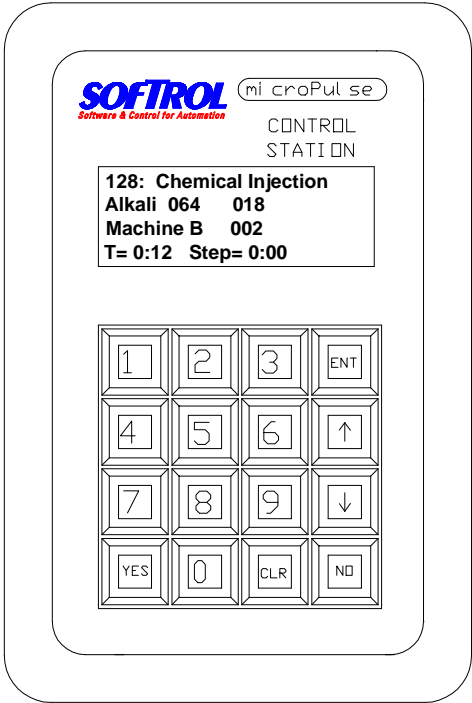
**RJ45
(COMPUTER)**

CATALYST

3. System Operation

Injection Controller

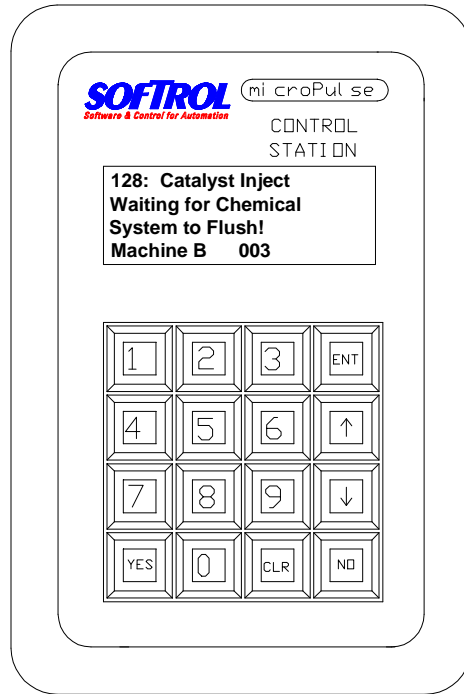
While an injection formula is running, the LCD will show the name and number of the formula, the current step and line number, the selected machine, the total time elapsed (T), and the step time as shown below:



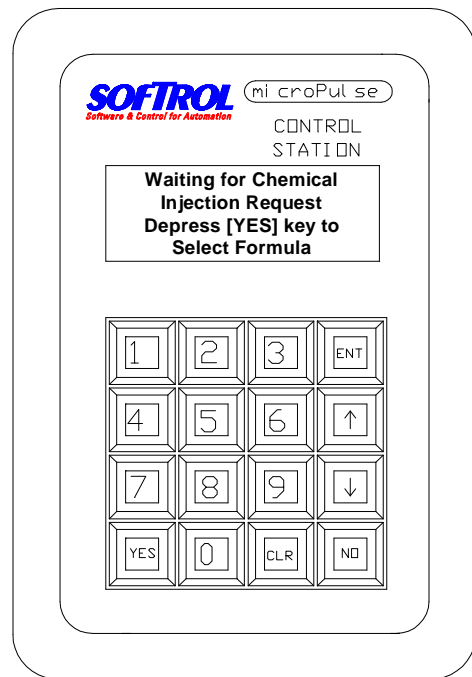
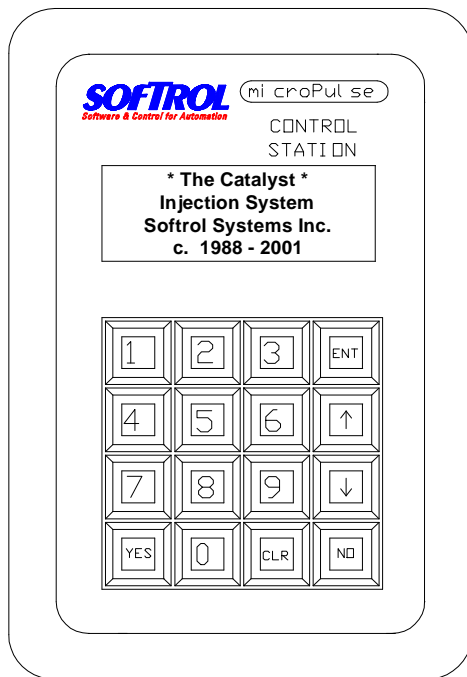
After the injection is completed the system will be flushed with water.

CATALYST

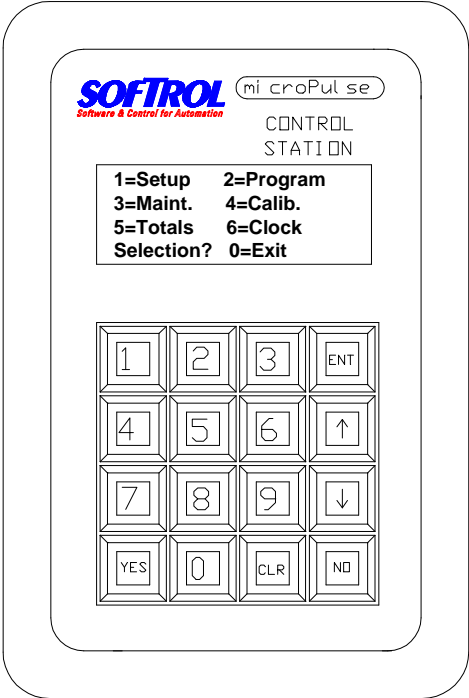
The LCD will display:



While the controller is idle, and waits for an injection request the LCD alternates between the two displays below:



The Main Menu



To access the Main Menu you must enter a password. The Injection Controller is shipped from the manufacturing facility with 8 pre-programmed passwords. Each password consists of 6 digits that correspond to each password level. For example:

- Level 1 = 111111
- Level 2 = 222222
- Level 3 = 333333
- Level 4 = 444444
- Level 5 = 555555
- Level 6 = 666666
- Level 7 = 777777
- Level 8 = 888888 (freezes the timer only)

CATALYST

These passwords should be changed (see below) and customized for each level. There can only be one password assigned to each level for a total of eight passwords. To determine which password level is needed for access to each function see the following table:

Action	Password Level
Manual Chemical Injection	No Password
Cancel Signal	Levels 4-7
Cancel Steps	Levels 1-7
Access Totals	Levels 2-7
Calibrate	Levels 3-7
Set Clock	Levels 3-7
Cancel Maintenance Watchdogs	Levels 4-7
Setups	Levels 6-7
Program Formulas	Levels 6-7
Freeze Timers	Level 8

To Edit/Change Passwords at the Controller

Input the Level 6 or 7 password to access the Main Menu

Press the [1] key 1=Setup

Press the [1] key 1=Watch Dogs/Setup

The LCD screen displays:

1=Machine Setup
 2=Maintenance Setup
 3=Clear Ram Vocabs
 4=Passwords 0=Exit

Press the [4] key 4=Passwords

The LCD screen displays:

Level # 1
 Password =111111
 Use arrows to scroll
 ENTER=Accept NO=Exit

Use the arrows to scroll to the password level desired. Enter the six-digit password for this level.

Press the [ENT] key to accept.

Use the arrow keys to scroll to another password level if desired

CATALYST

Press the [NO] key to exit

Disabling the System

The system can be placed in the disabled mode. This will allow for maintenance and calibration without the machines calling for chemical. From the main screen:

- Press the [NO] & [ENT] keys at the simultaneously to **DISABLE** the system.
- Hold down the [ENT] key and then press the [YES] key to **ENABLE** the system.

Downloading Chemical Names

Once the system has been installed and the network connections have been established, the chemical names and check formulas can be downloaded from the PulseNet computer. See section 5 for more details on configuring PulseNet. The names and formulas will be downloaded when a Group Formula Update for the Catalyst Group is preformed. Once this is accomplished, it will be easier to calibrate and prime the system.

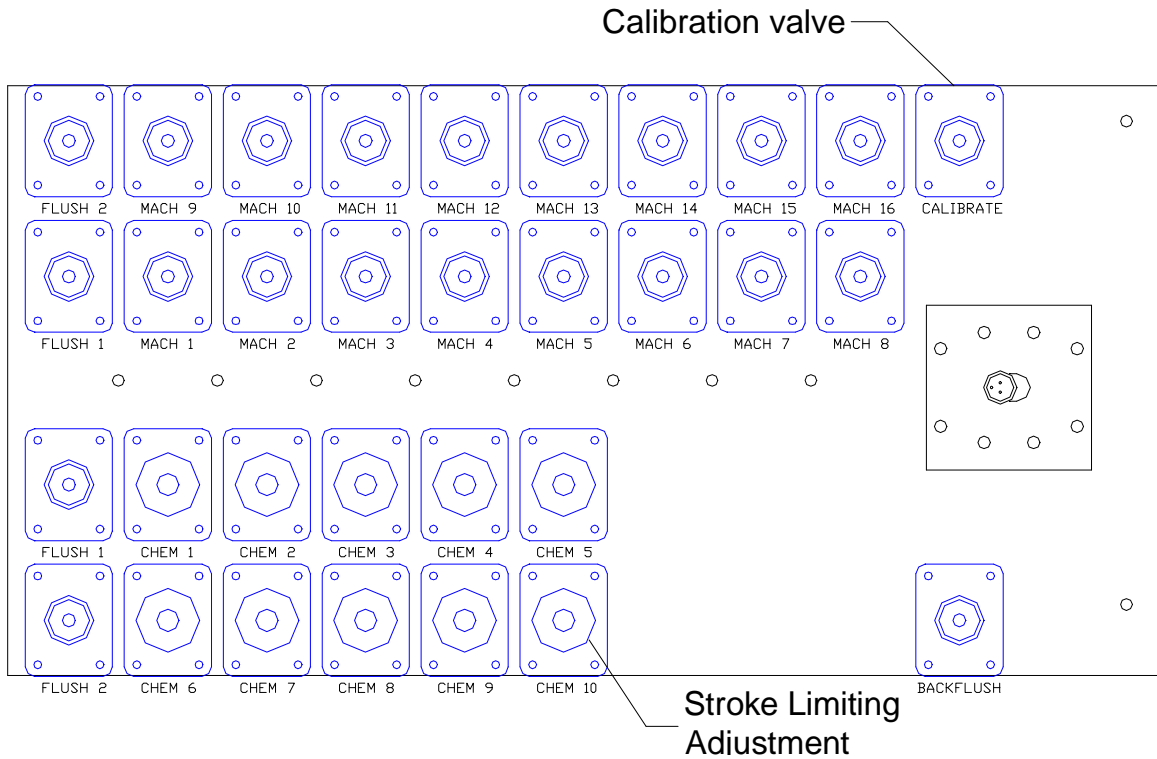
Priming the System

To check the Chemical Output Valves (Priming the System)
At the Injection Controller screen:

Waiting for Chemical
Injection Request!

- Enter the Level 7 password (factory default: 777777).
- Press the [3] key for Maintenance at the Main Menu.
- Press the [1] key for Manual Outputs.
- Press the [3] key for Machine selects.
- Press the [Down arrow] key to get to calibration port.
- Press [Yes] to turn the output on.
- Press [0] to exit
- Press the [1] key for Chemicals.
- Use the arrows to scroll to the chemical to be checked.
- Press and hold the [YES] key to turn on the chemical's delivery valve and pump. Releasing the [YES] key turns off the valve and pump.
- Use the Stroke Limiting adjustment nut to adjust the flow through the valve. Low flow = .5 to 1 gpm, High flow = 1—3 gpm.
- Press the [CLR] + [ENT] keys to flush the system between each chemical injection.
- Repeat this procedure for each chemical. Press the [0] key to exit.

CATALYST



Key Strokes for the Catalyst

- CLR + ENT** = Flush all valves down the Calibration port
- 1 + ENT** = Flush Chemicals 1-8 thru Calibration port
- 3 + ENT** = Flush Chemicals 9-16 thru Calibration port
- 5 + ENT** = Flush machine flush valves thru Backflush port
- No + ENT** = Disable the Catalyst
- YES + ENT** = Enable the Catalyst

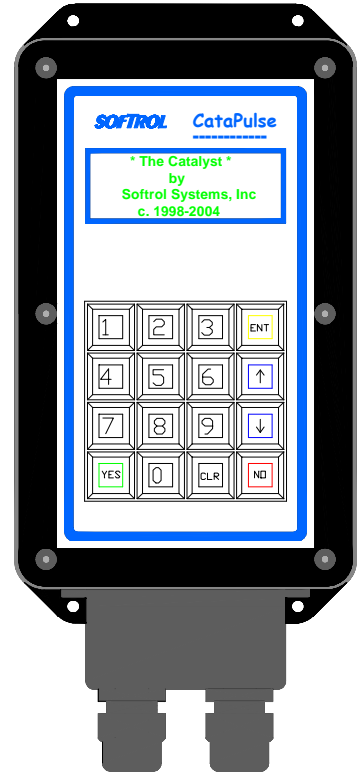
Interface Operation

Typically the interface is set-up to automatically read the formula from the machine when it starts and end the formula when the machine ends its cycle. When this is the case, no operator intervention is required.

Operator intervention is required when the formula on the interface is started manually. This can be useful when the machine lacks multiple chemical outputs or the machine has a chart controller and a normal interface is used. To start a formula manually, press YES and the enter in the appropriate formula number.

Additionally, it may be useful to have the operator enter in the weight of the load at the start of each cycle. This can be used for weight tracking as well as ratiometric chemical additions.

To use this option, turn the setup for Prompt Weight=**YES**. It is useful to have the formula started manually if the weight is being tracked. This will help speed up the process since the formula identification step will be eliminated.



ANY FORMULA THAT IS STARTED MANUALLY SHOULD NOT HAVE THE FORMULA IDENTIFICATION STEP.

Press and hold the [1] button to view the chemicals 1-8 that are in the step. The 1st column is the desired amount, the 2nd column is the received amount. Button [2] shows chemicals 9-16.

Advancing a Formula:

If a formula on the machine needs to be advanced, the best option is to advance the machine to the chemical identification step. This will tell the interface to go to the appropriate step in its formula.

Ending a Formula:

To end a formula, the machine can be advanced to the end formula signal (Latch by itself) or it can be ended manually. To end the formula manually do the following:

Press **NO**- This will pause the formula

Press **CLR**- This will silence the alarm

Enter in a Password- This can be level 1 thru 7. **(111111 or 777777)**

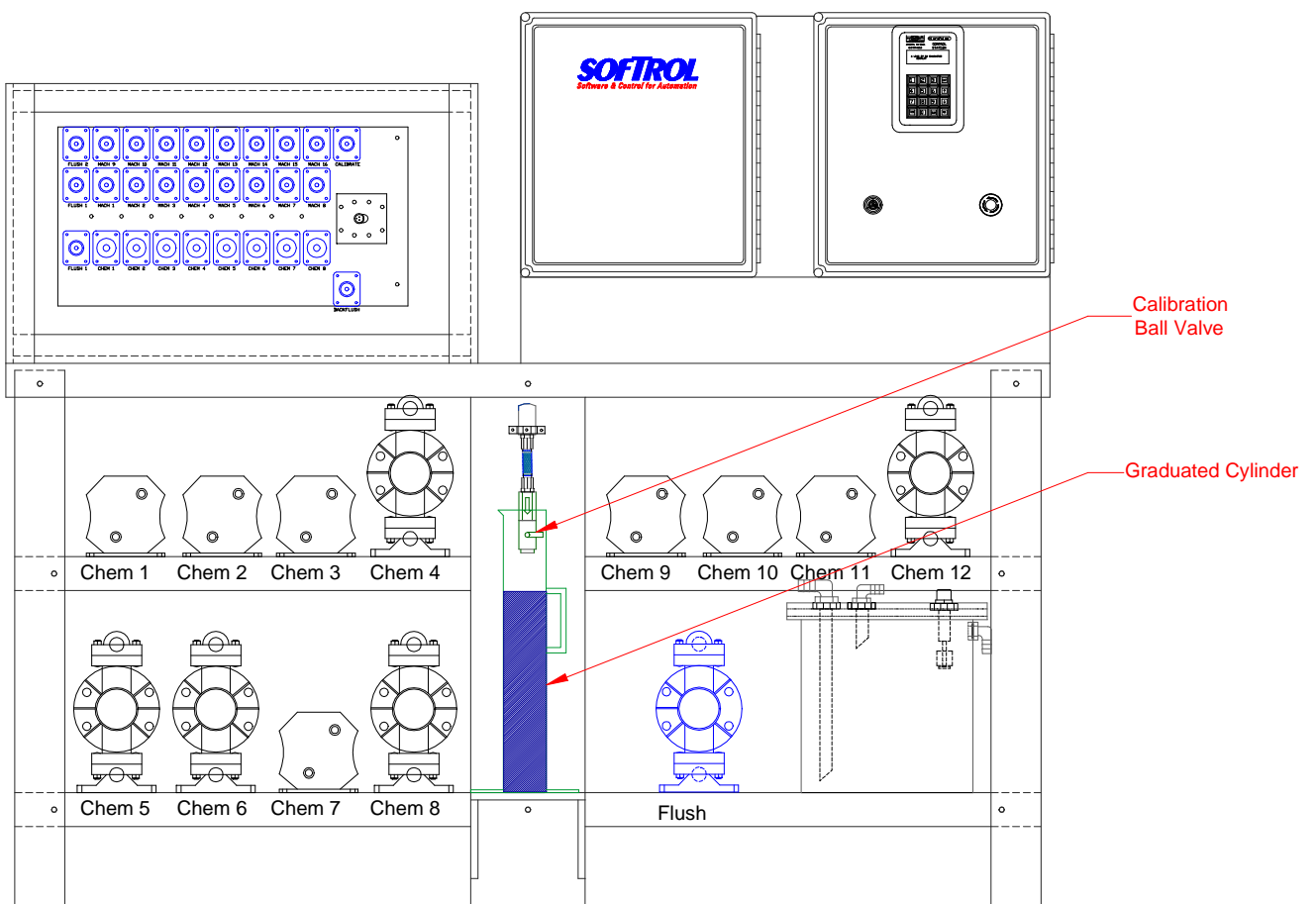
CATALYST

Press **NO + ENT** at the same time to take the formula to the end. This will cancel the formula and it will not accrue weight or runs in the totals report. It will show up as a canceled load. If the formula is advanced to the end (use UP arrow), the load will be considered complete.

4. Calibration

Calibration of chemicals with the Injection Controller is done on a per chemical basis. This allows you to have extremely accurate injections of chemicals with a wide range of varying specific gravity and viscosity. The flow properties of a heavy, viscous surfactant will be quite different from those of a low viscosity acid.

Softrol Systems recommends that plant personnel become very familiar with the types of chemicals they will be handling and the potential hazards that are associated with each chemical. This information is contained in the MSDS (Material Safety Data Sheet) supplied by the chemical vendors. Softrol Systems also recommends that, at the very minimum, plant personnel be required to wear all protective equipment recommended in the MSDS.



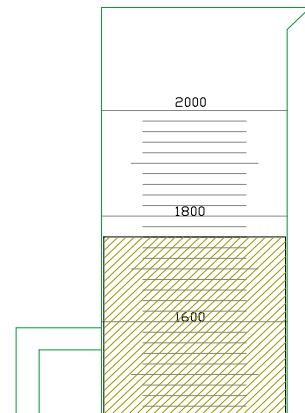
Flow Meter Based Calibration

To calibrate chemicals using the flow meter, please do the following:

1. At the Waiting for Chemical Injection screen on the Injection Controller – disable the system by pressing [No] & [ENT]. This will prevent the system from receiving chemical requests from machines.
2. Open the valve at the end of the calibration line and place the graduated cylinder underneath it.
3. Press [CLR] + [ENT] to flush the system. Make sure the system is thoroughly flushed. Empty and dry the cylinder.
4. Enter the Level 7 password to access the Main Menu.
5. Press [4] 4=Calib.
6. Press [1] 1=Calibrate Chems.
7. Use the [↑] and [↓] arrows to scroll through the available chemical numbers until the chemical to be calibrated is displayed on line 1 of the LCD display.
8. Press the [ENT] key to select that chemical.
9. Select [1] for flow sensor calibrations.
10. Press and **hold** the [YES] key to dispense chemical. This will stop when the [YES] key is released.
For chemicals with large injections (Alkali, Detergent, Bleach...etc), fill the cylinder to 1800 ml. For chemicals with small injections (<6oz ex. Sour, A/C, ...etc) fill the cylinder to about 800 ml.
11. The Catalyst screen will display the counts from the flowmeter. These should be about 18-30 counts per oz.
12. Close the valve at the end of the calibration line. Place the graduated cylinder on a level surface and accurately read the amount of chemical in the graduated cylinder.

The cylinder has graduations in 20 ml increments. To convert ml to Oz., divide by 29.57. Be sure to measure the chemical only and not foam. This will result in more accurate injections.

Example $1760 \text{ ml} / 29.57 = 59.5 \text{ Oz.}$



CATALYST

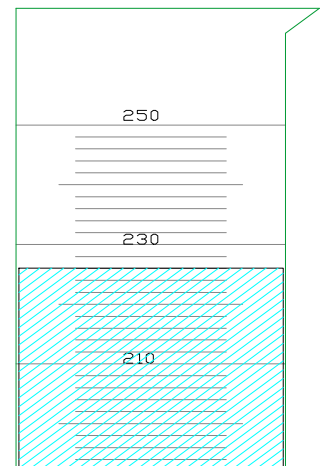
13. Press [ENT] to accept the counts. The controller will display a suggested amount based on the previous calibration. Press [CLR] and enter in the new amount. Enter the amount to the tenths place. Example- 58 Oz. = 58.0
14. Press [ENT]. The Catalyst will display:
Save Calibration As
1= Initial 2= H-Factor
3= Update 4= V-Factor
0= Discard and Exit
15. Select [1] to store the calibration as the initial calibration. This is very important, if it is not done, the calibration will be lost.
16. The controller will then return to the calibration menu.
17. Press and hold [1] & [ENT] to flush chemicals 1-8 for 5 seconds. Then press and hold [3] & ENT to flush chemicals 9-16 for 5 seconds. Finally, press and hold [CLR] & [ENT] to flush the system for about 15 seconds.

H-Factor Calibrations- This is used for greater accuracy for small dispense amounts (<6 Oz.). If you do wish to do a H-Factor calibration, skip to step 26.

18. Select [1] for calibrate chemicals.
19. Select the same chemical as previously calibrated.
20. Select #1 for Flow sensor calibration.
21. Place the 250 ml graduated cylinder under the calibration port.
22. Press and hold [YES] to dispense 200-220 ml. (it will contain mostly water)

The small graduated cylinder is marked in 2 ml graduations. Accurately read the amount and divide by 29.57 to convert to Oz.

Example $226 \text{ ml} / 29.57 = 7.6 \text{ Oz.}$



23. Press [ENT] to accept the counts.
24. Enter in the amount dispensed. It should be slightly more than the suggested amount. If the amounts differ by more than 1 oz. then it might be necessary to recalibrate.

CATALYST

25. Select #2 H-Factor.
26. Flush the system by the same procedure in step 17
27. Press 0 to exit to the main menu.
28. Enable the system by holding down the [ENT] key and pressing [YES]

Time Based Calibration

Due to certain circumstances, it may be beneficial to calibrate the chemicals based on time rather than flow meter input.

To calibrate the chemicals without the flow meter, do the following:

- Follow the normal calibration procedure. At step 9 select #2 for Time Based Calibration.
- Press YES to dispense the chemical as described in step 11. The controller will display the time on the screen in tenths of a second.
- Once the product has been dispensed, press enter to accept the counts and then enter in the received amount. The controller will automatically save the calibration as the Initial calibration.
- The Catalyst will now dispense that particular chemical without reference from the flow meter.
- There is no need to change the programming on the machines or interfaces, the Catalyst will still dispense the chemical in the desired units.
- On time based delivery, the controller will open the chemical valve and turn on the pump for a specified time. If there is no flow or lack of product, the Catalyst will not alarm.

Calibration Errors-

- 0 cannot be entered in for a Calibration.
- If No counts or low counts (<1 per second) are detected, the Catalyst will alarm with a Minimum Frequency Error. If this occurs, press No to exit and check the flow rate as well as the response from the meter.

Checking the Calibration

WARNING: DO NOT USE THE CALIBRATION ROUTINE TO CHECK CALIBRATION ACCURACY OR THE CALIBRATION WILL BE ALTERED. INSTEAD, PROGRAM A CALIBRATION TEST FORMULA.

CATALYST

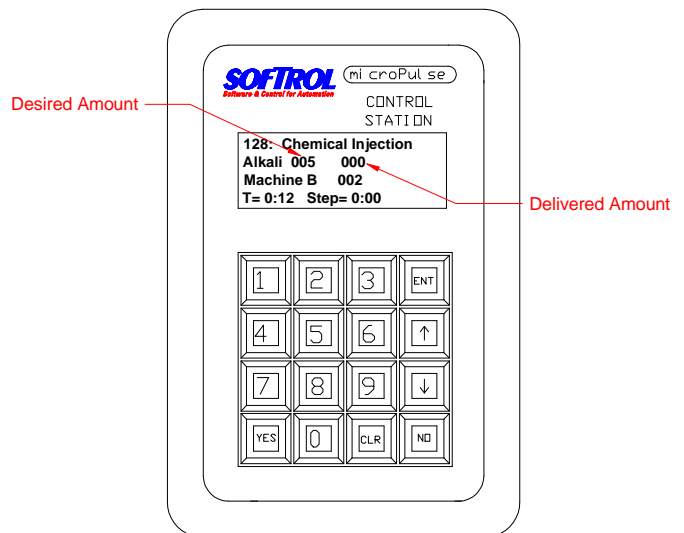
After the chemical is calibrated, it is preferable to run a calibration check formula. These are the formulas that are stored on the Catalyst itself. These formulas should correspond to the chemical number. For example, formula #1 checks chemical #1. If chemical #1 is Alkali, formula #1 should be called Check Alkali and when run, it will dispense the requested amount of Alkali.

Check Formula example:

```
:001 Check Alkali
:002 Set Chemical Flush = 0
:003 Add 0 oz of Alkali
:004 Run Time 0:00
:005 END FORMULA
```

To run the check formula, do the following:

1. At the Waiting for Chemical Injection screen on the Injection Controller – disable the system by pressing [No] & [ENT]. This will prevent the system from receiving chemical requests from machines.
2. Open the calibration port and place the graduated cylinder underneath it.
3. Press [YES] and then enter in the formula number. Press [ENT] to begin.
4. The controller will ask you to select the destination. Press [ENT] to select the Calibration port. (This is very important so the unit will not flush after dispensing the chemical.)
5. The controller will then ask you to key in the desired amount.
6. Then press [YES] to begin the dispensing of the chemical.
7. The controller will display the desired amount as well as the received amount. The received amount should be counting up to the desired amount.
8. Once the injection is complete, measure the amount of chemical that has been dispensed.
9. To determine the amount of error, subtract the measured amount received from the amount desired. Divide this number by the amount desired and then multiply by 100. This will give you the percentage error



Example- Desired 64 Oz Received 62 Oz
64-62=2 2/64=.03125
.03125 X 100 = 3.125 % error

CATALYST

If any calibrations are outside the desired tolerance (normally 1%-5%), see the section, Trouble With Calibrations. Taking a painstaking approach to the calibration procedure will pay off later with extremely accurate chemical injections. By contrast, a poorly executed calibration routine will result in inaccurate and possibly costly chemical injections.

Flush the system when finished by the procedure in step 17 and press [ENT] & [YES] to enable the Catalyst to resume pumping.

CATALYST

ML to Oz. Conversion Table

ML	OZ	ML	Oz	ML	OZ	ML	OZ	ML	OZ	ML	OZ
50	1.7	140	4.7			660	22.3	1110	37.5	1560	52.8
52	1.8	142	4.8	230	7.8	670	22.7	1120	37.9	1570	53.1
54	1.8	144	4.9	240	8.1	680	23.0	1130	38.2	1580	53.4
56	1.9	146	4.9	250	8.5	690	23.3	1140	38.6	1590	53.8
58	2.0	148	5.0	260	8.8	700	23.7	1150	38.9	1600	54.1
60	2.0	150	5.1	270	9.1	710	24.0	1160	39.2	1610	54.4
62	2.1	152	5.1	280	9.5	720	24.3	1170	39.6	1620	54.8
64	2.2	154	5.2	290	9.8	730	24.7	1180	39.9	1630	55.1
66	2.2	156	5.3	300	10.1	740	25.0	1190	40.2	1640	55.5
68	2.3	158	5.3	310	10.5	750	25.4	1200	40.6	1650	55.8
70	2.4	160	5.4	320	10.8	760	25.7	1210	40.9	1660	56.1
72	2.4	162	5.5	330	11.2	770	26.0	1220	41.3	1670	56.5
74	2.5	164	5.5	340	11.5	780	26.4	1230	41.6	1680	56.8
76	2.6	166	5.6	350	11.8	790	26.7	1240	41.9	1690	57.2
78	2.6	168	5.7	360	12.2	800	27.1	1250	42.3	1700	57.5
80	2.7	170	5.7	370	12.5	810	27.4	1260	42.6	1710	57.8
82	2.8	172	5.8	380	12.9	820	27.7	1270	42.9	1720	58.2
84	2.8	174	5.9	390	13.2	830	28.1	1280	43.3	1730	58.5
86	2.9	176	6.0	400	13.5	840	28.4	1290	43.6	1740	58.8
88	3.0	178	6.0	410	13.9	850	28.7	1300	44.0	1750	59.2
90	3.0	180	6.1	420	14.2	860	29.1	1310	44.3	1760	59.5
92	3.1	182	6.2	430	14.5	870	29.4	1320	44.6	1770	59.9
94	3.2	184	6.2	440	14.9	880	29.8	1330	45.0	1780	60.2
96	3.2	186	6.3	450	15.2	890	30.1	1340	45.3	1790	60.5
98	3.3	188	6.4	460	15.6	900	30.4	1350	45.7	1800	60.9
100	3.4	190	6.4	470	15.9	910	30.8	1360	46.0	1810	61.2
102	3.4	192	6.5	480	16.2	920	31.1	1370	46.3	1820	61.5
104	3.5	194	6.6	490	16.6	930	31.5	1380	46.7	1830	61.9
106	3.6	196	6.6	500	16.9	940	31.8	1390	47.0	1840	62.2
108	3.7	198	6.7	510	17.2	950	32.1	1400	47.3	1850	62.6
110	3.7	200	6.8	520	17.6	960	32.5	1410	47.7	1860	62.9
112	3.8	202	6.8	530	17.9	970	32.8	1420	48.0	1870	63.2
114	3.9	204	6.9	540	18.3	980	33.1	1430	48.4	1880	63.6
116	3.9	206	7.0	550	18.6	990	33.5	1440	48.7	1890	63.9
118	4.0	208	7.0	560	18.9	1000	33.8	1450	49.0	1900	64.3
120	4.1	210	7.1	570	19.3	1010	34.2	1460	49.4	1910	64.6
122	4.1	212	7.2	580	19.6	1020	34.5	1470	49.7	1920	64.9
124	4.2	214	7.2	590	20.0	1030	34.8	1480	50.1	1930	65.3
126	4.3	216	7.3	600	20.3	1040	35.2	1490	50.4	1940	65.6
128	4.3	218	7.4	610	20.6	1050	35.5	1500	50.7	1950	65.9
130	4.4	220	7.4	620	21.0	1060	35.8	1510	51.1	1960	66.3
132	4.5	222	7.5	630	21.3	1070	36.2	1520	51.4	1970	66.6
134	4.5	224	7.6	640	21.6	1080	36.5	1530	51.7	1980	67.0
136	4.6	226	7.6	650	22.0	1090	36.9	1540	52.1	1990	67.3
138	4.7	228	7.7			1100	37.2	1550	52.4	2000	67.6

CATALYST

5. Configuring PulseNet

The Catalyst Chemical System comes standard with the PulseNet Catalyst Plus Module. This software can be used to easily program formulas, monitor the system, and generate production and consumption reports. Before the software can be used properly, it must be configured to meet the plant specifications. The manual for the PulseNet software has specific details on how to set-up the software for your plant. The key items for setup can be found in the PulseNet manual and start on page 15. They are as follows:

- **Configure Plant Location-** This needs to be completed for the reports.
- **Configure Ports-** This should already be done if the computer was received from Softrol. If not, this will need to be completed per the manual.
- **Configure Groups-** This will need to be completed. There should be a group for each different size / type of machine.
Note: All machines in the same group will have the exact same formulas. There should also be a group created for the Catalyst. The controller type for this group will be the Catalyst Plus Podium.
- **Configure Supply Inventory Data-** This will need to be entered to have chemical totals reports. The units are the units that the bulk chemical is delivered in. This will most likely be in Gal. Then the cost would be entered in cost per gallon. This will give the Plant Chemical totals report in Gallons, not ounces. (If the units of measurement on the Catalyst are Oz.)
- **Configure Plant Utility Data-** This is generally not used in a Catalyst only plant. Please refer to the PulseNet Manual if this option is desired.
- **Configure Classification-** This can be done for the plant production report. Each formula can be assigned to a classification for convenience in reporting.

Now we get into the group setups. These should be done for the first group and then can be copied into each of the other groups.

- **Edit Vocab Files-** The only Vocab that needs to be created is under chemical units and is unit 001. This will be set to whatever units that you will be calibrating in- most likely Oz.
- **Edit Chemical Assignments-** This setup is very important for proper operation of the system. In this screen, the name of the chemical is created as well as the units it is measured in, if it can be used with steam, and the units per pound if it is to be used with ratiometric processing. Also, the chemical supply is identified and corresponding amount is entered.

Note: Most likely, the bulk units are in gallons while the calibrated units are in ounces. Then the amount of gallons per ounce would be entered as .007812. See page 22 of the PulseNet manual for examples.

CATALYST

Once this page is completed, save it and then change the Group ID to another group. Now import the data from the first group into the new group and save. Repeat this until all of the groups have been completed.

Finally, enter the system defaults Menu and set the RSR to have an automatic time. You will need to enter in the time the RSR will occur. This should be at the end of a shift or the end of the day.

Note: The machines/interfaces and the computer need to be powered on to communicate to the totals to the computer.

Also, check the box to also upload history. This will allow the plant history reports to be viewed for specified time periods.

PulseNet is a very powerful software tool and has many features. The above information is just the basic amount that needs to be entered to have the system function properly.

6. Programming from PulseNet

The Catalyst Chemical System comes standard with the PulseNet Catalyst Plus Module. This software can be used to easily program formulas, monitor the system, and generate production and consumption reports.

One of the best features of PulseNet is the ease with which formulas can be programmed. We will show you how to program a few simple formulas in order to get you started quickly and painlessly. There are many details involved in programming a formula. These are covered fully in the PulseNet User's Manual included with this installation. We will only use the basic programming tools on this tutorial.

IOP	12	13	14
01	02	03	04

```

0001: LIGHT REACT.VS
0002:   Fill Hot When Level < 10.0" Until Next Step
0003:   Fill Cold When Level < 20.0" Until Next Step
0004:   Steam When Temperature < 160°F Until Next Step
0005:   Cooldown When Temp > 138°F Until Next Step
0006:   Extract High Until Next Step
0007:   Extract Low Until Next Step
0008:   Run Time 5:00                                001/0005:00
0009: Desize
0010:   Normal Rotation
0011:   Fill Hot When Level < 15.0" Until Next Step
0012:   Steam When Temperature < 140°F Until Next Step
0013:   Wait to Satisfy
0014:   Run Time 1:00                                002/0006:00
0015: HOT SUDS
0016:   Dwell Timer 999 Seconds
0017:   Fill Hot When Level < 10.0" Until Next Step
0018:   Wait to Satisfy
0019:   Steam When Temperature < 180°F Until Next Step
0020:   Wait to Satisfy
    
```

Group #1: Dirty Laundry Eaters 22,905 bytes free Class: Blue Cotton Yield: 400 Lbs. Count: 200	Formula #1, LIGHT REACT.VS MANAGER 10-01-1997 11:46 Estimated Run Time: 46:00 Empirical Run Time: 0:00
---	--

CATALYST

Programming a Wash Formula

At the main screen of PCPM, click on Group. Select Edit Formulas to bring up the editing screen.

Click on File on the menu then select Open Formula.

A list of Formulas will be displayed. For this example, please click on 001 Unassigned to select formula 1.

The editing window will display two lines. One line will be the unedited formula name and the other with END FORMULA instruction.

Click on the first line and press <Enter>.

Input the name of the formula. In this case input Hot Wash.

The display will show the edited name.

Move the cursor to the END FORMULA line and press the <Insert> key.

A window with icons for all the available instructions will be displayed. The set of instructions displayed will vary according to the type of controller used. For this example we will be using a washer controller.

The display shows 10 icons, one icon for each set of instructions.



Click on the rightmost icon on the top, which depicts a water faucet. A list of all the selections will be displayed. Click on the first selection.

Input the inches of water of hot fill. In this case input 10.0

Press <Enter>

The main editing display will show the newly inserted instruction.

CATALYST

The next instruction to be inserted is a Run instruction. Move the cursor to the END FORMULA line and press the <Insert> key. The window with the instruction icons will be displayed.

Click on the Clock Icon, the first icon on the top left.

Input the Run Time. For this example input 5:00

The newly inserted instruction will be displayed on the editing screen. The formula has been programmed. The display should look like below:

```
0001: Hot Wash
0002: Fill Hot When Level < 10.0" Until Next Step
0003: Run Time 5:00
0004: END FORMULA
```

The formula must be saved or it will be lost when the computer is turned off. To save the formula, click on **File** and then click on **Save**. To exit the editor, click on the Door Icon on the top of the window. For additional information refer to the PulseNet User's Manual.

Programming Operations using PulseNet

Operations are small but complete sections of instructions that perform a specific task. They are reusable and are used to construct the more complex formulas.

Operations are programmed in the same manner as formulas. From the main screen in the formula editor, click on the **File** and select **Open Operation**. Refer to the PulseNet User's Manual for more information on Programming Formulas and Operations.

The washer formulas can be very complex and are beyond the scope of this. For more information on developing these formulas, consult the washer manual as well as the PulseNet manual.

CATALYST

Programming the Interface

Using the PulseNet software in the same way as the washer formulas can program the interface. However, since the interface does not have all of the capabilities of the washer controller, it has a limited instruction set. These are the instructions that may be used:

Add Chemical by Percent
 Add Chemical by Unit
 Chemical Step
 Run Time
 Signal
 Wait to Satisfy

The formula on an interface consists of chemical steps and chemical amounts. Each step must end with a Run Time 0:00. This tells the interface to wait there until the washer calls for the next step.

The formula always begins with the Formula Name and ends with the End of Formula. When the washer identifies the formula to the interface, the interface starts the formula. The interface will execute all the instructions in the first step. This can include chemical injections. If no injection is desired at the identification of the formula, the formula name should be immediately followed by a run time of 0:00. For example a flush at the beginning of a formula:

Formula #18, Bar Mops

0001: Bar Mops
 0002: Run Time 0:00
 0003: *****Chemical Step 1*****
 0004: Add 30 Oz. of Alkali
 0005: Add 15 Oz. of Detergent
 0006: Run Time 0:00

If there is chemical desired upon identifying the formula, then the first step should include these amounts. For example a break at the beginning of a formula:

Formula #8, Color Pants

0001: Color Pants
 0002: *****Chemical Step 1*****
 0003: Add 30 Oz. of Alkali
 0004: Add 15 Oz. of Detergent
 0005: Run Time 0:00

CATALYST

All of the Chemical steps should end with a Run Time 0:00. This includes the last step before the end of formula. For example:

```
0012:      *****Chemical Step 4*****
0013:      Add 12 Oz. of Softener
0014:      Add 10 Oz. of Sour
0015:      Run Time 0:00
0016:  END OF FORMULA
```

The chemicals in a step are injected in order of their chemical number. For instance, if Detergent is set-up as chemical #1 and Alkali as Chemical #2, The Detergent will always be injected before the Alkali when they are in the same step. Example-

```
0001:  Color Pants
0002:      *****Chemical Step 1*****
0003:      Add 30 Oz. of Alkali
0004:      Add 15 Oz. of Detergent
0005:      Run Time 0:00
```

Some examples of formulas and their functional descriptions are on the following page.

Programming the Injection Controller

Only calibration test formulas should be programmed for the injection controller. These formulas will be used to test the accuracy of chemical calibrations. Chemical units should be set to 0. When the formula is ran the controller will prompt for a unit input.

A typical test formula is shown below.

```
:0001  Check Alkali
:0002      Set Chemical Flush = 0
:0003      Add 0 Oz of Alkali
:0004      Wait to Satisfy
:0005      Run Time 0:00
:0006  END FORMULA
```

Go ahead and program the formula by yourself. If you run into problems take another look at the other formula examples. Refer to the PulseNet User's Manual for additional information.

CATALYST

7. Programming the Washers

Washers with Softrol controllers can be programmed by PulseNet and can interface directly with the Catalyst unit. The section on Programming from PulseNet describes how to create washer formulas. The chemical additions are simply programmed with the chemical name and the desired amount.

Note: The injection must be followed by a Wait to Satisfy in order for the machine to hold while chemical is being injection. (Softrol controllers only)

Non-Softrol controlled washers will require an interface to work with the Catalyst chemical system. The interface reads signals from the washer's chemical outputs and determines the formula that is being run and the step that it is at. See the section on Programming from PulseNet for information on how to program washers with Softrol controls.

The interface has 8 inputs that correspond to the binary formula identifier:

Input	1	2	3	4	5	6	7	8
Binary	1	2	4	8	16	32	64	Latch

The inputs to the interface are wired to the chemical outputs of the washer. If there are not 8 outputs, the last output should be wired to the input #8 of the Interface.

To identify the formula, the washer needs to be programmed to give the corresponding binary number followed by a latch. Example:

Formula	Outputs
1	1,8
2	2,8
3	1,2,8
7	1,2,3,8
63	1,2,3,4,5,6,8

The outputs should be programmed to turn on for 5 seconds. The Latch output should be programmed to turn on last. This will cause the interface to read all inputs that are on or that were on during a specified time period.

CATALYST

Once the formula is identified to the interface, the washer should be programmed to identify the chemical step that is desired. The chemical step is identified in the same binary manner; however, the latch is **not** called for. The maximum number of chemical steps is 16. Example:

Chemical Step	Outputs
1	1
2	2
3	1,2
4	3
5	1,3

To signal the end of the formula, the washer should be programmed to turn on the Latch input for 5 seconds. There should not be any other binary inputs to the interface on at this time. Some washers require a water level to turn on any chemical outputs; in this case, the end of the formula signal should be programmed before the extract step.

The number of formulas depends on the number of outputs available from the washer. Additionally, some machines require that chemical be used for the hold. This will reduce the number of outputs available for the interface. Ideally, all 8 outputs from the washer can be turned on at the same time. If the washer cannot do this, then the maximum time between output signals should be no more than 20 seconds.

The following pages show examples of formulas for different machines. These are general guidelines for programming and should be used only as such.

CATALYST
Braun Formula
Program 14 Bar Mops

Step	Operation	Time	Level	Temp	Flush	SS	SPL		VO		Option
							A	L	A	L	
1	Rinse	0	0	0	0	B	2	5	3	5	2+4+8+Latch =Formula 14
2	Rinse	2	17	140	0	B	4	5	11	5	
3	Drain										
4	Break	12	9	170	0	B	1	5	0	0	ST + T Chem Step 1
5	Drain										
6	Rinse	2	17	160	0	B	0	0	0	0	
7	Drain										
8	Wash	2	9	170	0	B	2	5	0	0	ST + T Chem Step 2
9	Drain										
10	Rinse	2	17	170	0	B	0	0	0	0	
11	Drain										
12	Rinse	2	17	160	0	B	0	0	0	0	
13	Drain										
14	Rinse	2	17	160	0	B	0	0	0	0	
15	Drain										
16	Wash	10	9	145	0	B	1	5	2	5	Chem Step 3
17	Drain										
18	Rinse	2	17	145	0	B	0	0	0	0	
19	Drain										
20	Rinse	2	17	130	0	B	3	5	0	0	Chem Step 4
21	Drain										
22	Wash	5	9	100	0	B	1	5	3	5	Chem Step 5
23	Extract	2									Low Spd
24	Shakeout	1	0	0	0	B	0	0	0	0	
25	Extract	6									
26	Shakeout	0	0	0	0	B	11	5	0	0	Formula End
27	End										

Catalyst Formula**Formula #14, Bar Mops**

0001: Bar Mops
0002: Run Time 0:00
0003: *****Chemical Step 1*****
0004: Add 280 Oz. of Alkali
0005: Add 60 Oz. of Detergent
0006: Run Time 0:00
0007: *****Chemical Step 2*****
0008: Add 48 Oz. of Detergent
0009: Run Time 0:00
0010: *****Chemical Step 3*****
0011: Add 256 Oz. of Bleach
0012: Run Time 0:00
0013: *****Chemical Step 4*****
0014: Add 10 Oz. of Antichlor
0015: Run Time 0:00
0016: *****Chemical Step 5*****
0017: Add 12 Oz. of Mildewcide
0018: Add 9 Oz. of Sour
0019: Run Time 0:00
0020: END OF FORMULA

Braun Formula

Braun outputs **1 2 3 4 5 6 7 11**
Interface inputs **1 2 4 8 16 32 64 Latch**

Steps 1 & 2 Identify the formula as formula 14. The Catalyst interface will recognize the formula and start formula 14. The formula will proceed to the first step ender (line 2). No chemicals are called for and thus will not be injected.

Step 4 signals the interface to go to chemical step #1. The interface will then place the Braun on hold and request the Alkali and Detergent. Once the chemical is delivered, the interface will proceed to the next step ender (line 6) and release the washer.

Steps 5- 25 will continue to call for the appropriate chemical steps and deliver the chemicals.

Step 26 signals the interface to end the formula. This will start the Load/Unload timer until the next formula is run.

Program 31 White Bath Towel

Step	Operation	Time	Level	Temp	Flush	SS	SPL		VOL		Option	
							A	A	B	B		
1	Break	0	0	0	0	B	1	5	2	5		
2	Break	0	0	0	0	B	3	5	4	5		
3	Break	10	9	160	0	B	5	5	11	5	ST + T	1+2+4+8 +16+Latch =Formula 31
4	Drain											
5	Rinse	2	17	160	0	B	0	0	0	0		
6	Drain											
7	Wash	1	9	155	0	B	0	0	0	0	ST + T	
8	Wash	2	9	155	0	B	2	5	0	0		Chem Step 2
9	Drain											
10	Rinse	2	17	145	0	B	0	0	0	0		
11	Drain											
12	Rinse	2	17	130	0	B	1	5	2	5		Chem Step 3
13	Drain											
14	Rinse	2	17	115	0	B	0	0	0	0		
15	Drain											
16	Wash	5	9	100	0	B	3	5	0	0		Chem Step 4
17	Extract	7										
18	Shakeout	0	0	0	0	B	11	5				Formula End
19	End											

Catalyst Formula

Formula #31, White Bath Towel

0001: White Bath Towel
0002: *****Chemical Step 1*****
0003: Add 30 Oz. of Alkali
0004: Add 15 Oz. of Detergent
0005: Run Time 0:00
0006: *****Chemical Step 2*****
0007: Add 48 Oz. of Bleach
0008: Run Time 0:00
0009: *****Chemical Step 3*****
0010: Add 6 Oz. of Antichlor
0011: Run Time 0:00
0012: *****Chemical Step 4*****
0013: Add 12 Oz. of Softener
0014: Add 10 Oz. of Sour
0015: Run Time 0:00
0016: END OF FORMULA

Braun Formula

Braun outputs **1 2 3 4 5 6 7 11**
Interface inputs **1 2 4 8 16 32 64 Latch**

The Braun formula above is programmed to identify formula 31 and call for the appropriate chemical injections.

Steps 1-3 Identify the formula to the interface as formula 31. The interface will start the formula and proceed to the step ender (line 5) This includes chemical step 1 so the Alkali and Detergent will be injected as the washer fills.

Step 8 tells the interface to go to chemical step 2. The interface will add the bleach and stop at line 8.

Step 18 signals the interface to end the formula. The Load/Unload timer will start and run until the next formula is run.

Ellis / AWC 1000 Formula 1> BAR TOWELS

#	OPERATION	MIN	SEC	TEMP	LEV	CHEMICAL	KEY #S	ACS Output	Chem #	Binary
1	<i>Formula Select</i>		05			<i>Formula ID & Chem Step 1</i>	17 - 23			
2	<i>Fill</i>		01	180	12		2	17	1	1
3	ALKALI FLUSH	3		180	12		2 - 3	18	2	2
4	<i>Drain</i>	1					5	19	3	4
5	FLUSH	1	30	180	12		2	20	4	8
6	<i>Drain</i>	1					5	21	5	16
7	<i>Fill</i>		01	180	6		2	22	6	32
8	<i>Inject</i>		05			Chem Step 2	18	23	7	Latch
9	BREAK	10		180	6		2 - 3			
10	<i>Drain</i>	1					5			
11	FLUSH	1	30	175	12		2			
12	<i>Drain</i>	1					5			
13	<i>Fill</i>		01	175	6		2			
14	<i>Inject</i>		05			Chem Step 3	17 - 18			
15	SUDS	6		175	6		2 - 3			
16	<i>Drain</i>	1					5			
17	FLUSH	1	30	170	12		2			
18	<i>Drain</i>	1					5			
19	FLUSH	1	30	165	12		2			
20	<i>Drain</i>	1					5			
21	FLUSH	1	30	160	12		2			
22	<i>Drain</i>	1					5			
23	FLUSH	1	30	155	12		2			
24	<i>Drain</i>	1					5			
25	<i>Fill</i>		01	150	6		2 - 3			
26	<i>Inject</i>		05			Chem Step 4	19			
27	BLEACH	10		150	6		2			
28	<i>Drain</i>		45				5			
29	RINSE	2		135	12		2			
30	<i>Drain</i>		45				5			
31	<i>Fill</i>		01	120	12		2			
32	<i>Inject</i>		05			Chem Step 5	17 - 19			
33	ANTICHLOR	2		120	12		2			
34	<i>Drain</i>		45				5			
35	RINSE	1		105	12		1			
36	<i>Drain</i>		45				5			
37	<i>Fill</i>		01	90	6		1			
38	<i>Inject</i>		05			Chem Step 6	18 - 19			
39	SOUR	5		90	6		1			
40	<i>Drain</i>	1					5 - 10			
41	<i>High Extract</i>	6					5 - 14			
42	<i>Shakeout</i>	1	30				5 - 11			
43	<i>Stop</i>		30			<i>Formula End</i>	5 - 23			
44	<i>End</i>						4 - 5 - 8 - 16			

Catalyst Formula

Formula #1, White Bar Towels

```

0001: Bar Towels
0002:      *****Chemical Step 1*****
0003:      Add 30 Oz. of Alkali
0004:      Run Time 0:00
0005:      *****Chemical Step 2*****
0006:      Add 72 Oz. of Alkali
0007:      Add 48 Oz. of Detergent
0008:      Run Time 0:00
0009:      *****Chemical Step 3*****
0010:      Add 24 Oz. Alkali
0011:      Add 24 Oz. Detergent
0012:      Run Time 0:00
0013:      *****Chemical Step 4*****
0014:      Add 64 Oz Bleach
0015:      Run Time 0:00
0016:      *****Chemical Step 5*****
0017:      Add 4 Oz Antichlor
0018:      Run Time 0:00
0019:      *****Chemical Step 6*****
0020:      Add 8 Oz Sour
0021:      Run Time 0:00
0017: END OF FORMULA

```

Ellis Formula

```

AWC outputs      17 18 19 20 21 22 23
Interface inputs  1  2  4  8 16 32 Latch

```

The Ellis formula above is programmed to identify formula 1 and call for the appropriate chemical injections.

Step 1 Identifies the formula to the interface as formula 1. The interface will start the formula and proceed to the step ender (line 4). This includes chemical step 1 so the Alkali will be injected as the washer fills.

Step 8 tells the interface to go to chemical step 2. The interface will add the break chemicals and stop at line 8.

-
-
-

Step 43 signals the interface to end the formula. The Load/Unload timer will start and run until the next formula is run.

Milnor Mark Formula 01> BAR TOWELS

- T = Type of Step (0 = End Formula 1 = 1-Way Wash 2 = 2-Way Wash 3 = Soak Wash
 4 = Pre + Final Extract 5 = Intermediate Extract 6 = Final Extract 7 = Double Ext)
- MMQ = Time (Minutes [10's], Minutes [1's], Quarter Minutes)
- FFF = Bath Temperature
- H = Hot Water (0 = Off 1 = On 2 = Raises Temp)
- C = Cold Water (0 = Off 1 = On 3 = Lowers Temp)
- 3 = 3rd Water (0 = Off 1 = On)
- B = Bottom Fill (0 = No 1 = Yes)
- L = Liquor Level (0 = No Water 1 = Level 1 2 = Level 2 3 = Level 3)
- S = Steam (0 = None 1 = After + Timer Run 2 = Timer Stop Only 3 = After + Timer Stop
 4 = 4 = Early & After + Timer Run 5 = Early + Timer Stop 6 = Early & After + Timer Stop)
- CC = Chemical Number (00, 01, 02, 03, 04, 05 16 = Signal Only)
- NN = Chemical Name (00 = Same as Chemical Number)
- W = When to Inject (0 = With Fill 1 = Level OK 2 = Level + Temp OK)
- SSS = Seconds of Chemical Injection
- * = Signal with Chemical? (0 = No 1 = Yes)
- RPM = Basket Speed in % of Normal
- D = Drain (0 = Standard 1 = 2-Way Wash Speed 2 = Do Not Drain 3 = Stop w/ Drain
 4=Stop w/ Fill 5=Stop w/ F & D 6=Stop w/ F & no D 7=D w/ 25 sec Spray Rinse)
- R = Drain Destination (0 = Drain to Sewer 1 = Drain to Reuse)
- S = Spray Rinse at End of Intermediate Extract (0 = No 1 = Yes)
- E = How to End (0 = Stopped 1 = Reversing 2 = Drain Speed 3 = Break Cake 4=Tumbling)

@ @ @ @ @ @ @ @ @ = Option

STEP	OPERATION	TYPE	MMQ	FFF	H	C	3	B	L	S	CC	NN	W	SSS	*	RPM	D	R	S	E	CHEMICAL	
01	15/Alk Flsh	2	030	180	1	0	0	0	3	3	01	01	0	005	0		0			-	Formula ID & Chem Step 1	
											05	01	0	005	0		0			-	Latch	
02	02/Flush	2	012	000	1	0	0	0	3	-	00	00	0	000	0		0			-		
03	03/Break	2	100	180	1	0	0	0	2	3	02	02	0	005	0		0			-	Chem Step 2	
04	02/Flush	2	012	000	1	0	0	0	3	-	00	00	0	000	0		0			-		
05	04/Suds	2	060	175	1	0	0	0	2	3	01	01	0	005	0						Chem Step 3	
											02	02	0	005	0		0			-		
06	02/Flush	2	012	170	2	3	0	0	3	0	00	00	0	000	0		0			-		
07	02/Flush	2	012	165	2	3	0	0	3	0	00	00	0	000	0		0			-		
08	02/Flush	2	012	160	2	3	0	0	3	0	00	00	0	000	0		0			-		
09	02/Flush	2	012	155	2	3	0	0	3	0	00	00	0	000	0		0			-		
10	06/Bleach	2	100	150	1	0	0	0	2	5	03	03	2	005	0		0			-	Chem Step 4	
11	07/Rinse	2	020	135	2	3	0	0	3	0	00	00	0	000	0		0			-		
12	08/Anticlor	2	020	120	2	3	0	0	3	0	01	01	0	005	0						Chem Step 5	
											03	03	0	005	0		0			-		
13	07/Rinse	2	010	105	2	3	0	0	3	0	00	00	0	000	0		0			-		
14	10/Sour	2	042	090	2	3	0	0	2	0	02	02	0	005	0						Chem Step 6	
											03	03	0	005	0			2			-	
15	11/Stop	2	002	090	2	3	0	0	2	0	05	05	0	005	0		0				Formula END	
16	14/Extract	6	070																		4	

Milnor Mark (I – V) Formula 01- BAR TOWELS

STEP	OPERATION	TY PE	MM Q	FF F	H	C	3	B	L	S	C	N	W	S	*	R	P	D	R	S	E	CHEMICAL
01	15/Alk Flsh	2	030	180	1	0	0	0	0	3	3	0	0	0	0	0	0	0	0	0	0	Formula ID & Chem Step 1
												0	0	0	0	0	0	0	0	0	0	Latch
												0	0	1	0	3	0	0	0	0	0	Hold
02	02/Flush	2	012	000	1	0	0	0	0	3	-	0	0	0	0	0	0	0	0	0	0	
03	03/Break	2	100	180	1	0	0	0	0	2	3	0	0	0	0	0	0	0	0	0	0	Chem Step 2
												0	0	1	0	3	0	0	0	0	0	Hold
04	02/Flush	2	012	000	1	0	0	0	0	3	-	0	0	0	0	0	0	0	0	0	0	
05	04/Suds	2	060	175	1	0	0	0	0	2	3	0	0	0	0	0	0	0	0	0	0	Chem Step 3
												0	0	0	0	0	0	0	0	0	0	
												0	0	1	0	3	0	0	0	0	0	Hold
06	02/Flush	2	012	170	2	3	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	
07	02/Flush	2	012	165	2	3	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	
08	02/Flush	2	012	160	2	3	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	
09	02/Flush	2	012	155	2	3	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	
10	06/Bleach	2	100	150	1	0	0	0	0	2	5	0	0	2	0	0	0	0	0	0	0	Chem Step 4
												0	0	2	0	3	0	0	0	0	0	Hold
11	07/Rinse	2	020	135	2	3	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	
12	08/Anticlor	2	020	120	2	3	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	Chem Step 5
												0	0	0	0	0	0	0	0	0	0	
												0	0	1	0	3	0	0	0	0	0	Hold
13	07/Rinse	2	010	10	2	3	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	

				5							0	0	0							
14	10/Sour	2	042	09	2	3	0	0	2	0	0	0	0	0	2					Chem Step 6
				0							0	0	0	0	0					
											0	0	0	0	0					
											0	0	0	0	0					Hold
											0	0	0	0	0					
15	11/Stop	2	002	09	2	3	0	0	2	0	0	0	0	0	0					Formula END
				0							8	5	5	5						
16	14/Extrac t	6	070																	

Note: The washer must have the option for Chemsave and be enabled for more than 8 chemicals. If not, the washer should be programmed as shown in the previous Milnor example and held by the water levels.

Milnor Formula

Milnor outputs	1	2	3	4	5	6	7	8
Interface inputs	1	2	4	8	16	32	64	Latch

The Milnor formula above is programmed to identify formula 1 and call for the appropriate chemical injections.

Step 1 Identifies the formula to the interface as formula 1. The interface will start the formula and proceed to the step ender (line 4). This includes chemical step 1 so the Alkali will be injected as the washer fills.

Step 3 tells the interface to go to chemical step 2. The interface will add the break chemicals and stop at line 8.

Step 10 tells the interface to go to chemical step 4. The interface will add the Bleach and stop at line #15.

Note: The **W** for when to add chemicals is a 2, which will wait until the washer has filled and reached temp before the bleach is added.

Step 16 signals the interface to end the formula. The Load/Unload timer will start and run until the next formula is run.

Catalyst Formula

Formula #1, White Bar Towels

0001: Bar Towels
0002: *****Chemical Step 1*****
0003: Add 30 Oz. of Alkali
0004: Run Time 0:00
0005: *****Chemical Step 2*****
0006: Add 72 Oz. of Alkali
0007: Add 48 Oz. of Detergent
0008: Run Time 0:00
0009: *****Chemical Step 3*****
0010: Add 24 Oz. Alkali
0011: Add 24 Oz. Detergent
0012: Run Time 0:00
0013: *****Chemical Step 4*****
0014: Add 64 Oz Bleach
0015: Run Time 0:00
0016: *****Chemical Step 5*****
0017: Add 4 Oz Antichlor
0018: Run Time 0:00
0019: *****Chemical Step 6*****
0020: Add 8 Oz Sour
0021: Run Time 0:00
0017: END OF FORMULA

8- System Maintenance and Troubleshooting Maintenance

The Catalyst Chemical system will require periodic maintenance. Doing a few simple procedures can dramatically increase the life of the chemical system. The following is a suggested maintenance plan. Due to site-specific conditions, the intervals may need to be changed.

1st Week

- Re-torque all chemical pumps.
- Carefully inspect all connections for signs of chemical or water leaks. If any leaks are found, fix them immediately.
- Check calibration of the chemicals.
- Tighten all hose clamps.
- Check the water temperature- it should be 80-110 degrees F.

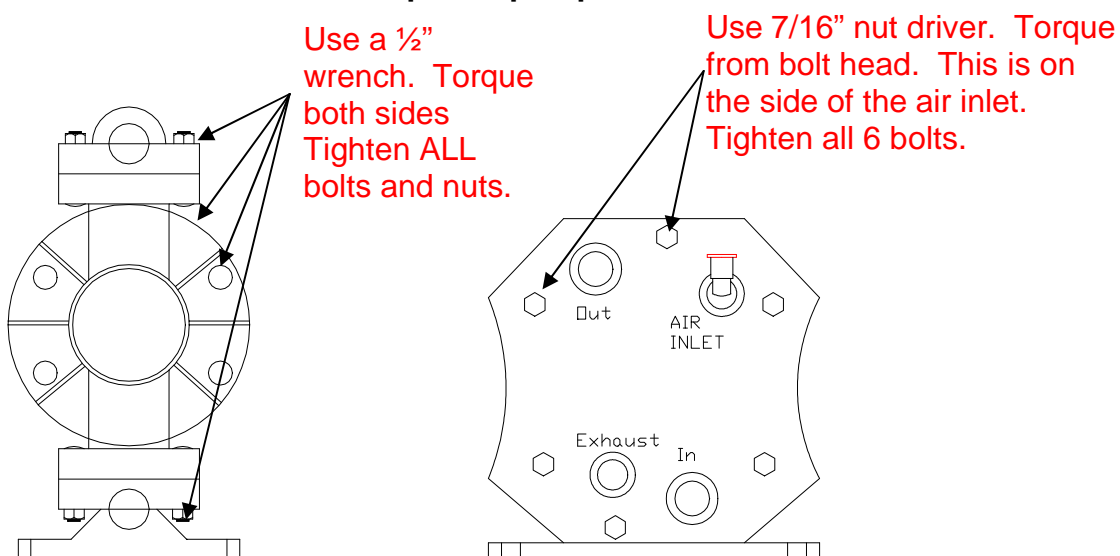
Weekly-

- Check the strainers on the chemical lines for blockage.
- Check air filters; drain if necessary.
- Clean system by wiping down with a damp cloth. Use air to blow off the pump section.

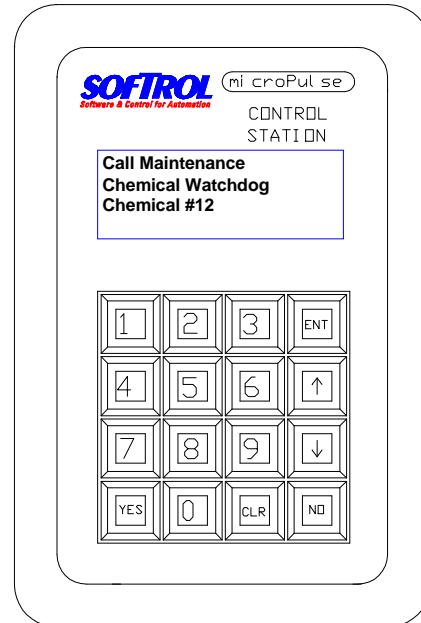
Monthly-

- Check the torque on the pumps.
- Inspect the system for leaks.
- Check Calibrations.
- Tighten hose clamps

Torque on pumps: 70 in-lbs



Catalyst Alarms



The Catalyst can have 7 different alarms while running. They are:

- Power Interrupted During Formula.** This happens when the power is lost to the processor while running a formula. Press the YES button to resume the formula.
- Low Air Pressure.** This happens when the air pressure drops below 65 psi during a chemical injection. Once the air pressure is above 65 psi, pressing the YES button will resume the formula. The Catalyst will display low air pressure, but will not alarm if it is not running a formula.
- Chemical Watchdog.** This alarm occurs when the flow meter senses that it is out of chemical, sensor is jammed, or the injection took too long. Use the password to reset this error. If the system is out of chemical and needs to be primed, holding the YES button will allow pump to turn on and ignore the watchdog. Release the YES button when the pump is primed. See the next section for more details.
- Sensor Flush.** This is similar to the Chemical watchdog, however, it occurs during the metered flush after the injection. This should be corrected the same as a chemical watchdog.

**Power Interruption
During Formula
Execution! Press
[YES] to Continue**

**128: Chemical Injection
Alkali 005 000
Low Air Pressure !!**

**Call Maintenance !!!
Chem watchdog
Chemical #1
Chemical #2**

**Call Maintenance
Sensor Flush Watchdog
Sensor #1**

- **Flush Water Tank Not at Minimum Level.** This message will be displayed when the water level in the flush tank is not at the minimum level needed to start an injection. This message will only display and not alarm when the system is enabled. If the system is enabled and this condition exists, the system will display the message and continue to fill the tank for 1 minute before sounding the alarm. The injection cannot start until this has been corrected. To silence the alarm, disable the Catalyst by pressing No & Ent and correct the problem. The input for flush tank low is S7-04 and turns on when the tank level is low.
- **Current Calibrations Do not Match Slot 5.** The Catalyst will check the calibration value in the REM K-4 and compare it to the value held in the memory card in slot 5; if they do not match, an alarm will occur and the system will display this message. This problem will occur when either the memory card (Flowmem- Slot 5) or processor memory card (REM K4- Proc Slot) is replaced. If the Flowmem is replaced, the calibrations will need to be copied **to** Slot 5. If the REM K4 is replaced, the calibrations will need to be copied **from** Slot 5. To copy the calibrations, do the following:
 - Enter in the level 7 password.
 - Select 2 for Program.
 - Select 5 for Copy.
 - Select 3 for Copy Calibrations.
 - Select 1 to copy the Calibrations **to** Slot 5.

Or

 - Select 2 to copy the Calibrations **from** Slot 5.
 - The controller will prompt you to enter in a password. Enter the level 7 password. The controller will return to the main menu.
 - Exit the menu and the controller should return to the waiting for formula state.
 - The chemicals can also be re-calibrated to eliminate this error.

If the memory card has been replaced, you will also need to send a Group Formula Update from PulseNet. This should be done for the Catalyst group.

If this error occurs and no cards have been replaced in the controller, then it is likely that the calibrations on the processor RAM have been corrupted. Follow the same procedure and copy the calibrations **from** Slot 5.

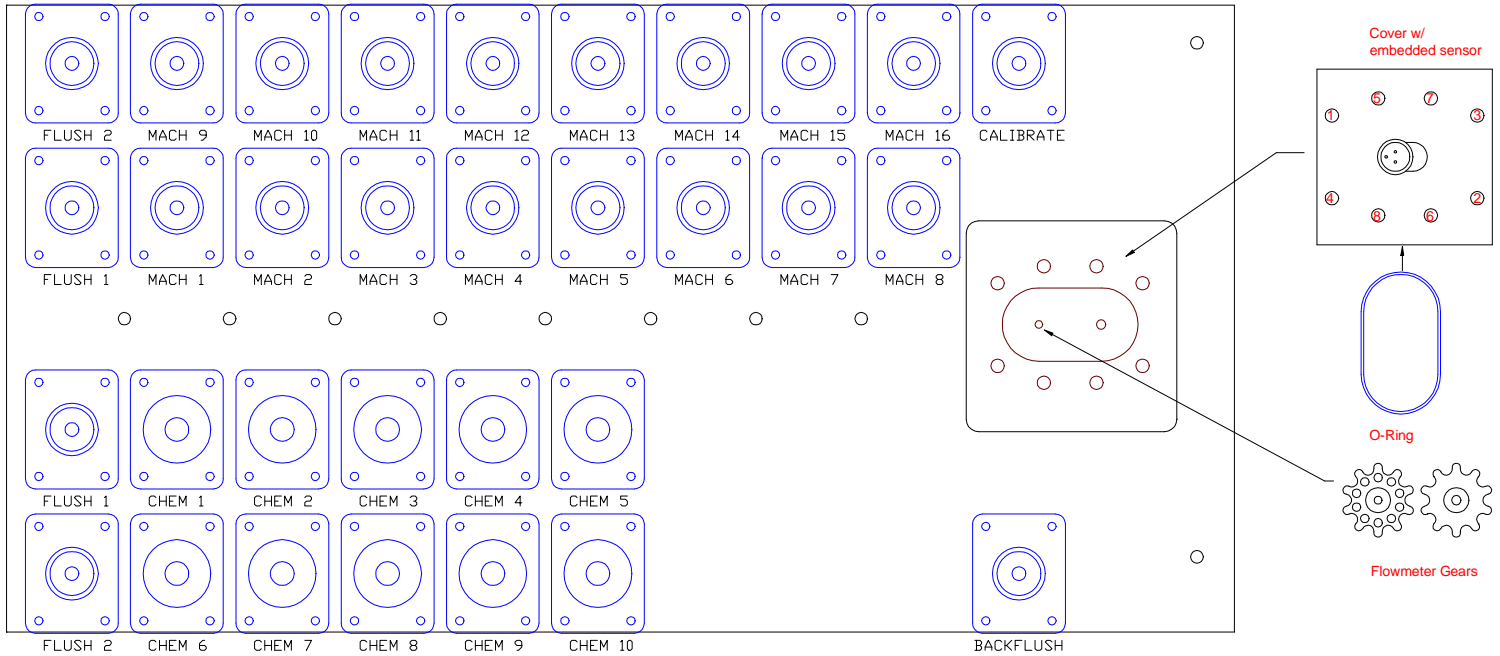
- **Check Chemical Tanks.** This error occurs when the input S7-07 turns on. This can be used for low level in day tanks. Once this input is on, the system will not dispense until it is corrected. To clear this error, disable the system by pressing No & Ent and fill the tank.

How to clear a chemical watchdog on the Catalyst

The Catalyst will alarm with a chemical watchdog when the injection takes too long or when the controller does not register any pulses from the flow meter. If the controller encounters these faults, it will alarm and display the watchdog with the chemical number. Do the following:

1. Press [CLR] to silence the alarm.
2. Check the supply tank or drum to make sure there is sufficient chemical supply.
3. If there is chemical, enter the level 7 password. The default is 777777. **If the unit is out of chemical, replace the drum or fill the tank. To prime the system, enter in the level 7 password and then press and hold YES. Once the pump has been primed, release the YES key.**
4. The formula will reset; press [YES] to restart the injection.
5. Watch the display. It will show the desired amount and the delivered amount. The delivered amount should be counting up. If not, the unit will alarm again.
6. If the system alarms and chemical is pumping, the flowmeter is likely obstructed and will need to be cleared. If chemical did not pump, go to step 12.
7. Press & hold [CLR] & [ENT] for approximately 15 seconds to flush the system.
8. Press & hold [The Manifold #] & [CLR] for approximately 15 seconds to flush the individual manifold. Observe the flowmeter, if gears rotate, then they are not jammed and the formula should be restarted. If the gears are jammed, then the flowmeter will need to be disassembled. See the net section.
9. Enter in the level 7 password and press [YES] to restart the injection.
10. If the system is still not metering the chemical, flush the system and disassemble the flowmeter. Make sure there are no obstructions and the gears turn freely. **(Make sure when replacing the gears, the numbers face the back of the meter)**
11. Enter in the level 7 password and restart the injection by pressing [YES]. Make sure the system is pumping chemical.
12. Check the air pilot valve for the chemical valve and pump. They should both turn on (LED on air valve should come on).
13. The chemical valve has a stroke limiting adjustment; make sure the valve is opening enough to let chemical flow. Turn the adjustment counter-clockwise to increase flow.
14. If the valves are not turning on, troubleshoot the output cards in the controller.

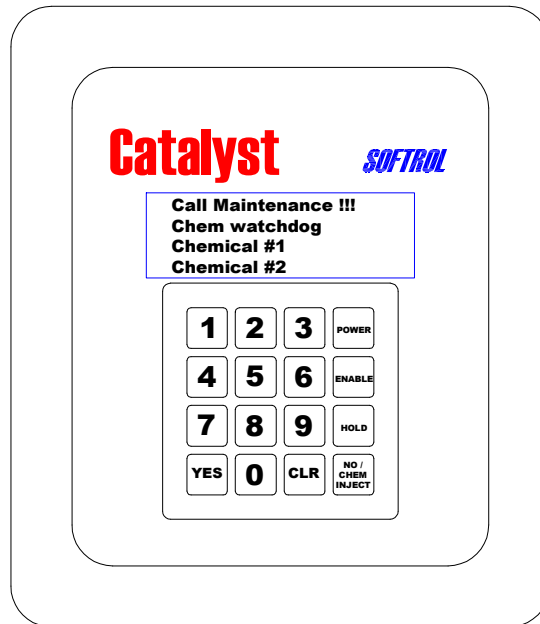
Flowmeter Disassembly



If the flowmeter becomes clogged with debris and cannot be cleared by back flushing, it will be necessary to disassemble and clean the flowmeter. To disassemble the meter, do the following:

- Press and hold [5] & [ENT] for 20 seconds to flush the system with water.
- Place several rags or towels under the meter. (The manifold will be full of water)
- Press the **Emergency Stop Button**
- Remove the cable that attaches to the cover of the flowmeter.
- Remove the 8 bolts that hold the cover in place.
- Carefully remove the cover from the manifold. Use a screwdriver to pry it loose if necessary.
- Remove the gears from the meter. Remove any debris that may be blocking them.
- Replace the gears. **Make sure the magnets on the gears face the cover of the flowmeter.** The gears should turn freely when in place.
- Replace the O-ring with a new one. Replace the cover. Tighten the bolts in a staggered manner. The bolts should only be finger tight (10-12 in.-lbs.)
- Attach the cable. Release the **Emergency Stop Button**.
- Restart the system and check flowmeter to make sure it is functioning properly.

Interface Troubleshooting



The Catalyst interface can have 4 different alarms while running. They are:

- **Power Interrupted During Formula.** This happens when the power is lost to the processor while running a formula. Press the YES button to resume the formula.
- **Machine Disabled.** This happens when the machine on input is lost during the formula. The machine on light (ENTER key) at the top right of the keypad must be on to run the formula. This is input D1.
- **Chemical Watchdog.** This alarm occurs when the interface has requested chemical and the Catalyst has not responded. Enter in a level 4 password or higher and then press YES to resume. If the Catalyst does not answer the chemical request, then there might be a problem with the Catalyst or the network. If this happens often, check the chemical watchdog setup in the interface.
- **Invalid Formula.** This will be displayed when the interface receives an input that indicates a formula that is not currently programmed.
 - To clear the formula, press [CLR] + [NO]+[ENT].
 - To select the correct formula, use the arrow keys.
 - Check the machine programming and chemical outputs to verify proper operation.

**Power Interruption
During Formula
Execution! Press
[YES] to Continue**

**Machine Disabled !
Press [YES] to Continue**

**Call Maintenance !!!
Chem watchdog
Chemical #1
Chemical #2**

**Invalid Formula
Selection!
NO= Exit**

Manual Formula Advancement/Cancel

Advancing a Formula:

If a formula on the machine needs to be advanced, the best option is to advance the machine to the chemical identification step. This will tell the interface to go to the appropriate step in its formula.

Canceling a Formula:

When a formula on the interface is canceled, no credit will be received for the run or poundage. This may be required when the wrong formula is started. To cancel the formula manually do the following:

Press **NO**- This will pause the formula

Press **CLR**- This will silence the alarm

Enter in a Password- This can be level 1 thru 7. (**111111 or 777777**)

Press **NO + ENT** at the same time to take the formula to the end.

Ending a Formula:

When the formula is ended, credit will be received for poundage and the run time. This may be required when a formula has been run and there is a problem with extract and the load is manually removed before the shakeout. To end the formula manually do the following:

Press **NO**- This will pause the formula

Press **CLR**- This will silence the alarm

Enter in a Password- This can be level 1 thru 7. (**111111 or 777777**)

Press **[UP Arrow]** to take the formula to the end.

Changing a Formula:

If the incorrect formula has been started on the machine and the operator desires a new formula, the best option is to Cancel the formula on the interface. This will not give the credit for the incorrect formula in PulseNet and will show up as a canceled load.

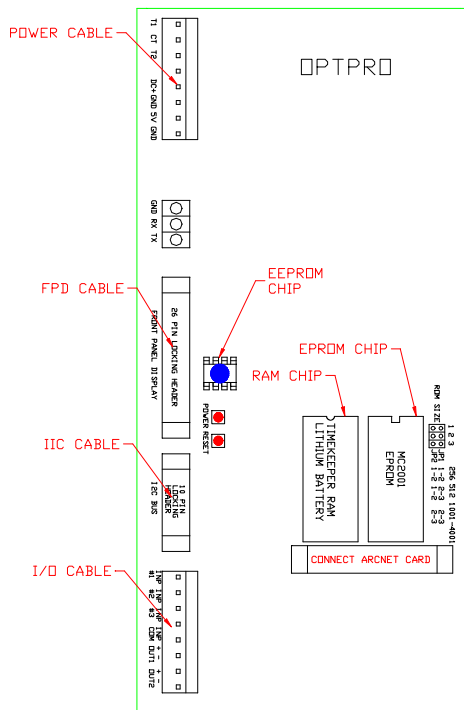
Note- If this is not done and the machine is restarted on the new formula, the interface will switch to the new formula and the old formula will be credited with a run. The machine must be restarted from the very beginning of the formula to identify the new formula to the interface.

Interface Board Problems

- Memory Card May Be Corrupt. This may be displayed when the memory chip in the interface has been reinitialized. To correct this do the following:
 - Press [CLR] then 777777 [ENT] 0624577
 - Press 777777
 - Select 1 for machine setups
 - Enter valid setups (From interface configuration)
- If this does not correct the problem, replace the memory chip or the entire OPT-PRO board.

Replacing the OPT-PRO

- Disconnect the power to the interface.
- Remove the FPD, Power, IIC and I/O cables.
- Remove the EEPROM chip and insert into new board.
- Remove the OPT-ARC card.
- Remove the EPROM chip and insert into new board.
- Install the OPT-ARC card on the new board.
- Reconnect all the cables to the new card.
- Power up the interface. Enter in valid setups- Including the LAN ID. Send a group formula update for the interface.



CataPulse Interface Troubleshooting-

The CataPulse interface can have 6 different alarms while running. They are:

- 1. Power Interrupted During Formula.** This happens when the power is lost to the processor while running a formula. Press the YES button to resume the formula.

**Power Interruption
During Formula
Execution! Press
[YES] to Continue**

- 2. Machine Disabled.** This happens when the machine on input is lost during the formula. The machine on light (ENTER key) at the top right of the keypad must be on to run the formula. This is input D1.

**Machine Disabled !
Press [YES] to Continue**

- 3. Chemical Watchdog.** This alarm occurs when the interface has requested chemical and the Catalyst has not responded. Enter in a level 4 password or higher and then press YES to resume. If the Catalyst does not answer the chemical request, then there might be a problem with the Catalyst or the network. Also, check the chemical watchdog time in the setups. This time should be 4 to 10 min.

**Call Maintenance!!!
Chem watchdog
Chemical #1**

- 4. Invalid Formula.** This will be displayed when the interface receives an input that indicates a formula that is not currently programmed.

- To clear the formula, press [CLR] + [NO]+[ENT].
- To select the correct formula, use the arrow keys.
- Check the machine programming and chemical outputs to verify proper operation.

**Formula Number = 63
Not Assigned
Use arrows to scroll
ENT=Accept NO=Exit**

- 5. Invalid Formula Request.** This will be displayed when the interface, in the waiting for formula state, receives the latch input without a valid formula number.

- To clear the formula, press [CLR] + [NO]+[ENT].
- To select the correct formula, use the arrow keys.
- Check the machine programming and chemical outputs to verify proper operation.

**Formula Number = 131
INVALID FORMULA RQX!
Use arrows to scroll
ENT=Accept NO=Exit**

- 6. Invalid Injection Request.** This will be displayed when the interface, in the waiting for formula state, receives binary inputs without the latch.

- To clear the formula, press [CLR] + [NO]+[ENT].
- To select the correct formula, use the arrow keys.
- Check the machine programming and chemical outputs to verify proper operation.

**Formula Number = 130
INVALID INJECT RQX!
Use arrows to scroll
ENT=Accept NO=Exit**

Advancing a Formula:

If a formula on the machine needs to be advanced, the best option is to advance the machine to the chemical identification step. This will tell the interface to go to the appropriate step in its formula.

Canceling a Formula:

When a formula on the interface is canceled, no credit will be received for the run or poundage. This may be required when the wrong formula is started. To cancel the formula manually do the following:

Press **NO**- This will pause the formula
Press **CLR**- This will silence the alarm
Enter in a Password- This can be level 1 thru 7. (**111111 or 777777**)
Press **NO + ENT** at the same time to take the formula to the end.

Ending a Formula:

When the formula is ended, credit will be received for poundage and the run time. This may be required when a formula has been run and there is a problem with extract and the load is manually removed before the shakeout. To end the formula manually do the following:

Press **NO**- This will pause the formula
Press **CLR**- This will silence the alarm
Enter in a Password- This can be level 1 thru 7. (**111111 or 777777**)
Press **[UP Arrow]** to take the formula to the end.

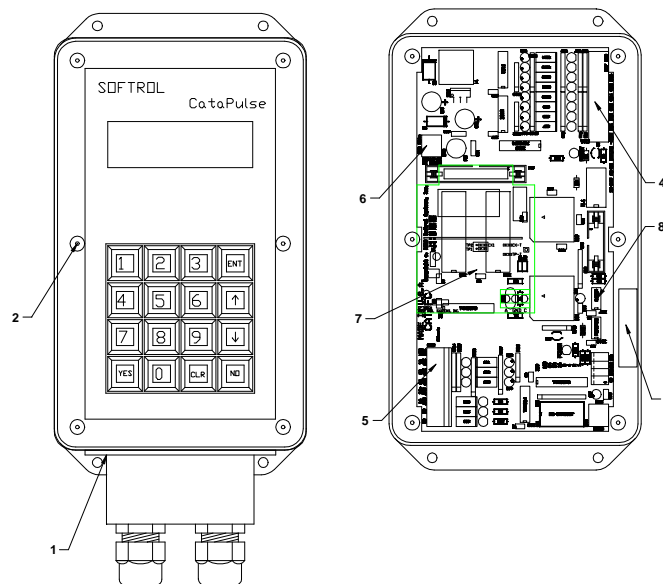
Changing a Formula:

If the incorrect formula has been started on the machine and the operator desires a new formula, the best option is to Cancel the formula on the interface. This will not give the credit for the incorrect formula in PulseNet and will show up as a canceled load.

Note- If this is not done and the machine is restarted on the new formula, the interface will switch to the new formula and the old formula will be credited with a run. The machine must be restarted from the very beginning of the formula to identify the new formula to the interface.

Hardware replacement-

The CataPulse is designed for limited in field service. The two main components of the interface are the mother board and the arcnet card. The following directions should be used for replacement of the mother board.



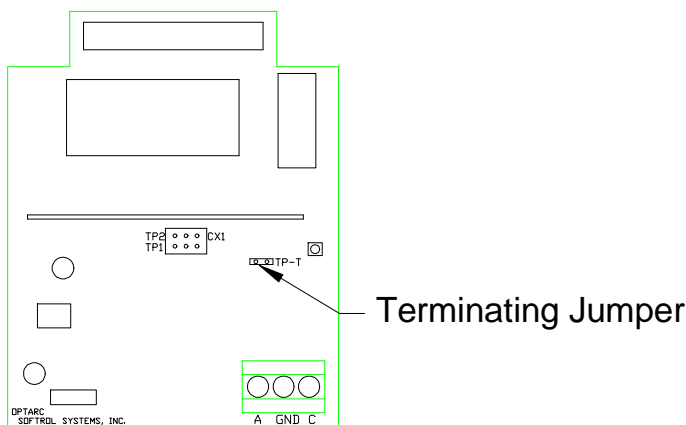
Replacement Procedure

1. Remove the small junction box at the bottom of the interface. Unplug the power connection and the communications connection. Be careful, the power will have 24 VDC.
2. Remove the 6 screws that hold the cover in place. Remove the cover and disconnect the 4 wires that connect it to the mother board.
3. Rotate the horn 180 deg. The wire connectors should be at the top.
4. Remove the plug that connects to the inputs.
5. Remove the connector from the outputs.
6. Remove the plug for the mother board power.
7. Remove the screw that holds the arcnet card in place. Remove the arcnet card.
8. Remove the EEPROM chip. Note the orientation of the chip in the socket. The notch on the chip should line up with the notch on the socket. *If you do not change this chip, the latch time will need to be set. This is found in the installation and configuration section.*
9. Remove the mother board from the plastic holder. You may need to pry back the sides to release the board.

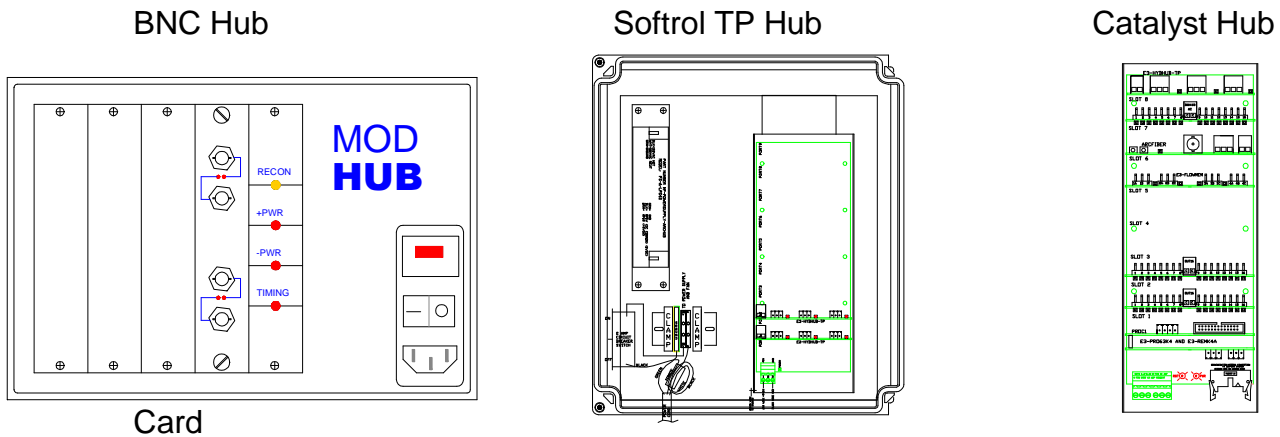
10. Replace the mother board with a new one. Be sure to set the LAN ID to the correct number by using the dip switches in the lower right hand corner of the card. You can use the old mother board as a reference or refer to the installation and configuration section. Replace the new EEPROM with the old one. *If you do not change this chip, the latch time will need to be set. This is found in the installation and configuration section.*
11. Put the arcnet card back in the holder and insert the screw that holds it in place.
12. Reconnect all the plugs for the wires that connect to the mother board in the reverse order in which they were removed.
13. Reconnect the cover and the power. Once the unit is powered up, you will need to do the machine setups and passwords. These can be found in the installation and configuration section. Download the formulas to the interface. You may wish to run a test formula at this time.

To replace the Arcnet card:

1. Turn power off the interface. Open the interface.
2. Remove the wires that go to the arcnet card.
3. Remove the retaining screw that holds the arcnet card in place.
4. Remove the card and replace with a new one.
5. Check the terminating jumper. If the interface has only one communication line going to it (it is at the end of the "daisy chain") then the jumper should be in place. If not, remove the jumper and discard.
6. Replace the retaining screw and reconnect the wires to the card. The white wires go to terminal A and the colored wires go to terminal B.
7. Check the communications. The red LED on the card should be on steady.



ArcNet Communications



All of the communications involved with the Catalyst are run on an ArcNet network. ArcNet is an industrial, high-speed network designed to be rugged and trouble free. The network can be run on RG-62 Coaxial cable, Cat 5 twisted pair, or fiber optic cables. Most all of the Catalyst installations now use Cat 5 Twisted pair cable and is attached to the controller with Phoenix connectors.

All the chemical requests from the machines and interfaces to the Catalyst are transmitted over this network. If the network is not functioning properly, the delivery of chemicals can be impeded.

The network is typically laid out in a bus fashion with an active hub.

Note: If it is a single Catalyst using twisted pair, the hub card may be located in the controller in slot 8. If there are multiple Catalysts, or the system is older, an active hub will be used.

The illustration above depicts a Mod Hub on the left (for older, coax networks) and an Arc hub on the right. (Usually twisted pair) For more information on the layout of the network, please see section 2:10 of Installation and Configuration.

Troubleshooting the network:

The active hub (Pictured above) is the central piece of equipment that brings the all of the branches of the network together. In normal operation, the yellow RECON light should be off. If this light is on steady or blinking, then there may be a problem with the network. If this light blinks occasionally (once every 100

seconds), then the network should be OK as this is the normal reconfiguration of ArcNet. The ArcHub does not have this light- All the red LEDs should be on steady. If you suspect a problem with the Network try the following:

Communications can be verified from the Pulsenet computer by bringing up the multiple display feature. If the front panel displays of all the machines that are turned on are shown, then it is likely that communications are OK.

If there is a problem with communications, remove one of the lines from the hub. If the hub continues to reconfigure, plug that line back in an unplug another. Repeat this process until the network is stable. You can then recheck communications at the computer to see which machines are causing the trouble.

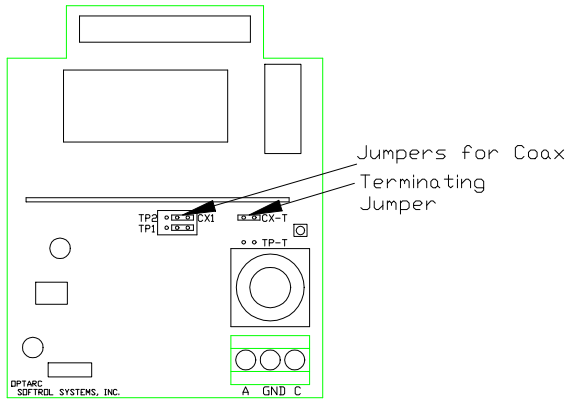
Once the line that is causing the problems is identified, the machine can usually be identified by the process of elimination. To do this, plug the line back into the hub and remove the tee from the first machine (or node) on that line. Check to see if communications are restored. Repeat this process until offending machine or the end of the line is reached.

Items that can cause network trouble:

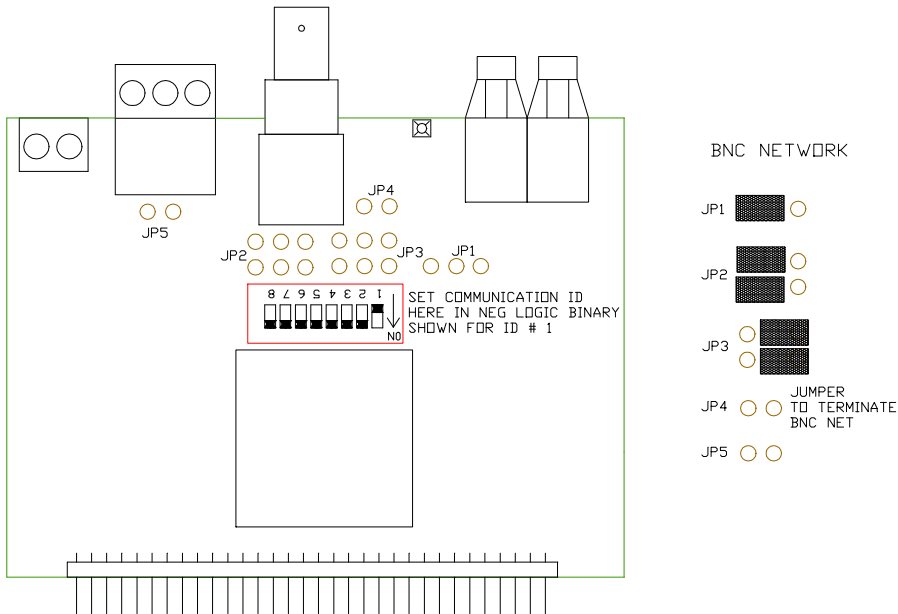
- Duplicate IDs.- Each node must have a unique ID from 1 to 255. The ID is usually set in the machine setup menu. The exception is the ArcFiber card and the CataPulse interface which is used with the K4 Processor. This card has a set of 8 dip switches that determine the ID.
- Terminating Jumper- Only the last machine on the line should be terminated. This terminator can be either a jumper on the card, or a BNC terminator connected to the other side of a tee. It **should not** have both. The computer must have a tee and terminator if it is at the end of the line. (it does not have terminating capability) If twisted pair is used, then the terminating jumpers must be used at the end of the line.
- Un-terminated Line- This will cause the network to reset. This can be a card at the end of the line that does not have a terminator, or when the cable is damaged or cut.
- CX / TP Jumper- The ArcNet cards can be configured for either Coax or twisted pair communications. For the Coax networks, the jumpers should be on the CX side. For Refer to the parts manual for exact jumper positions.
- Faulty ArcNet Card- Due to excessive noise on the line, ArcNet cards can be damaged and cause the network to fail. If this is the case, try to locate the source of electrical noise and correct it. Some sources of electronic noise are:
 - Cables run too close to power wires. If you must cross a power line, the cable should be run perpendicular to the line.

- Poorly grounded controllers and machines.
- Cables run too close to Variable Speed Drives.

Coax Network

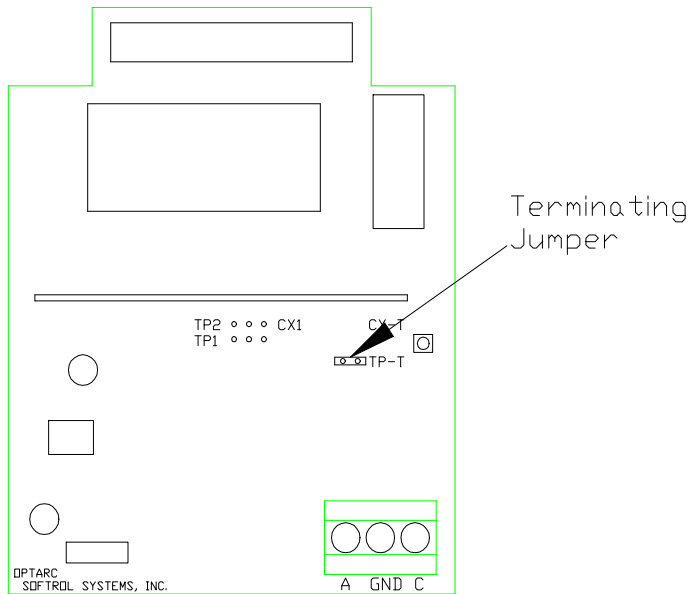


Interface Arcnet Card

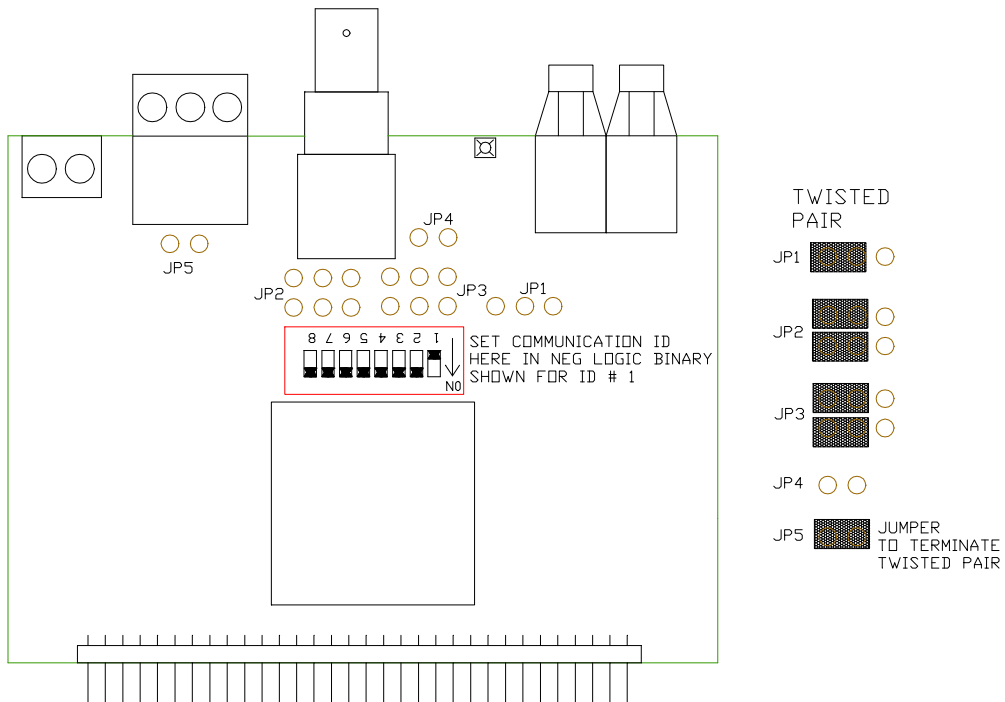


Catalyst Arcnet Card

Twisted Pair Network

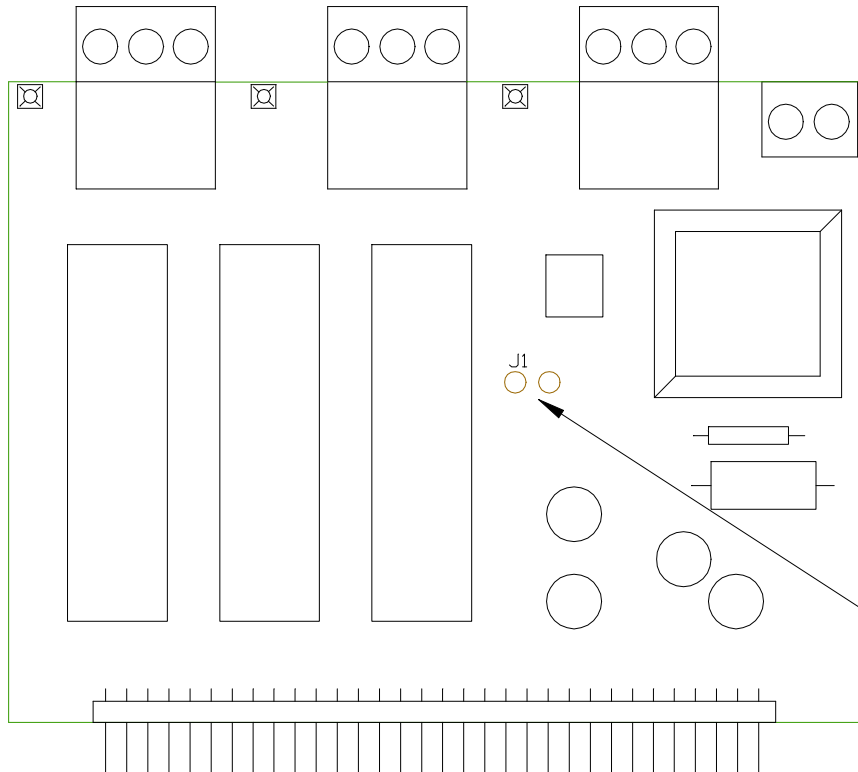


CataPulse Arcnet Card



Catalyst Arcnet Card

Twisted Pair Hub Card

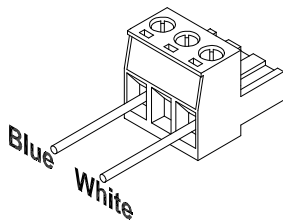


ADD JUMPER IF CARD IS USED IN SEPERATE HUB
REMOVE JUMPER IF CARD IS IN CATALYST CONTROL

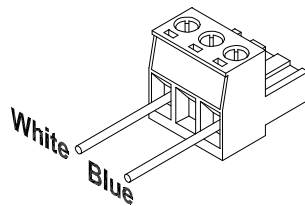
This card is used in the Catalyst control when the system does not have a hub. If the card is used in the Catalyst control, the jumper **MUST** be removed.

Twisted Pair Network

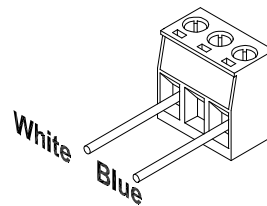
ARCNET TWISTED PAIR POLARITY GUIDE FOR THE CATALYST



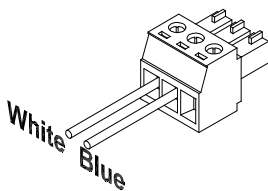
**ARCFIBER
(CATALYST)**



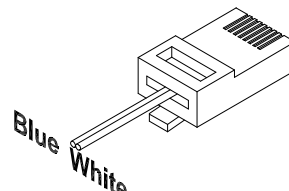
**HYHUB
(HUB)**



**OPTARC
(INTERFACE)**

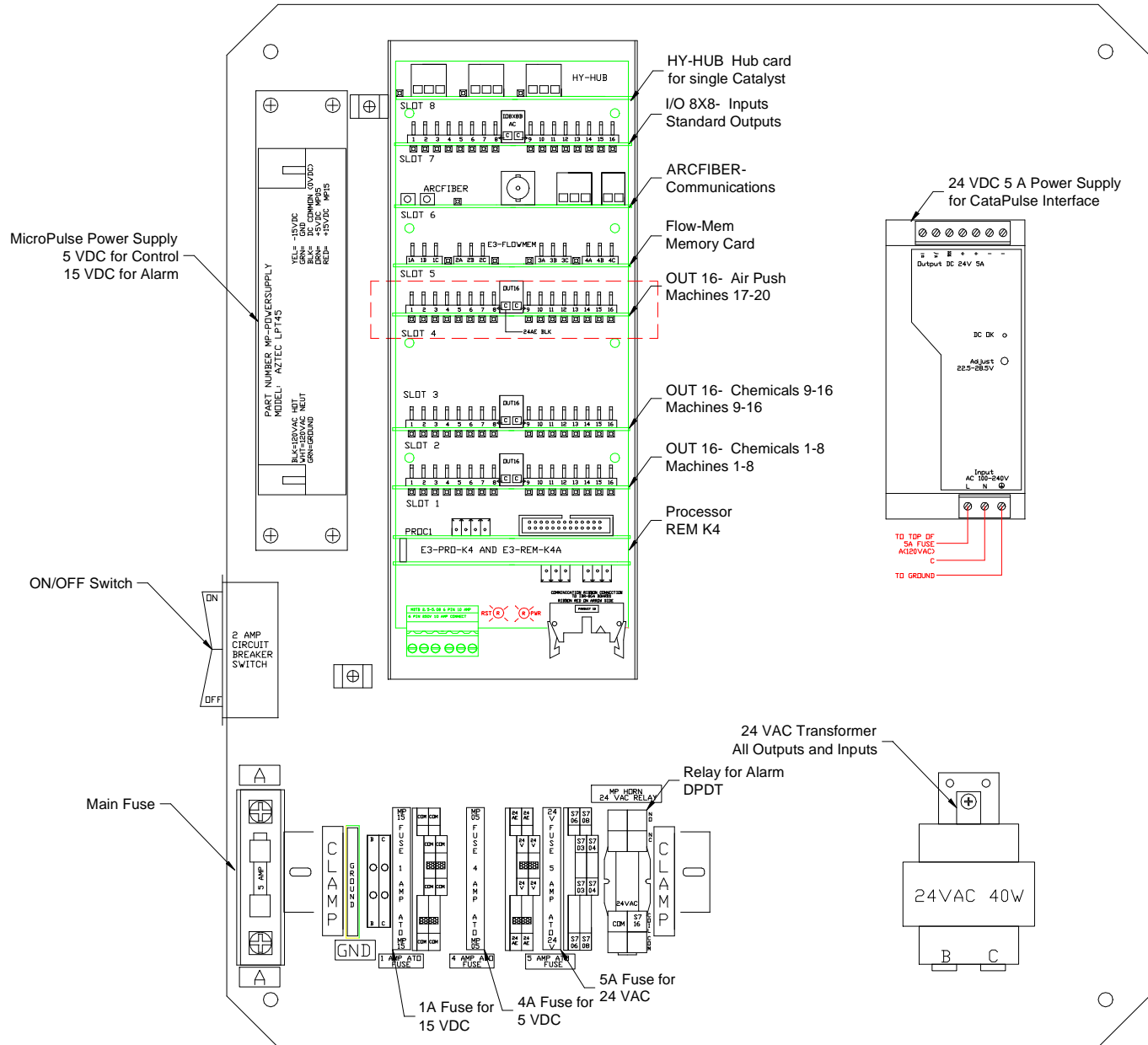


**PCI20
(COMPUTER)**



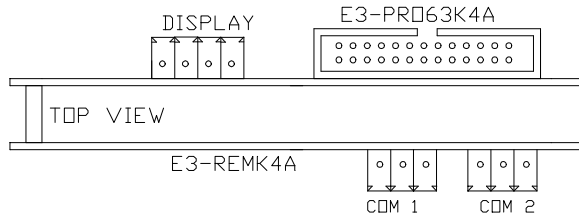
**RJ45
(COMPUTER)**

Catalyst Electronics

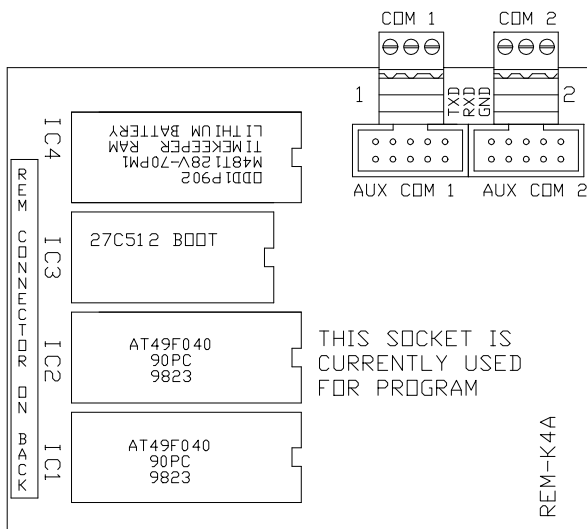


Typical Catalyst Electronics Layout.

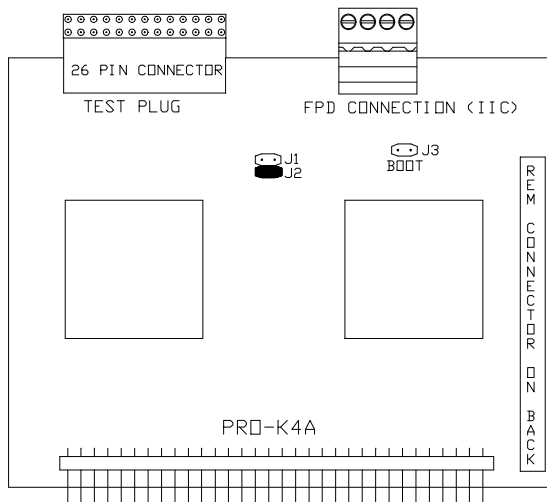
PROC Slot- PRO-K4A, REM-K4A



REM-K4A- This card contains the software that controls the Catalyst. It also contains the Catalyst setups and the current calibrations of the chemicals.



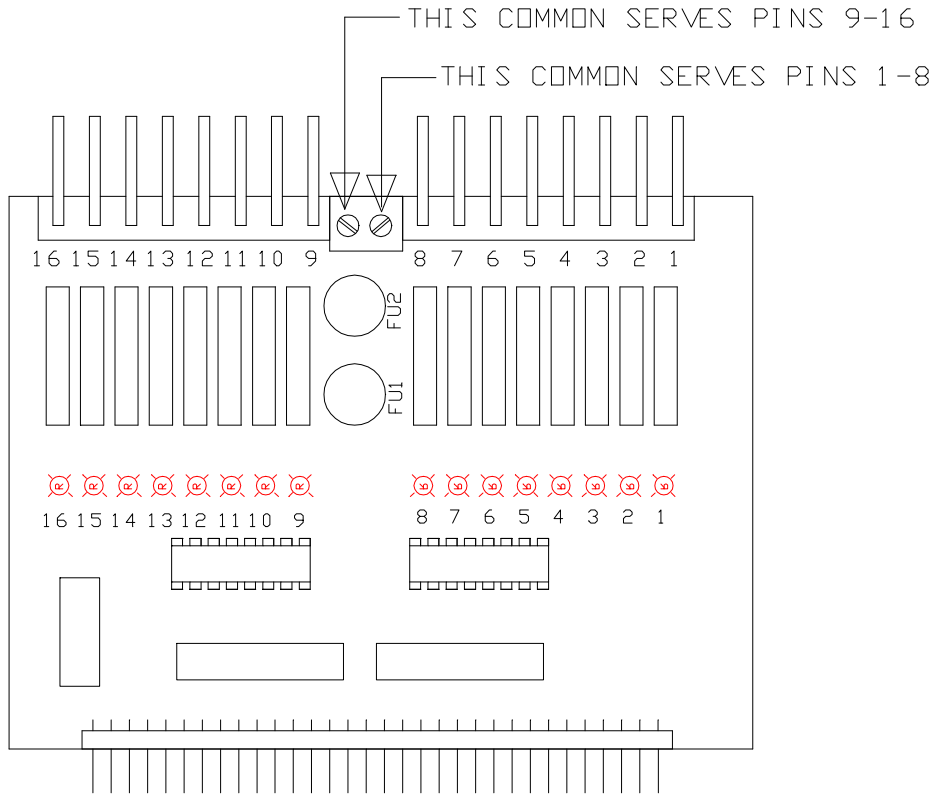
PRO-K4A- This card is the main processor for the system.



Slot 1- OUT-16

This card has the outputs for chemicals 1-8 and machines 1-8

The outputs go from right to left and are S1-01 to S1-16. This stands for slot 1, outputs 1-16.



Slot 2- OUT-16- Optional

This card has the outputs for chemicals 9-16 and machines 9-16

Slot 3- OUT-16- Optional

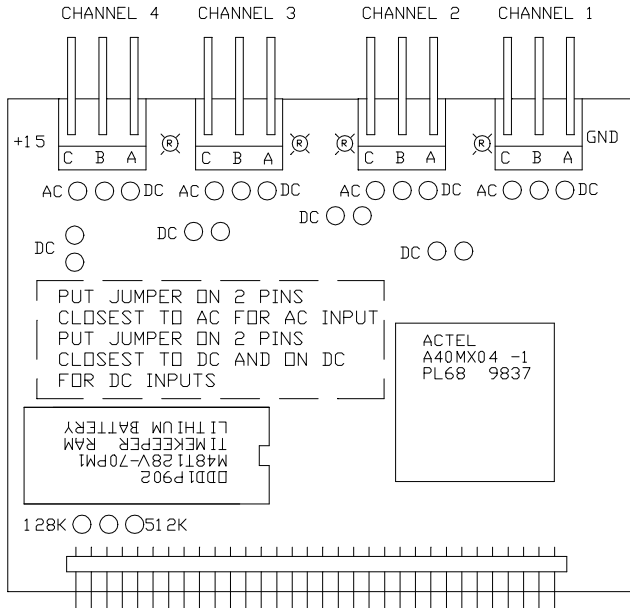
This card is used in a dual inject system and has outputs for pumps 1-16

Slot 4- OUT-16 – Optional

This card is used for the Air Push feature.

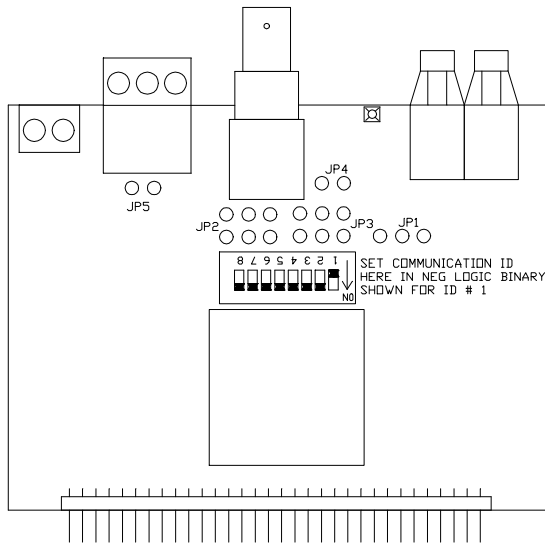
Slot 5- FLOW-MEM

This card contains the memory for the system (for formulas and totals) and has 4 flow-meter inputs. The Catalyst uses channel one for its meter. The card should be jumped for DC on channel 1 for the Catalyst meter.



Slot 6- ARCFIBER-B

This card is used for the communications to the PC and the machines. The card can be used either for BNC (coax cable) or for twisted pair (CAT 5)



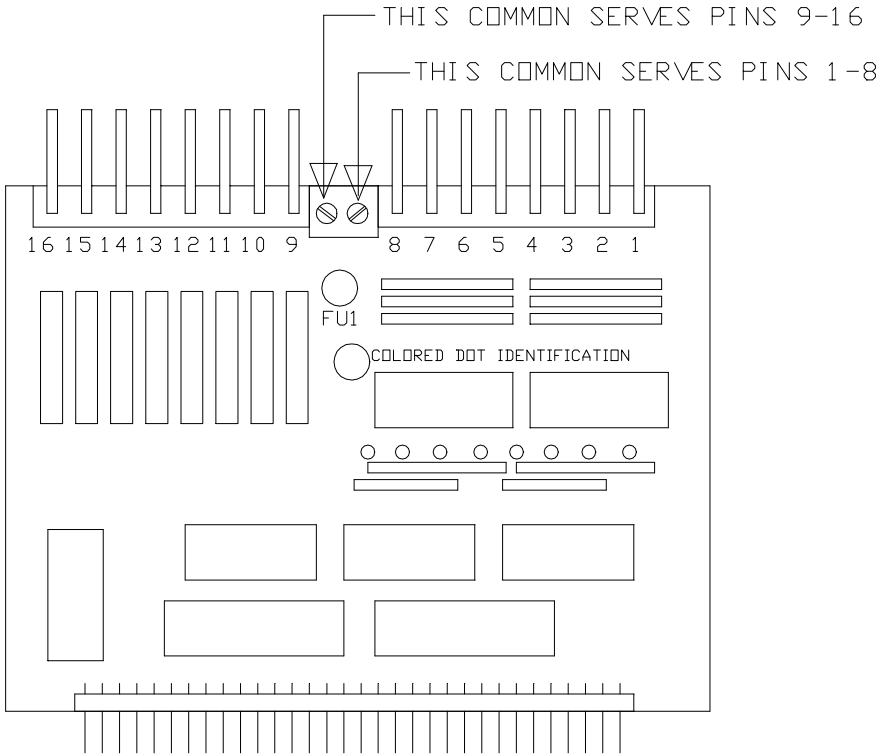
Slot-7- IO 8X8

This card has 8 inputs and 8 outputs. The inputs are on the left side and are from left to right:

- S7-03 Flush tank full- Tank will try to fill when off.
- S7-04 Flush tank empty- Turns on when tank is low.
- S7-06 Air Pressure is OK- Turns on when > 65 PSI
- S7-08 Emergency stop is OK- Turns off when E-stop is pressed.

The outputs are:

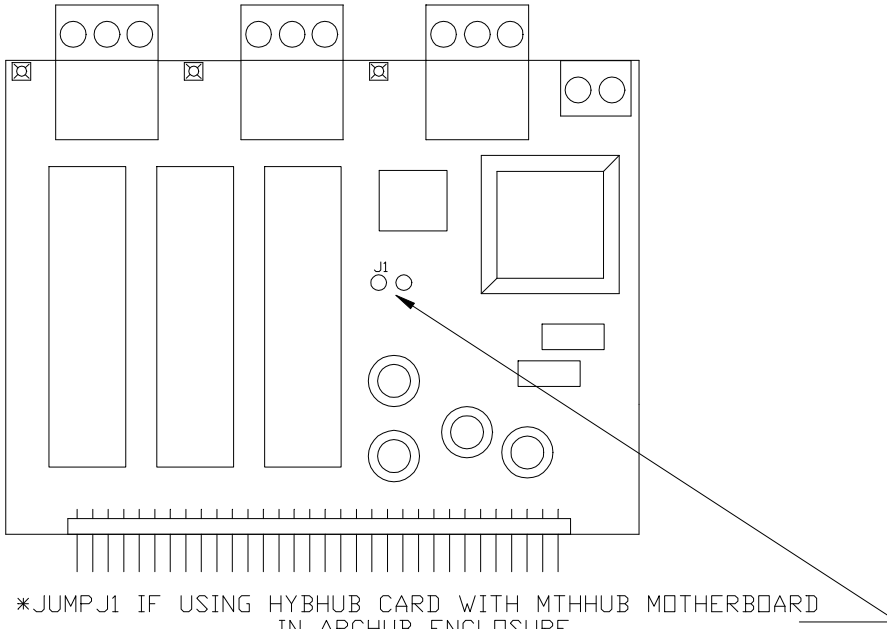
- S7-09 Calibration Valve
- S7-10 Fill Flush Tank
- S7-11 Flush Chems 1-8
- S7-12 Flush Chems 9-16
- S7-13 Flush Machine valves
- S7-14 Back Flush
- S7-15 Flush Pump
- S7-16 Signal



Slot 8- HYHUB-TP-CAT

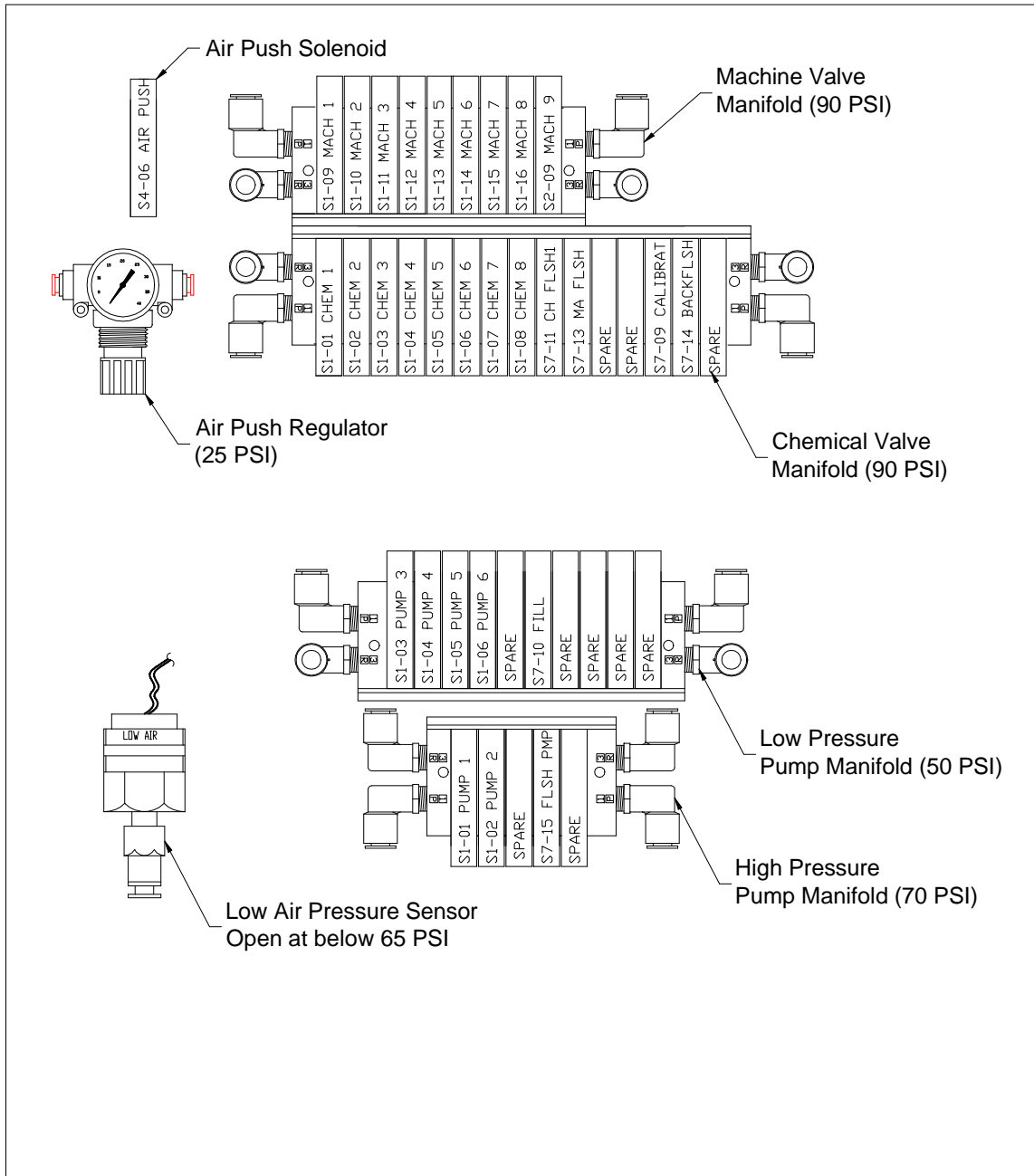
This card is sometimes used in place of a hub. It will have three branches from it:

- 1- Catalyst – Computer
- 2- Machine branch 1
- 3- Machine Branch 2



*JUMP J1 IF USING HYBHUB CARD WITH MTHHUB MOTHERBOARD
IN ARCHUB ENCLOSURE
*DO NOT JUMP J1 IF USING HYBHUB CARD IN CATALYST
CONTROL

Catalyst Pneumatics



The pneumatic layout will vary with the system configuration. A layout is mounted inside the pneumatic box. Air push is a option and may not be included or available.

OPERATOR'S MANUAL

66605X-X

INCLUDING: OPERATION, INSTALLATION & MAINTENANCE

RELEASED: 4-15-87

REVISED: 11-22-04

(REV. AM)

1/2" DIAPHRAGM PUMP 1:1 RATIO (NON-METALLIC)



**READ THIS MANUAL CAREFULLY BEFORE INSTALLING,
OPERATING OR SERVICING THIS EQUIPMENT.**

It is the responsibility of the employer to place this information in the hands of the operator. Keep for future reference.

SERVICE KITS

Refer to Model Chart to match the pump material options.
637140-XX for fluid section repair (see page 4).
637141 for air section repair (see page 6).

PUMP DATA

Models	See Model Description Chart for "-XXX".
Pump Type	Non-Metallic Air Operated Double Diaphragm
Material	See Model Description Chart.
Weight	Polypropylene 7.2 (3.3 kgs)
	Groundable Acetal 8.8 (4.0 kgs)
	P.V.D.F. (Kynar®) 9.5 (4.3 kgs)
Maximum Air Inlet Pressure	100 p.s.i.g. (6.9 bar)
Maximum Material Inlet Pressure	10 p.s.i.g. (0.69 bar)
Maximum Outlet Pressure	100 p.s.i.g. (6.9 bar)
Air Consumption	1 c.f.m. / gallon (approx.)
Maximum Flow Rate (Ball)	13 g.p.m. (49.2 l.p.m.)
	(Duckbill) 10 g.p.m. (37.9 l.p.m.)
Maximum Particle Size (Ball)	3/32" dia. (2.4 mm)
	(Duckbill) Fibers

Maximum Temperature Limits

E.P.R.	-60° to 280° F (-51° to 138° C)
Groundable Acetal	10° to 180° F (-12° to 82° C)
Hytrel®	-20° to 150° F (-29° to 66° C)
Neoprene	0° to 200° F (-18° to 93° C)
Nitrile	10° to 180° F (-12° to 82° C)
Polypropylene	35° to 150° F (2° to 66° C)
Polyurethane	10° to 150° F (-12° to 66° C)
P.V.D.F. (Kynar)	10° to 200° F (-12° to 93° C)
Santoprene®	-40° to 225° F (-40° to 107° C)
T.F.E. (Teflon®)	40° to 225° F (4° to 107° C)
Viton®	-40° to 350° F (-40° to 177° C)

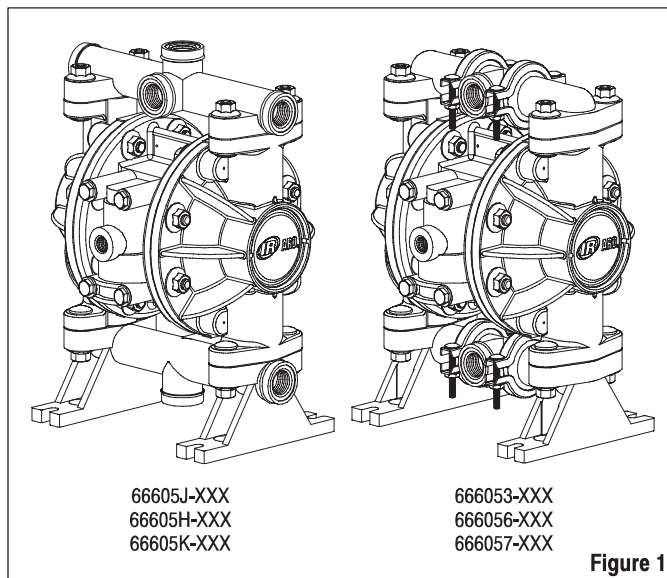
Groundable 666056-X and 66605H-X models only

Dimensional Data see page 8

Noise Level @ 70 p.s.i., 60 c.p.m. 71.1 db(A)

* The pump sound pressure levels published here have been updated to an Equivalent Continuous Sound Level (L_{Aeq}) to meet the intent of ANSI S1.13-1971, CAGI-PNEU-ROP S5.1 using four microphone locations.

NOTICE: All possible options are shown in the chart however certain combinations may not be recommended, consult a representative or the factory if you have questions concerning availability.



MODEL DESCRIPTION CHART

66605 X - X X X - 04	
FLUID CAPS & MANIFOLD MATERIAL	
3 - Piece Manifold	Single Piece Manifold
3 - Polypropylene	J - Polypropylene
6 - Groundable Acetal	H - Groundable Acetal
7 - Pure Kynar	K - Pure Kynar
SEAT MATERIAL	
0 - (Duck Bill)	4 - P.V.D.F. (Kynar)
2 - Stainless Steel	6 - Acetal
3 - Polypropylene	
BALL MATERIAL	
	(* Duckbill models)
1 - Neoprene	8 - Polyurethane
2 - Nitrile	A - Stainless Steel
3 - Viton	C - Neoprene (*)
4 - T.F.E. (Teflon)	D - Nitrile (*)
5 - E.P.R.	E - Santoprene
DIAPHRAGM MATERIAL	
1 - Neoprene	5 - E.P.R.
2 - Nitrile	8 - Polyurethane
3 - Viton	9 - Hytrel
4 - T.F.E. (Teflon) / Santoprene	B - Santoprene
CONE CHECK FLOW	
04 - Top Discharge	
FLUID SECTION SERVICE KIT SELECTION	
EXAMPLE: MODEL # 666053-321	66605X - X X X
Fluid Section Service Kit # 637140-21	637140 - <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
	Ball <input type="checkbox"/> Diaphragm <input type="checkbox"/>

OPERATING AND SAFETY PRECAUTIONS

READ, UNDERSTAND AND FOLLOW THIS INFORMATION TO AVOID INJURY AND PROPERTY DAMAGE.



EXCESSIVE AIR PRESSURE
STATIC SPARK



HAZARDOUS MATERIALS
HAZARDOUS PRESSURE

⚠ WARNING EXCESSIVE AIR PRESSURE. Can cause personal injury, pump damage or property damage.

- Do not exceed the maximum inlet air pressure as stated on the pump model plate.
- Be sure material hoses and other components are able to withstand fluid pressures developed by this pump. Check all hoses for damage or wear. Be certain dispensing device is clean and in proper working condition.

⚠ WARNING STATIC SPARK. Can cause explosion resulting in severe injury or death. Ground pump and pumping system.

- Sparks can ignite flammable material and vapors.
- The pumping system and object being sprayed must be grounded when it is pumping, flushing, recirculating or spraying flammable materials such as paints, solvents, lacquers, etc., or used in a location where surrounding atmosphere is conducive to spontaneous combustion. Ground the dispensing valve or device, containers, hoses and any object to which material is being pumped.
- 666056-XXX and 66605H-XXX Groundable Acetal pumps: Use the pump grounding screw provided. Connect a 12 ga. (minimum) wire (kit is included) to a good earth ground source.
- Secure pump, connections and all contact points to avoid vibration and generation of contact or static spark.
- Consult local building codes and electrical codes for specific grounding requirements.
- After grounding, periodically verify continuity of electrical path to ground. Test with an ohmmeter from each component (e.g., hoses, pump, clamps, container, spray gun, etc.) to ground to insure continuity. Ohmmeter should show 0.1 ohms or less.
- Submerge the outlet hose end, dispensing valve or device in the material being dispensed if possible. (Avoid free streaming of material being dispensed.)
- Use hoses incorporating a static wire.
- Use proper ventilation.
- Keep inflammables away from heat, open flames and sparks.
- Keep containers closed when not in use.

⚠ WARNING Pump exhaust may contain contaminants. Can cause severe injury. Pipe exhaust away from work area and personnel.

- In the event of a diaphragm rupture material can be forced out of the air exhaust muffler.
- Pipe the exhaust to a safe remote location when pumping hazardous or inflammable materials.
- Use a grounded 3/8" minimum i.d. hose between the pump and the muffler.

⚠ WARNING HAZARDOUS PRESSURE. Can result in serious injury or property damage. Do not service or clean pump, hoses or dispensing valve while the system is pressurized.

- Disconnect air supply line and relieve pressure from the system by opening dispensing valve or device and / or carefully and slowly loosening and removing outlet hose or piping from pump.

⚠ WARNING HAZARDOUS MATERIALS. Can cause serious injury or property damage. Do not attempt to return a pump to the factory or service center that contains hazardous material. Safe handling practices must comply with local and national laws and safety code requirements.

- Obtain Material Safety Data Sheets on all materials from the supplier for proper handling instructions.

⚠ CAUTION Verify the chemical compatibility of the pump wetted parts and the substance being pumped, flushed or recirculated. Chemical compatibility may change with temperature and concentration of the chemical(s) within the substances being pumped, flushed or circulated. For specific fluid compatibility, consult the chemical manufacturer.

⚠ CAUTION Maximum temperatures are based on mechanical stress only. Certain chemicals will significantly reduce maximum safe operating temperature. Consult the chemical manufacturer for chemical compatibility and temperature limits. Refer to Pump Data on page 1 of this manual.

⚠ CAUTION Be certain all operators of this equipment have been trained for safe working practices, understand it's limitations, and wear safety goggles / equipment when required.

⚠ CAUTION Do not use the pump for the structural support of the piping system. Be certain the system components are properly supported to prevent stress on the pump parts.

- Suction and discharge connections should be flexible connections (such as hose), not rigid piped, and should be compatible with the substance being pumped.

⚠ CAUTION Prevent unnecessary damage to the pump. Do not allow pump to operate when out of material for long periods of time.

- Disconnect air line from pump when system sits idle for long periods of time.

⚠ CAUTION Use only genuine ARO replacement parts to assure compatible pressure rating and longest service life.

NOTICE Install the pump in the vertical position. The pump may not prime properly if the balls do not check by gravity upon start-up.

NOTICE Re-torque all fasteners before operation. Creep of housing and gasket materials may cause fasteners to loosen. Re-torque all fasteners to insure against fluid or air leakage.

NOTICE Replacement warning labels are available upon request: "Static Spark" PN \ 93616-1, "Diaphragm Rupture" PN \ 93122.

⚠ WARNING = Hazards or unsafe practices which could result in severe personal injury, death or substantial property damage.

⚠ CAUTION = Hazards or unsafe practices which could result in minor personal injury, product or property damage.

NOTICE = Important installation, operation or maintenance information.

GENERAL DESCRIPTION

The ARO diaphragm pump offers high volume delivery even at low air pressure and a broad range of material compatibility options available. Refer to the model and option chart. ARO pumps feature stall resistant design, modular air motor / fluid sections.

Air operated double diaphragm pumps utilize a pressure differential in the air chambers to alternately create suction and positive fluid pressure in the fluid chambers. Ball checks insure a positive flow of fluid.

Pump cycling will begin as air pressure is applied and it will continue to pump and keep up with the demand. It will build and maintain line pressure and will stop cycling once maximum line pressure is reached (dispensing device closed) and will resume pumping as needed.

Models 666056-X and 66605H-X: The Acetal material used in these pumps contains Stainless Steel fibers. It's conductivity allows it to be connected to a suitable ground. A ground screw and ground wire kit is provided for this.

AIR AND LUBE REQUIREMENTS

- A filter capable of filtering out particles larger than 50 microns should be used on the air supply. There is no lubrication required other than the "O" ring lubricant which is applied during assembly or repair.
- If lubricated air is present, make sure that it is compatible with the Nitrile "O" rings in the air motor section of the pump.

OPERATING INSTRUCTIONS

- Always flush the pump with a solvent compatible with the material being pumped if the material being pumped is subject to "setting up" when not in use for a period of time.
- Disconnect the air supply from the pump if it is to be inactive for a few hours.
- The outlet material volume is governed not only by the air supply but also by the material supply available at the inlet. The material supply tubing should not be too small or restrictive. Be sure not to use hose which might collapse.
- When the diaphragm pump is used in a forced-feed (flooded inlet) situation, it is recommended that a "Check Valve" be installed at the air inlet.
- Secure the diaphragm pump legs to a suitable surface to insure against damage by vibration.

MAINTENANCE

- Certain ARO "Smart Parts" are indicated which should be available for fast repair and reduction of down time.
- Provide a clean work surface to protect sensitive internal moving parts from contamination from dirt and foreign matter during service disassembly and reassembly.
- Keep good records of service activity and include pump in preventive maintenance program.
- Service kits are available to service two separate diaphragm pump functions: 1. AIR SECTION, 2. FLUID SECTION. The Fluid Section is divided further to match typical active MATERIAL OPTIONS.

DUCKBILL CHECK VALVES (OPTIONAL)

Pump models with the suffix (-0CX or -0DX) come equipped with duckbill type checks. Standard duckbill pumps are shipped with the material inlet in the top and the material outlet on the bottom manifold. To change the direction of flow, disassemble the pump as instructed in the FLUID SECTION and reassemble as described below. A pump that was factory built with balls and seats can be retro-fitted with duckbill type check valves by purchasing the necessary parts and installing them as shown.

Reassembly:

The duckbills may be installed in either direction to produce flow from top to bottom of the pump or from bottom to top of the pump. In either case, **all of the (42) duckbills must point in the same direction.**

Flow from Top to Bottom: (see page 5)

1. With (15) fluid caps installed, stand the pump upside down.
2. Place (21) insert into (42) duckbill and slide (41) sleeve over (42) duckbill.
3. Slide the complete check assembly into the fluid cap bore with the (21) insert end first. [Duckbills (42) point up.]
4. Position (19) "O" ring over (41) sleeve.
5. Attach (35) manifold feet / (36) swivel assembly to the fluid caps.
6. Turn pump over to right side up position.
7. Assemble duckbill check as in step #1.
8. Slide the complete check assembly into the fluid cap bore with the (41) sleeve end first. [Duckbill is pointing down toward fluid cap cavity.]
9. Position (19) "O" ring around (21) insert.
10. Attach (34) manifold / (36) swivel assembly to fluid cap.

Flow from Bottom to Top: (Inlet Bottom - Outlet Top)

To reverse flow direction, slide check valve assemblies into the (15) fluid caps backwards from what is indicated in steps #2 and #7. In step #2, the (42) duckbills will be pointing down and in step #7, they will be pointing up.

PARTS LIST / 66605X-X FLUID SECTION

☆ **637140-XX FLUID SECTION SERVICE KITS** include: **BALLS** (see “BALL OPTIONS”, refer to -XX in chart below), **DIAPHRAGMS** (see “DIAPHRAGM OPTIONS”, refer to -XX in chart below), plus “O” ring items: 2, 19, 20, 33 and 93706-1 Key-Lube grease.

SEAT OPTIONS				BALL OPTIONS							
ITEM “21”				ITEM “22” (3/4” dia.) (Service Kit -XX)							
-XXX	Seat	Qty	[Mtl]	-XXX	Ball	Qty	[Mtl]	-XXX	Ball	Qty	[Mtl]
-2XX	93409-1	(4)	[SS]	-X1X	93100-1	(4)	[N]	-XAX	93410-1	(4)	[SS]
-3XX	93098-1	(4)	[P]	-X2X	93100-2	(4)	[B]	-XEX	93100-E	(4)	[SP]
-34X / -3AX	93098-10	(4)	[P]	-X3X	93100-3	(4)	[V]				
-4XX	93098-4	(4)	[PK]	-X4X	93100-4	(4)	[T]				
-6XX	93098-3	(4)	[D]	-X5X	93100-5	(4)	[E]	-0XX	ITEM “42” (Duckbill)		
-0XX	93115-1	(4)	[P]	-X8X	93100-8	(4)	[U]	-0CX	93114-1	(4)	[N]
								-0DX	93114-2	(4)	[B]

MATERIAL CODE	
[B]	Nitrile
[D]	Acetal
[E]	E.P.R.
[F]	Flouraz
[GA]	Groundable Acetal
[GFN]	Glass Filled Nylon
[H]	Hytre
[N]	Neoprene
[P]	Polypropylene
[PK]	Pure Kynar
[SP]	Santoprene
[SS]	Stainless Steel
[T]	Teflon
[U]	Polyurethane
[V]	Viton

DIAPHRAGM OPTIONS							
66605X-XXX	☆ SERVICE KITS -XX = (Ball or Duckbill) -X = (Diaphragm)	“7” / “8” Diaphragm (2) [Mtl]		“19” “O” Ring (4) 1-5/16” o.d.	“20” “O” Ring (2) 1-1/8” o.d.	“33” * “O” Ring (4) 1-3/16” o.d. [Mtl]	
-XX1	637140-X1	93113	[N]	Y325-122	Y325-119	Y325-120	[B]
-XX2	637140-X2	93465-G	[B]	Y325-122	Y325-119	Y325-120	[B]
-XX3	637140-X3	93581-3	[V]	Y327-122	Y327-119	Y327-120	[V]
66605J-, 66605J-XX4	637140-X4	93111 / 93465	[T/SP]	93265	Y328-119	94749	[T]
66605H-, 66605H-XX4	637140-X4	93111 / 93465	[T/SP]	93764	93933	95129	[F]
66605K-, 66605K-XX4	637140-X4	93111 / 93465	[T/SP]	93265	Y328-119	94749	[T]
-XX5	637140-X5	93760	[E]	93763	93761	93762	[E]
-XX8	637140-X8	93112	[U]	93119	93117	93118	[U]
-XX9	637140-X9	93465-9	[H]	Y325-122	Y325-119	Y325-120	[B]
-XXB	637140-XB	93465	[SP]	93763	93761	93762	[E]
-0X1	637140-C1, D1	93113	[N]	Y325-122	Not Req'd	Y325-120	[B]
-0X2	637140-C2, D2	93465-G	[B]	Y325-122	Not Req'd	Y325-120	[B]
-0X4	637140-C4, D4	93111 / 93465	[T/SP]	Y325-122	Not Req'd	94749	[T]
-0X8	637140-C8, D8	93112	[U]	93119	Not Req'd	93118	[U]
-0XB	637140-CB, DB	93465	[SP]	Y325-122	Not Req'd	Y325-120	[B]

- Not shown
- ⚡ Quantity = 22

★ Item “33” “O” rings are not used on models 66605H-XXX, 66605J-XXX and 66605K-XXX.

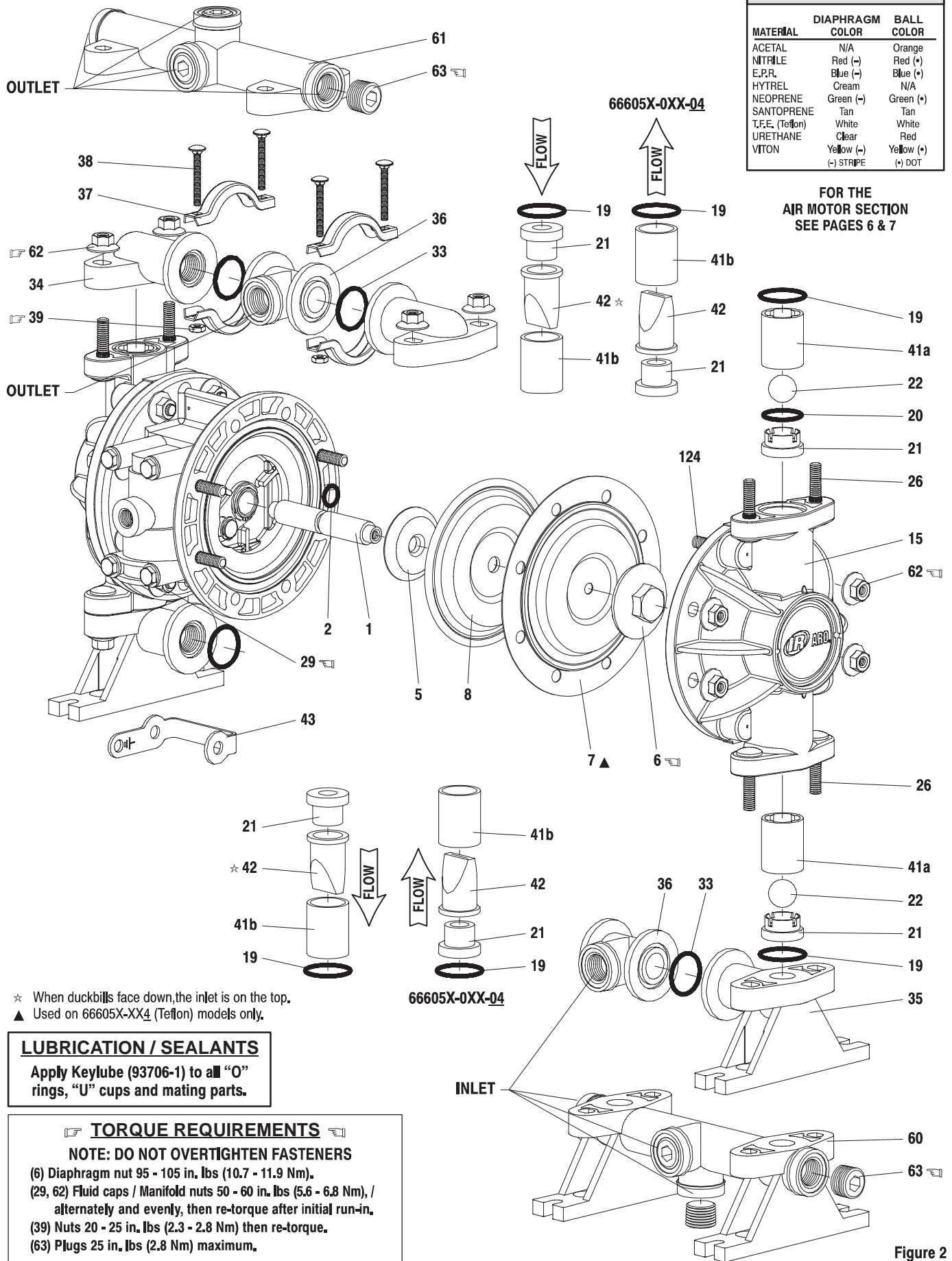
WETTED COMMON PARTS														
Item	Description (size)	Qty	POLYPROPYLENE				GROUNDABLE ACETAL				PURE KYNAR			
			66605J-XXX		66605J-XXX		66605G-XXX		66605H-XXX		66605J-XXX		66605K-XXX	
			Part No.	Mtl	Part No.	Mtl	Part No.	Mtl	Part No.	Mtl	Part No.	Mtl	Part No.	Mtl
□ 1	Rod	(1)	93084	[SS]	93084	[SS]	93084	[SS]	93084	[SS]	93084	[SS]	93084	[SS]
2	“O” Ring (3/32” x 5/8” o.d.)	(1)	Y325-111	[B]	Y325-111	[B]	Y325-111	[B]	Y325-111	[B]	Y325-111	[B]	Y325-111	[B]
5	Washer (2” o.d.)	(2)	94645	[GFN]	94645	[GFN]	94645	[GFN]	94645	[GFN]	94645	[GFN]	94645	[GFN]
□ 6	Diaphragm Nut (5/16” - 18)	(2)	93103-1	[P]	93103-1	[P]	93103-3	[D]	93103-3	[D]	93103-4	[PK]	93103-4	[PK]
15	Fluid Cap (includes 26 & 124)	(2)	93105-1	[P]	93105-1	[P]	93105-11	[GA]	93105-11	[GA]	93105-9	[PK]	93105-9	[PK]
26	Bolt (5/16” - 18 x 1-1/2”)	(8)	93109	[SS]	93109	[SS]	93109	[SS]	93109	[SS]	93109	[SS]	93109	[SS]
29	Nut (5/16” - 18)	(2)	-----	---	-----	---	Y12-5-S	[SS]	Y12-5-S	[SS]	-----	---	-----	---
34	Manifold, Outlet (top)	(2)	93102-1	[P]	-----	---	93102-6	[GA]	-----	---	93102-4	[PK]	-----	---
□ 35	Manifold, Foot (bottom)	(2)	93106-1	[P]	-----	---	93106-6	[GA]	-----	---	93106-4	[PK]	-----	---
□ 36	Swivel	(2)	93101-1	[P]	-----	---	93101-6	[GA]	-----	---	93101-4	[PK]	-----	---
□ 37	Clamp	(8)	93099	[SS]	-----	---	93099	[SS]	-----	---	93099	[SS]	-----	---
38	Bolt (#10 - 24 x 1-1/2”)	(8)	Y84-303-T	[SS]	-----	---	Y84-303-T	[SS]	-----	---	Y84-303-T	[SS]	-----	---
39	Nut (#10 - 24)	(8)	Y22-10-S	[SS]	-----	---	Y22-10-S	[SS]	-----	---	Y22-10-S	[SS]	-----	---
41a	Ball Cage	(4)	93097-1	[P]	93097-1	[P]	93097-3	[D]	93097-3	[D]	93097-4	[PK]	93097-4	[PK]
41b	Sleeve (models 66605X-0XX)	(4)	93120-1	[P]	93120-1	[P]	-----	---	-----	---	-----	---	-----	---
43	Ground Strap	(1)	-----	---	-----	---	92956-1	[SS]	92956-1	[SS]	-----	---	-----	---
■ 57	Ground Kit Assembly	(1)	-----	---	-----	---	66885-1	---	66885-1	---	-----	---	-----	---
60	Manifold, Inlet (bottom)	(1)	-----	---	93802-1	[P]	-----	---	93802-2	[GA]	-----	---	93802-3	[PK]
61	Manifold, Outlet (top)	(1)	-----	---	93801-1	[P]	-----	---	93801-2	[GA]	-----	---	93801-3	[PK]
62	Flange Nut (5/16” - 18)	(24)	93886	[SS]	93886	[SS]	93886 (⚡)	[SS]	93886 (⚡)	[SS]	93886	[SS]	93886	[SS]
63	Plug (1/2 - 14 N.P.T.)	(6)	-----	---	93897-1	[P]	-----	---	93897-2	[D]	-----	---	93897-3	[PK]

□ “Smart Parts” keep these items on hand in addition to the service kits for fast repair and reduction of down time.

PARTS LIST / 66605X-X FLUID SECTION

COLOR CODE		
MATERIAL	DIAPHRAGM COLOR	BALL COLOR
ACETAL	N/A	Orange
NITRILE	Red (-)	Red (+)
E.P.R.	Blue (-)	Blue (+)
HYTREL	Cream	N/A
NEOPRENE	Green (-)	Green (+)
SANTOPRENE	Tan	Tan
T.F.E. (Teflon)	White	White
URETHANE	Clear	Red
VITON	Yellow (-)	Yellow (+)
	(-) STRIPE	(+) DOT

FOR THE AIR MOTOR SECTION
SEE PAGES 6 & 7



☆ When duckbills face down, the inlet is on the top.
▲ Used on 66605X-XX4 (Teflon) models only.

LUBRICATION / SEALANTS
Apply Keylube (93706-1) to all "O" rings, "U" cups and mating parts.

TORQUE REQUIREMENTS
NOTE: DO NOT OVERTIGHTEN FASTENERS
(6) Diaphragm nut 95 - 105 in. lbs (10.7 - 11.9 Nm).
(29, 62) Fluid caps / Manifold nuts 50 - 60 in. lbs (5.6 - 6.8 Nm), / alternately and evenly, then re-torque after initial run-in.
(39) Nuts 20 - 25 in. lbs (2.3 - 2.8 Nm) then re-torque.
(63) Plugs 25 in. lbs (2.8 Nm) maximum.

Figure 2

PARTS LIST / 66605X-X AIR MOTOR SECTION

(✓) Indicates parts included in 637141 Air Section Repair Kit.

AIR SECTION PARTS

Item	Description (size in inches)	Qty	Part No.	[Mtl]
101	Motor Body	(1)	93091	[P]
✓ 102	"O" Ring (3/32" x 1" o.d.)	(2)	Y325-117	[B]
□ 103	Sleeve	(1)	93087	[Bz]
□ 104	Snap Ring (13/16")	(2)	37285	[C]
111	Spool	(1)	93085	[D]
118	Pilot Rod	(1)	93088	[C]
✓ 119	"O" Ring (1/8" x 3/4" o.d.)	(4)	93075	[U]
□ 120	Spacer	(3)	115959	[Z]
✓ 122	Snap Ring (1/2")	(2)	77802	[C]
124	Stud (5/16" - 18 x 1-17/32") (see page 5)	(8)	93249	[SS]
129	Muffler Assembly	(1)	66972	[P]
129☆	Exhaust Cover (see note 2)		93092	[PS]
✓ 130	Gasket	(1)	93107	[SY]
131	Bolt (5/16" - 18 x 1-1/4")	(8)	93095	[SS]
✓ 132	Gasket (see note 1)	(1)	93339-1	[B]

Item	Description (size in inches)	Qty	Part No.	[Mtl]
133	Washer (9/32" i.d.)	(4)	93096	[SS]
134	Bolt (1/4" - 20 x 5")	(4)	Y6-419-T	[SS]
135	Valve Block	(1)	93090	[P]
136	Plug	(1)	93086	[D]
✓ 137	"O" Ring (3/32" x 1-1/2" o.d.)	(1)	Y325-125	[B]
✓ 138	Packing, "U" Cup (1/8" x 1" o.d.)	(1)	94395	[U]
✓ 139	Packing, "U" Cup (1/8" x 1.427" o.d.)	(1)	93116	[B]
✓ 140	Valve Insert	(1)	93276	[CK]
✓ 141	Valve Plate	(1)	93275	[CK]
142	Washer	(2)	116038	[Z]
143	Plate	(2)	93089	[SS]
201	Muffler (see note 2)		93110	[C]
✓	Keylube "O" Ring Lubricant		93706-1	
	10 Pack of Keylube		637175	

DIAPHRAGM PUMP SERVICE

GENERAL SERVICE NOTES:

- Inspect and replace old parts with new parts as necessary. Look for deep scratches on metallic surfaces, and nicks or cuts in "O" rings.
 - 7/16" wrench, 1/2" wrench, 7/16" socket, 1/2" socket, torque wrench (measuring inch pounds), "O" ring pick.

FLUID SECTION DISASSEMBLY

- Remove (34) top manifold / (36) swivel assembly.
Note: Manifold options involve single piece manifolds (60 / 61) or three piece swivel type manifolds with clamps.
- Remove (41) ball cages, (22) balls, (19 and 20) "O" rings and (21) seats. Note: If cages are difficult to remove at this step, it may be helpful to proceed through step 5 and remove them once they are accessible from the inside of the fluid cap.
- Remove (35) bottom manifolds / (36) swivel assembly.
- Remove (19) "O" rings, (21) seats and (22) balls.
- Remove (15) fluid caps.
- Remove (6) diaphragm nut, (8) [(7) Teflon models only] diaphragm(s) and (5) diaphragm washer from (1) diaphragm connecting rod.
- Remove (1) connecting rod from air motor.
- Carefully remove remaining (6) diaphragm nut, (8) [(7) Teflon models] diaphragm and (5) diaphragm washer from (1) connecting rod. Do not mar surface of connecting rod.
- Remove (2) "O" ring from connecting rod.
- Remove (37) clamps from top and bottom manifold / swivel assemblies.
- Remove (33) "O" rings from (36) swivels.

Note 1: Part No.93339-1 One-Piece Gasket replaces the following parts (not shown) in models manufactured prior to October 1988, Y325-10 (4), Y325-12, 93093, 93094, Y325-8.

Note 2: The (129☆) Exhaust Cover and (201) Muffler were standard until 9/92. They are available separately for service or piped exhaust applications.

Note 3: A Major Valve Service Assembly is available separately which includes items: 111, 132, 135 - 141. Order part no 66362.

MATERIAL CODE

[B] = Nitrile	[D] = Acetal	[SY] = Syn-Seal
[Bz] = Bronze	[P] = Polypropylene	[U] = Polyurethane
[C] = Carbon Steel	[PS] = Polyester	[Z] = Zinc
[CK] = Ceramic	[SS] = Stainless Steel	

FLUID SECTION REASSEMBLY

- Reassemble in reverse order.
- Lubricate (1) connecting rod and (2) "O" ring with Key-Lube or equivalent "O" ring lubricant.
- Install (5) diaphragm washers with i.d. chamfer toward diaphragm.
- When replacing Teflon diaphragms, install the 93465 Santoprene diaphragm behind the Teflon diaphragm.
- When installing (41) cage, ball guides must line up with notches in (21) seat to prevent damage.
- Before installing (35), (34) manifolds, (19) "O" ring should be properly seated on the o.d. of (41) ball cage.
- Before tightening (39) nut and (38) carriage bolts on (36) swivels, attach the manifold / swivel assembly to the fluid caps. Rotate (36) swivel to desired position and tighten each of the nuts approximately 8 - 9 turns, then finish tightening (29) nuts.

PARTS LIST / 66605X-X AIR MOTOR SECTION

TORQUE REQUIREMENTS
NOTE: DO NOT OVERTIGHTEN FASTENERS.
 (134) Torque to 15 - 20 in. lbs (1.7 - 2.3 Nm), wait 10 minutes, then re-torque to 15 - 20 in. lbs (1.7 - 2.3 Nm).

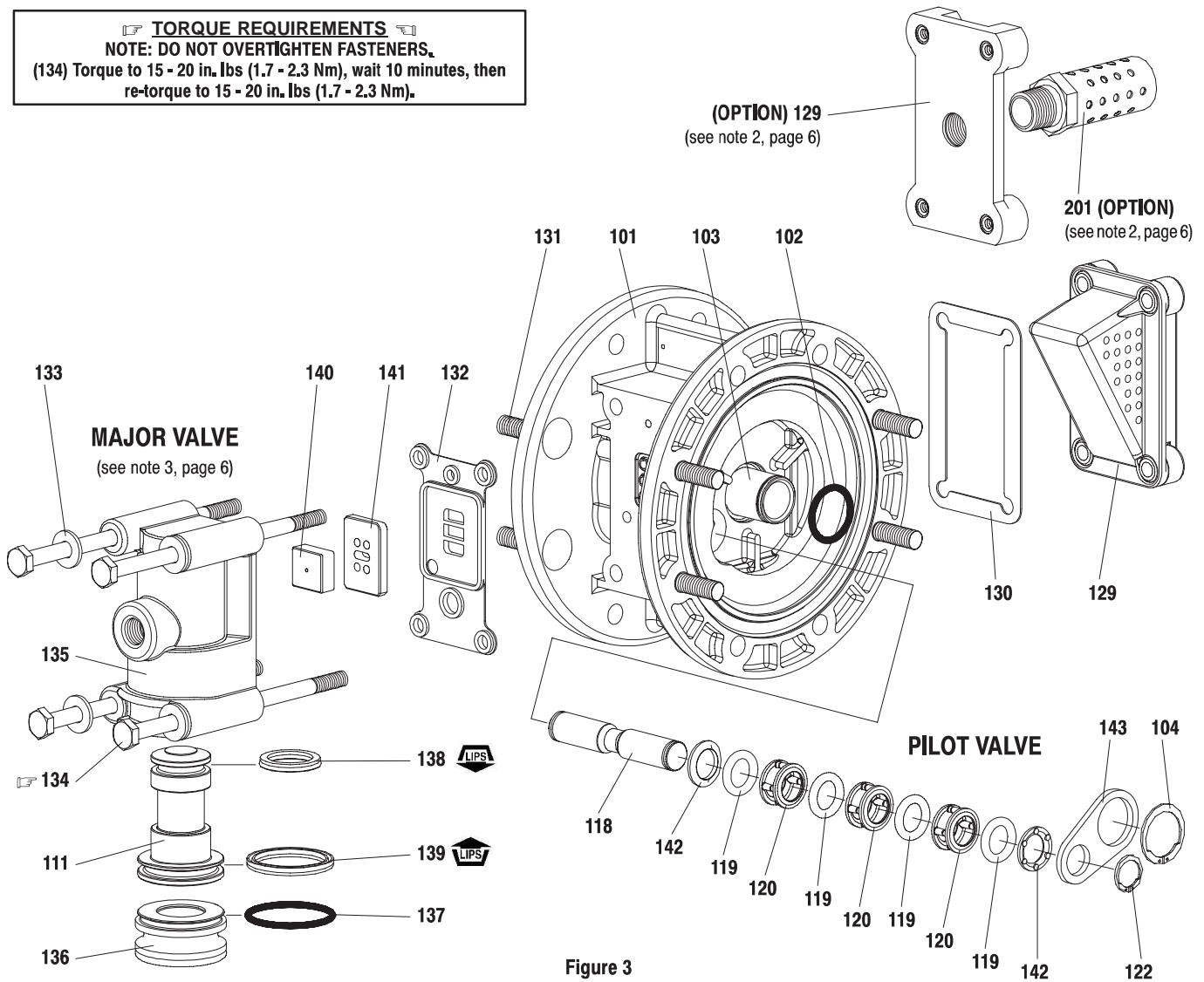


Figure 3

AIR MOTOR SECTION SERVICE

Service is divided into two parts - 1. Pilot Valve, 2. Major Valve.
 • Air Motor Section Service is continued from Fluid Section repair.

PILOT VALVE DISASSEMBLY

1. Remove (122) and (104) snap rings.
2. Remove (143) plates.
3. Remove (103) sleeve and (102) "O" rings.
4. Remove (118) piston, (142) washers, (119) "O" rings and (120) spacers from (101) center body.

PILOT VALVE REASSEMBLY

1. Assemble (119) "O" rings, (120) spacers and (142) washers on (118) pilot rod.
2. Insert the stack into the (101) body. Sleeve (103) may be used to assist pressing stack into body.
3. Install (103) sleeve and (102) "O" rings into (101) body.
4. Install (143) plates and (122) and (104) snap rings.

MAJOR VALVE DISASSEMBLY

1. Remove (129) exhaust cover and (130) gasket.
2. Pull (135) valve block assembly from (101) body.
3. Remove (134) bolts, (133) washers and (132) gasket from (135) valve block.
4. Remove (141) valve plate and (140) valve insert.
5. Remove (136) plug and (111) spool.

MAJOR VALVE REASSEMBLY

1. Install new (139) and (138) "U" cups on (111) spool - **LIPS MUST FACE EACH OTHER.**
2. Insert (111) spool into (135) valve block.
3. Install (137) "O" ring on (136) plug, insert plug into (135) valve block.
4. Install (140) valve insert and (141) valve plate into (135) valve block. Note: After 9/92, parts (140, 141) are white (ceramic), the dished side of the (140) valve insert should be against the shiny face of (141) valve plate for best performance.
5. Replace (132) gasket and install valve block assembly on (101) body.

TROUBLE SHOOTING

Product discharged from air exhaust.

- Check for diaphragm rupture.
- Check tightness of (6) diaphragm nut.

Air Bubbles in Product Discharge.

- Check connections of suction plumbing.
- Check band clamps on intake manifold.
- Check "O" rings between intake manifold and fluid caps.
- Check tightness of diaphragm nut.

Pump blows air out main exhaust when stalled on either stroke.

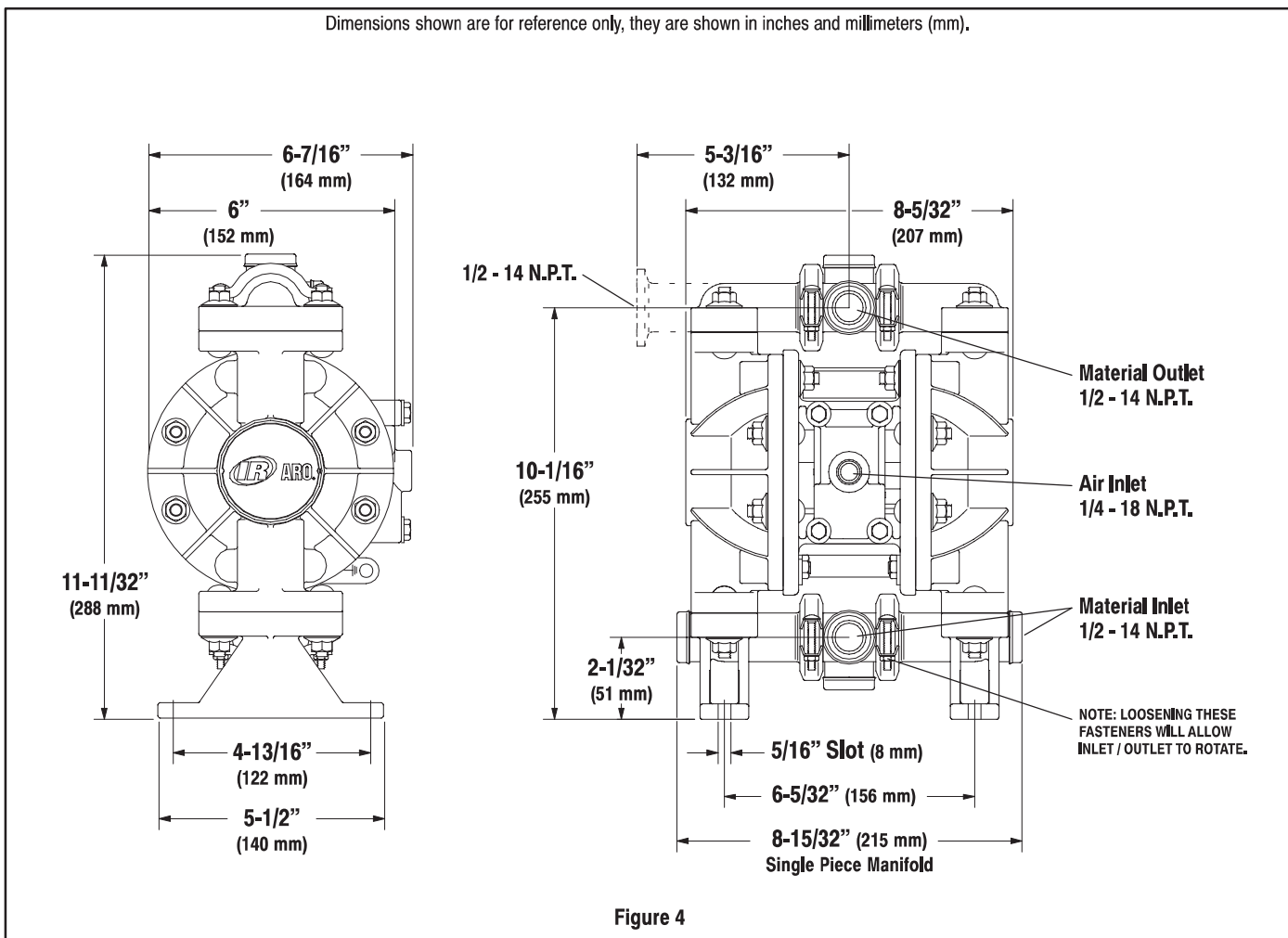
- Check "U" cups on (111) spool in major valve.
- Check (141) valve plate and (140) insert for wear.
- Check (103) sleeve and (2) "O" ring on diaphragm connecting rod.
- Check (119) "O" rings on (118) piston for wear.

Low output volume.

- Check air supply.
- Check for plugged outlet hose.
- For the pump to prime itself, it must be mounted in the vertical position so that the balls will check by gravity.
- Check for pump cavitation – suction pipe should be 1/2" min. or larger if high viscosity fluids are being pumped. Suction hose must be non-collapsible type, capable of pulling a high vacuum.
- Check all joints on intake manifolds and suction connections. These must be airtight.
- Check for sticking or improperly seating check valves.
- If pump cycles at a high rate or runs erratically, check (119) piston "O" rings for wear.

DIMENSIONAL DATA

Dimensions shown are for reference only, they are shown in inches and millimeters (mm).

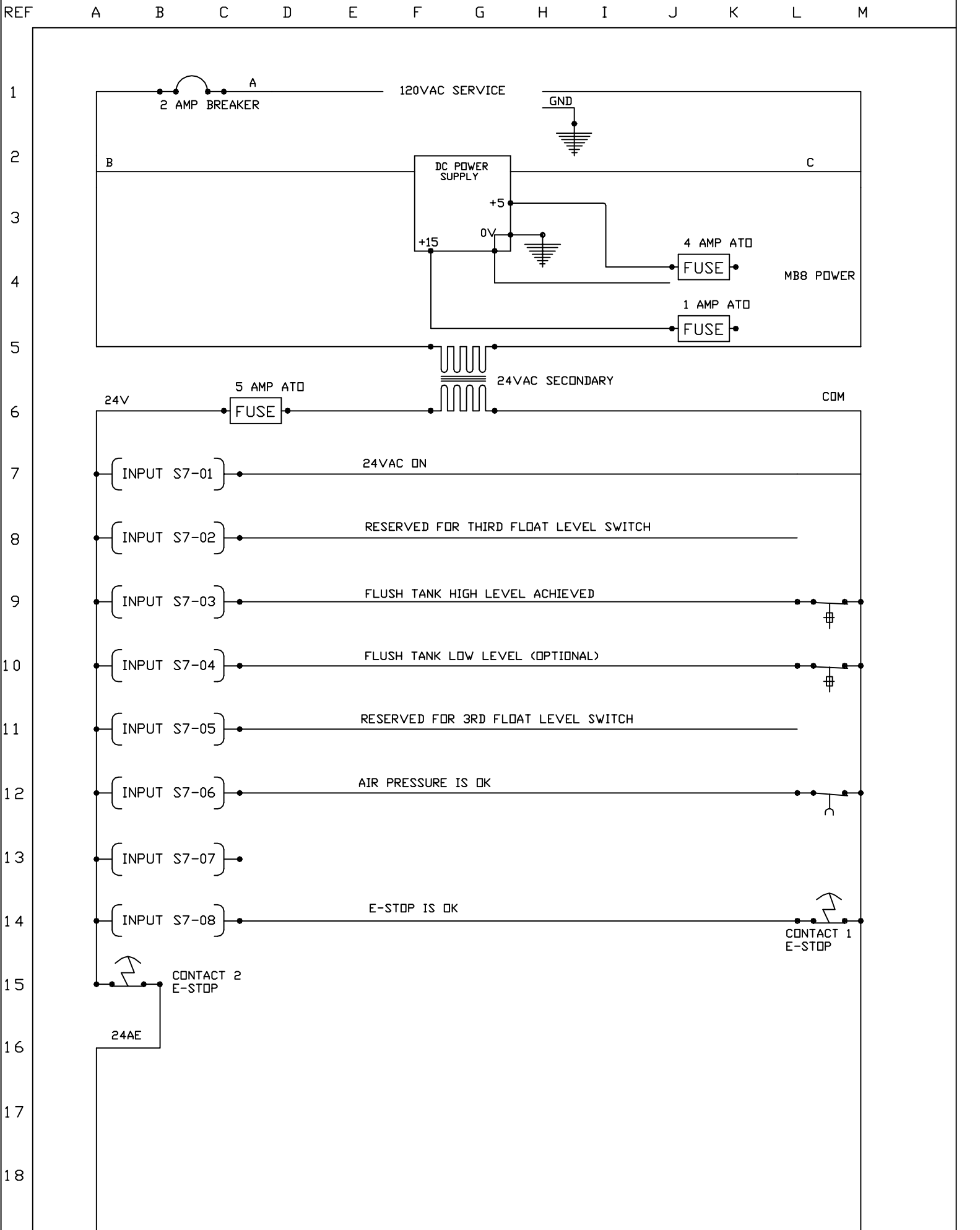


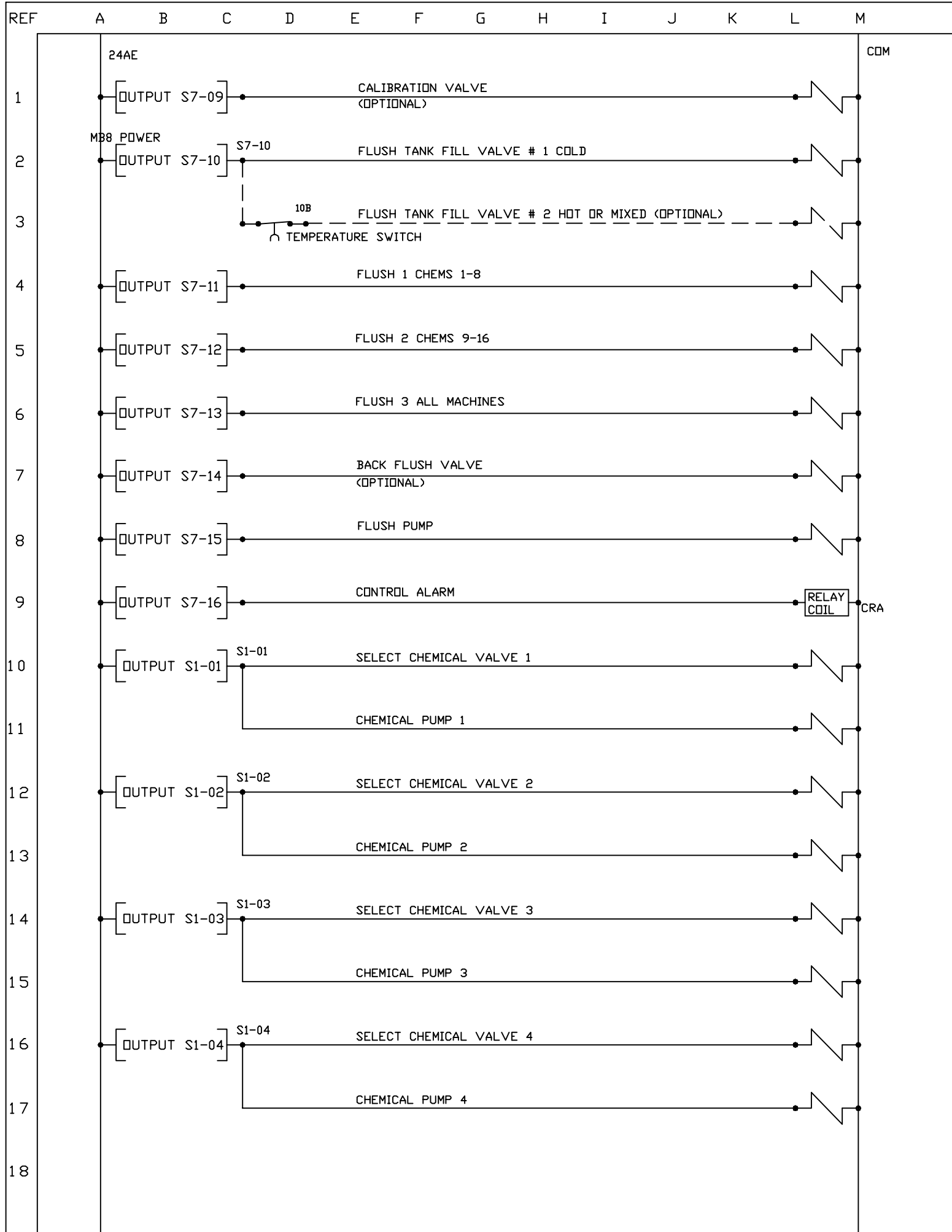
SOFTROL

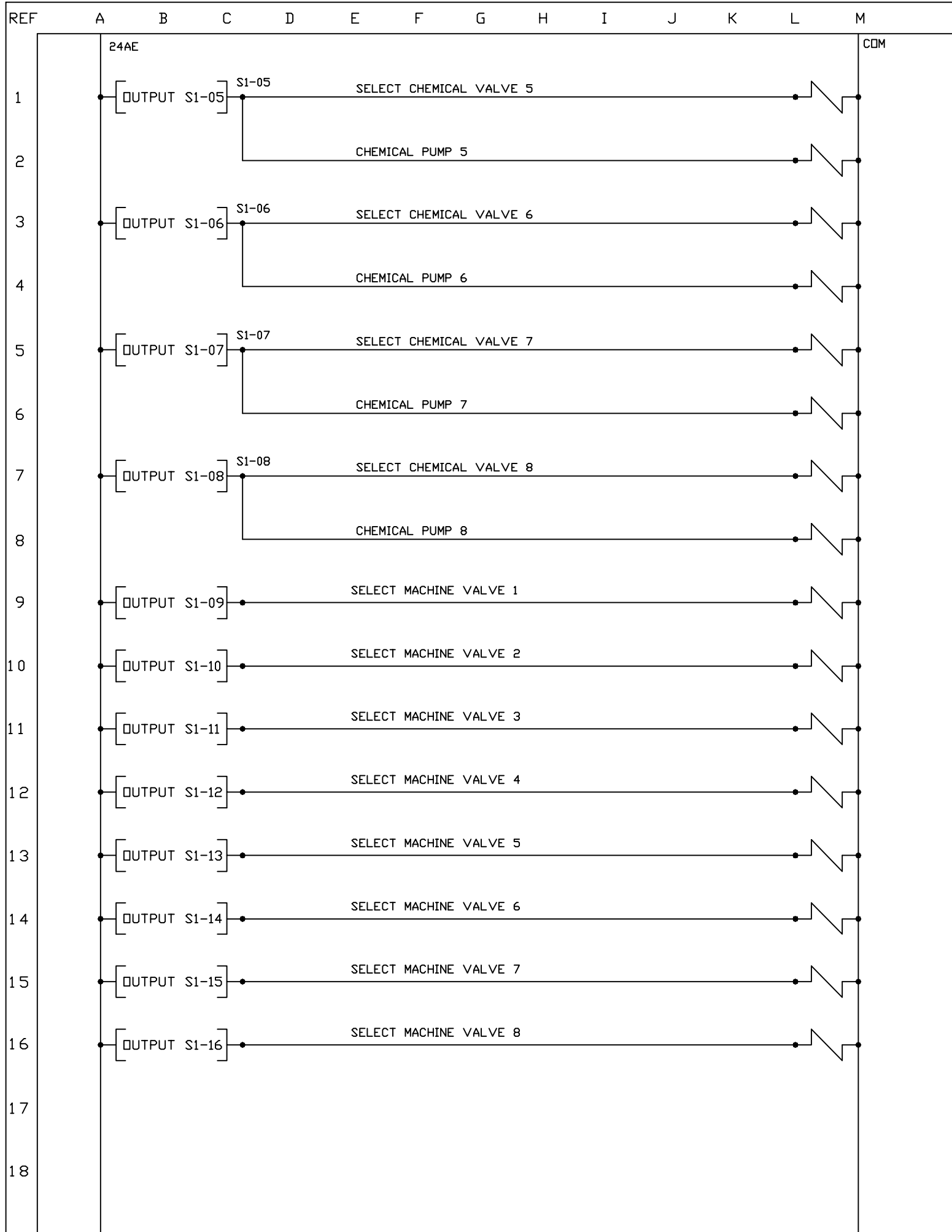
Software & Control for Automation

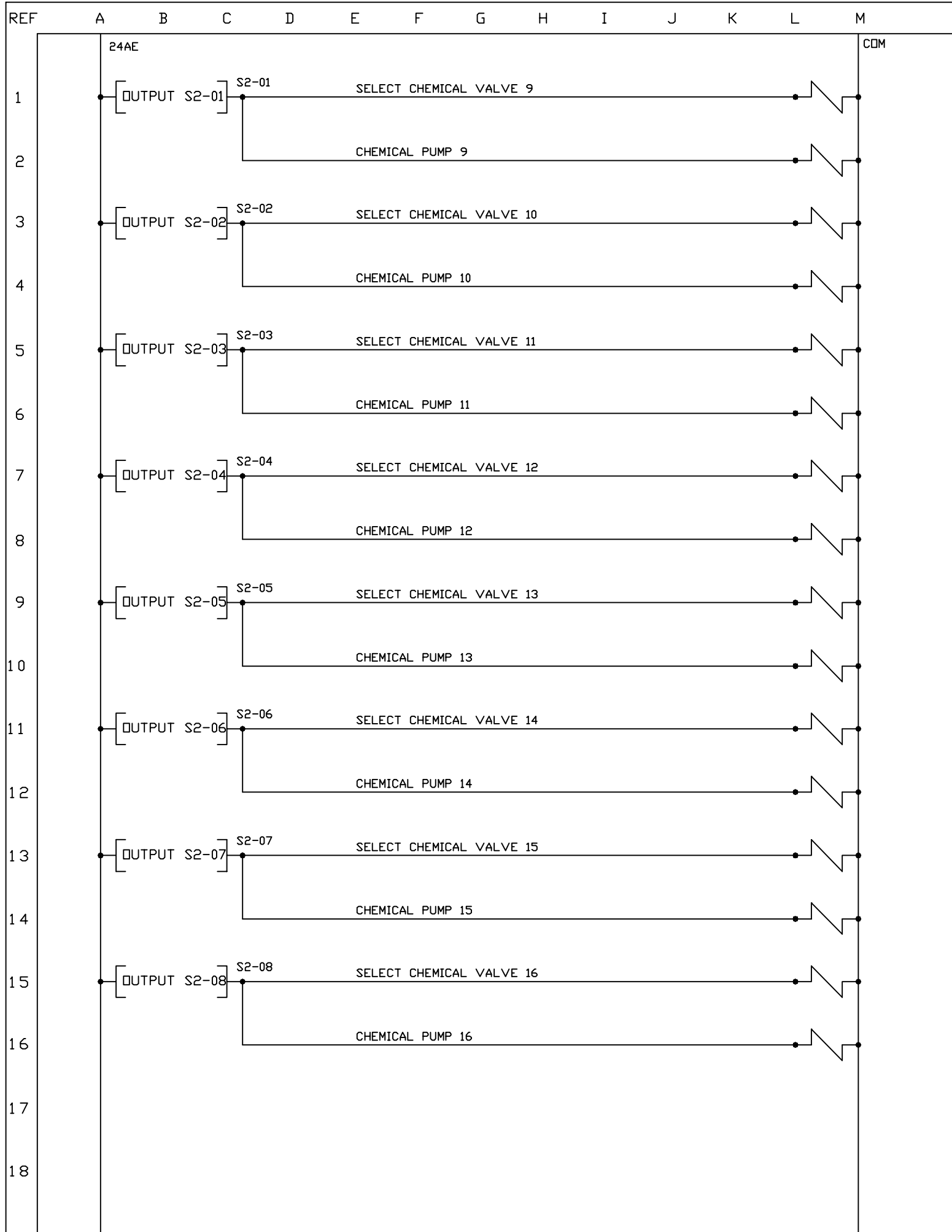
4867 N. MAIN ST. - ACWORTH, GA 30101
PH: (770)974-2700 FAX:(770)974-0435

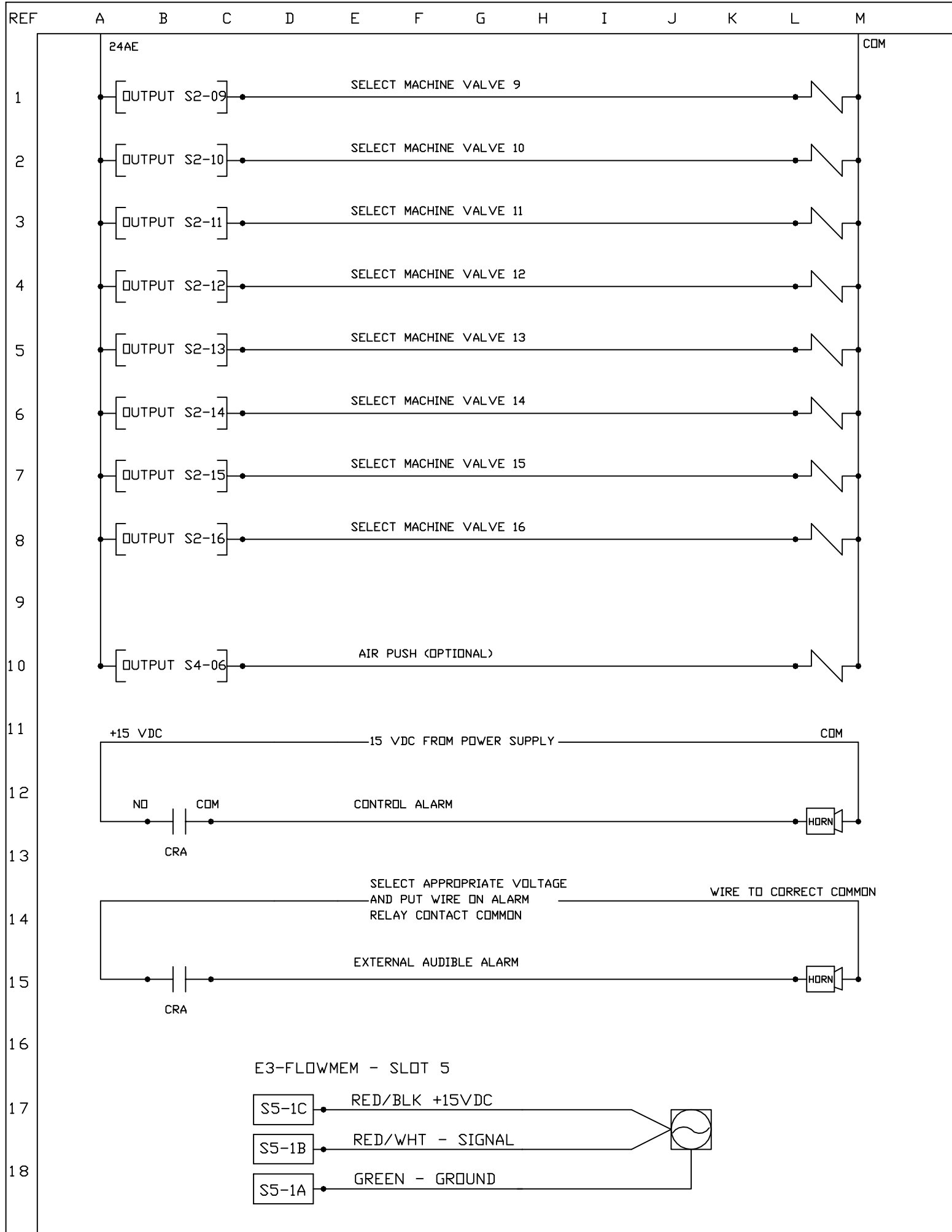
CATALYST
CLASSIC
PUMP AND VALVE
CONTROL
16 CHEMS
BY
16 MACHINES
SINGLE SYSTEM











SOFTROL

Software & Control for Automation

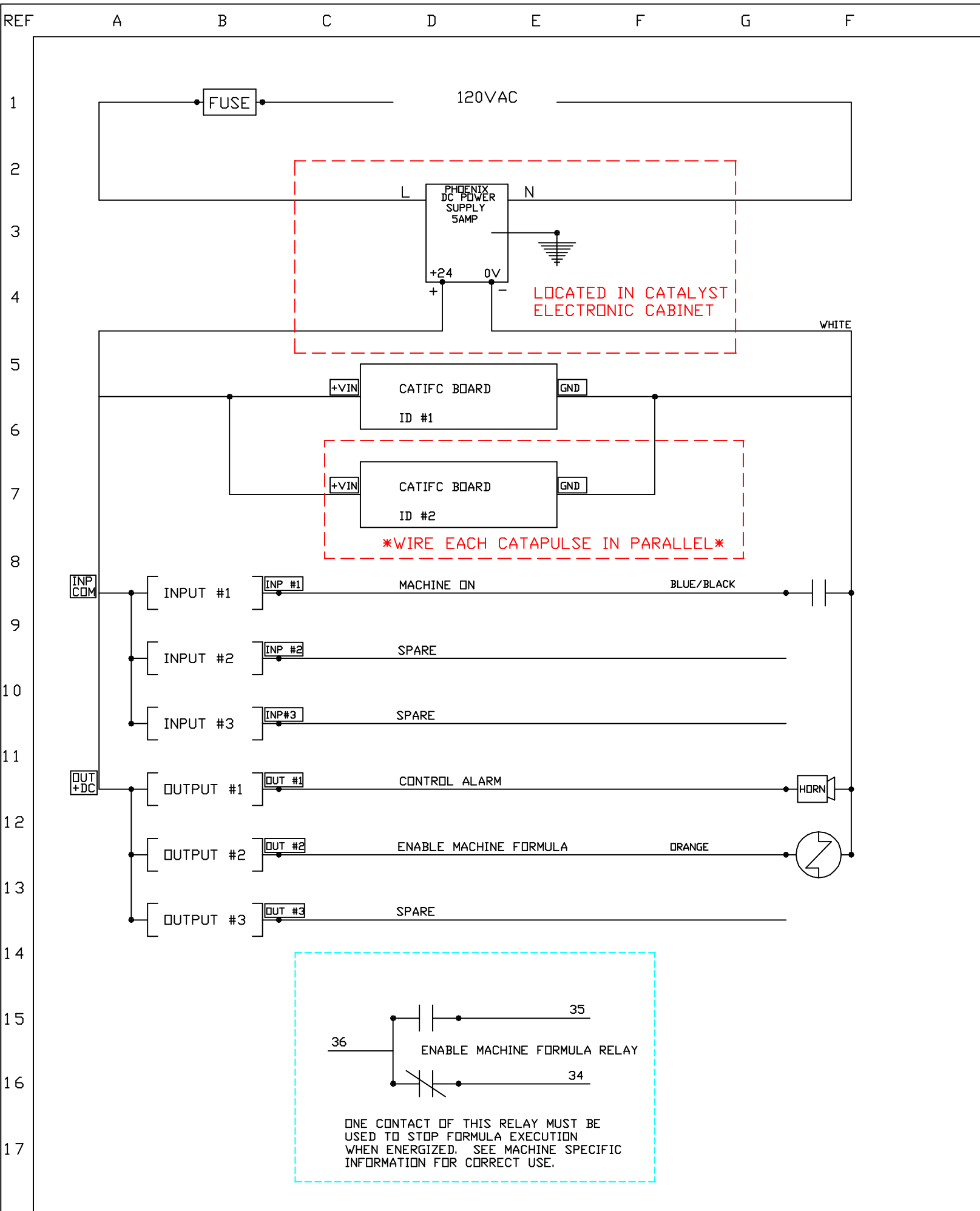
4867 N. MAIN ST. - ACWORTH, GA 30101

PH: (770)974-2700

FAX:(770)974-0435

CATAPULSE

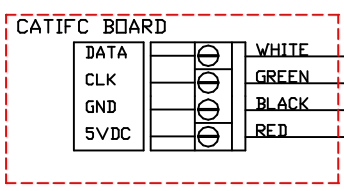
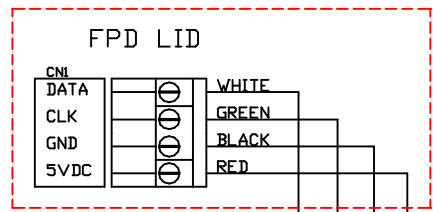
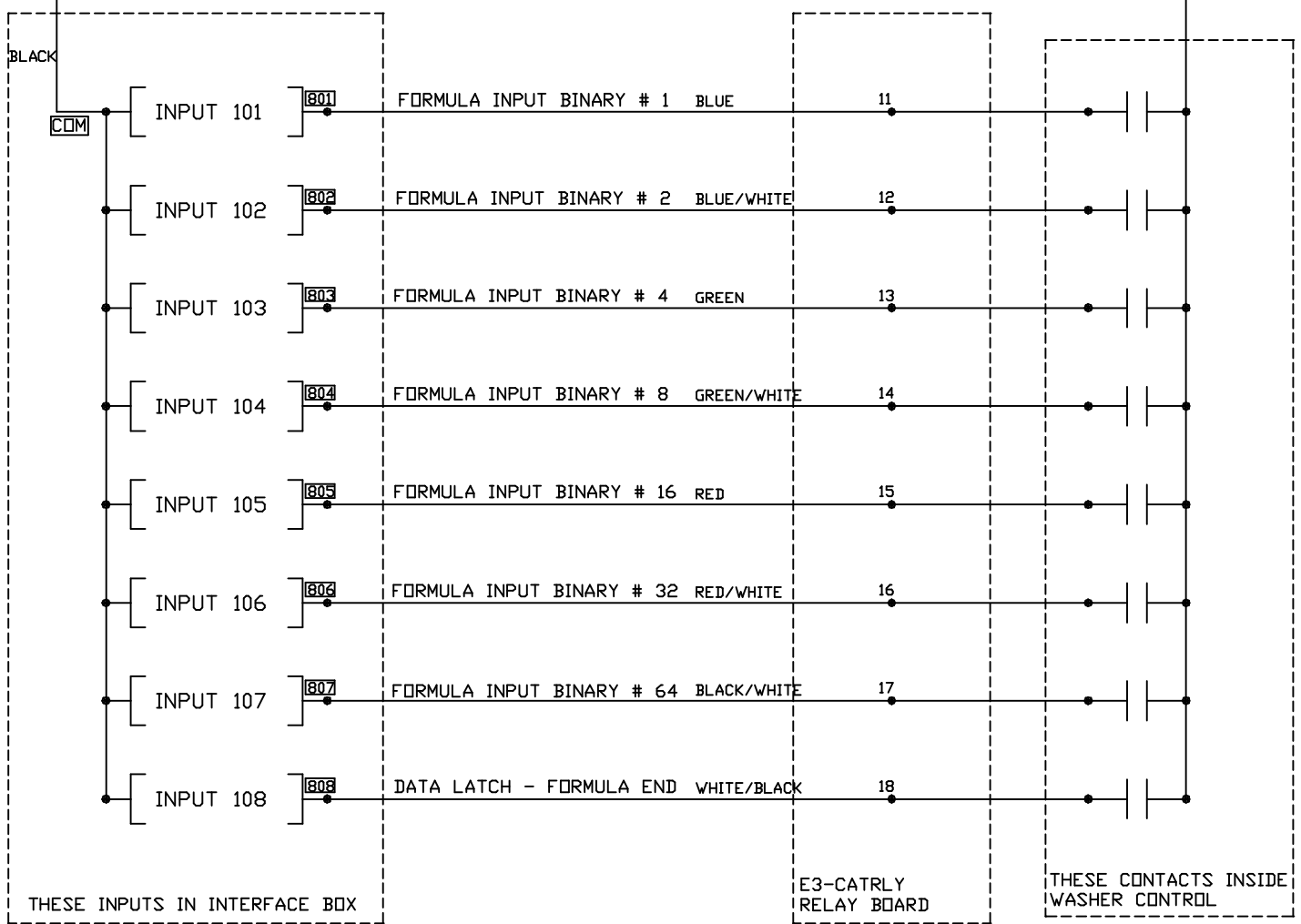
CHEMICAL INTERFACE
BOX



*USE THIS PAGE IF MACHINE VOLTAGE=12-24 VAC/DC

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17

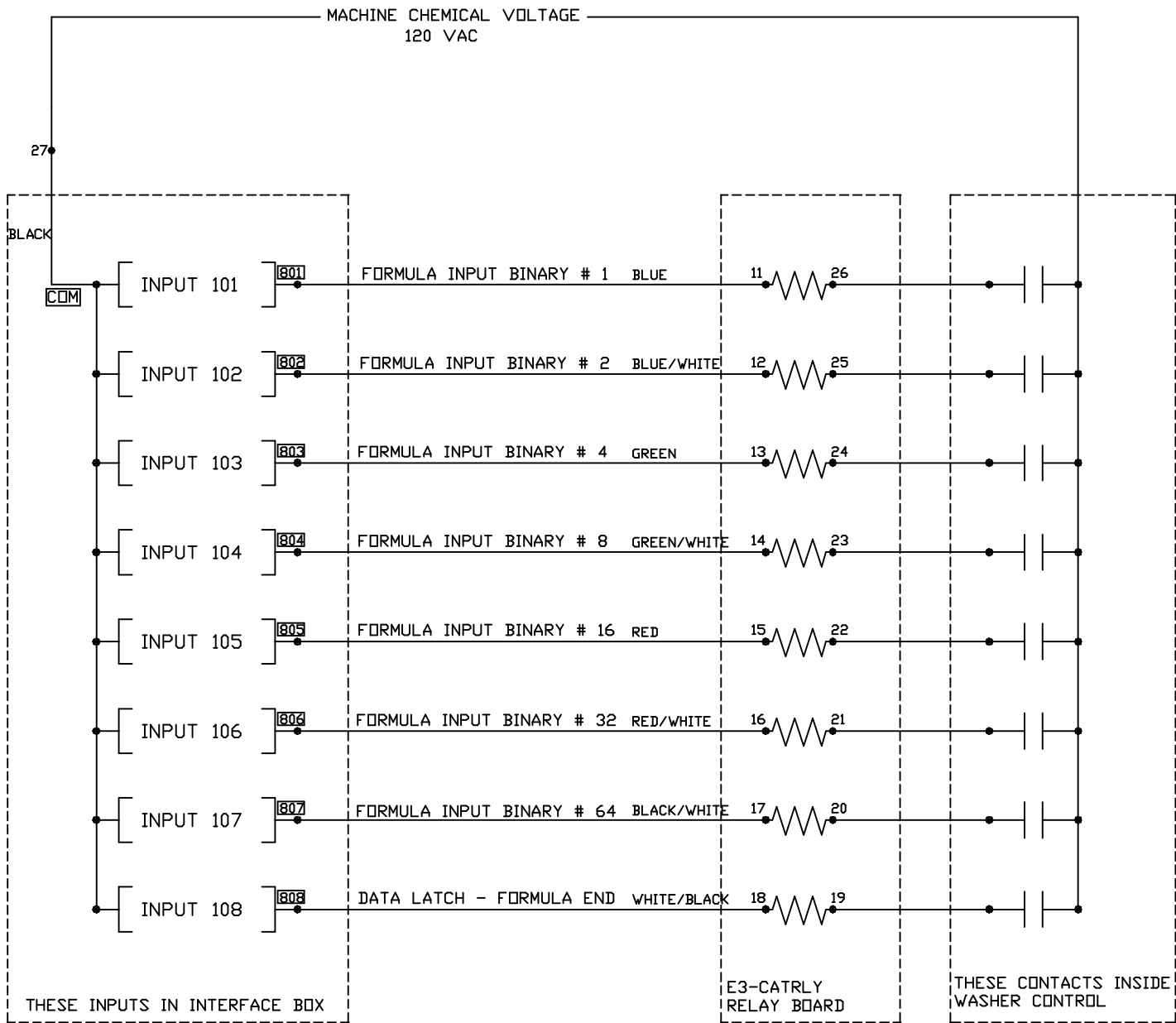
MACHINE CHEMICAL VOLTAGE
12-24 VAC/DC (USE APPROPRIATE VOLTAGE)



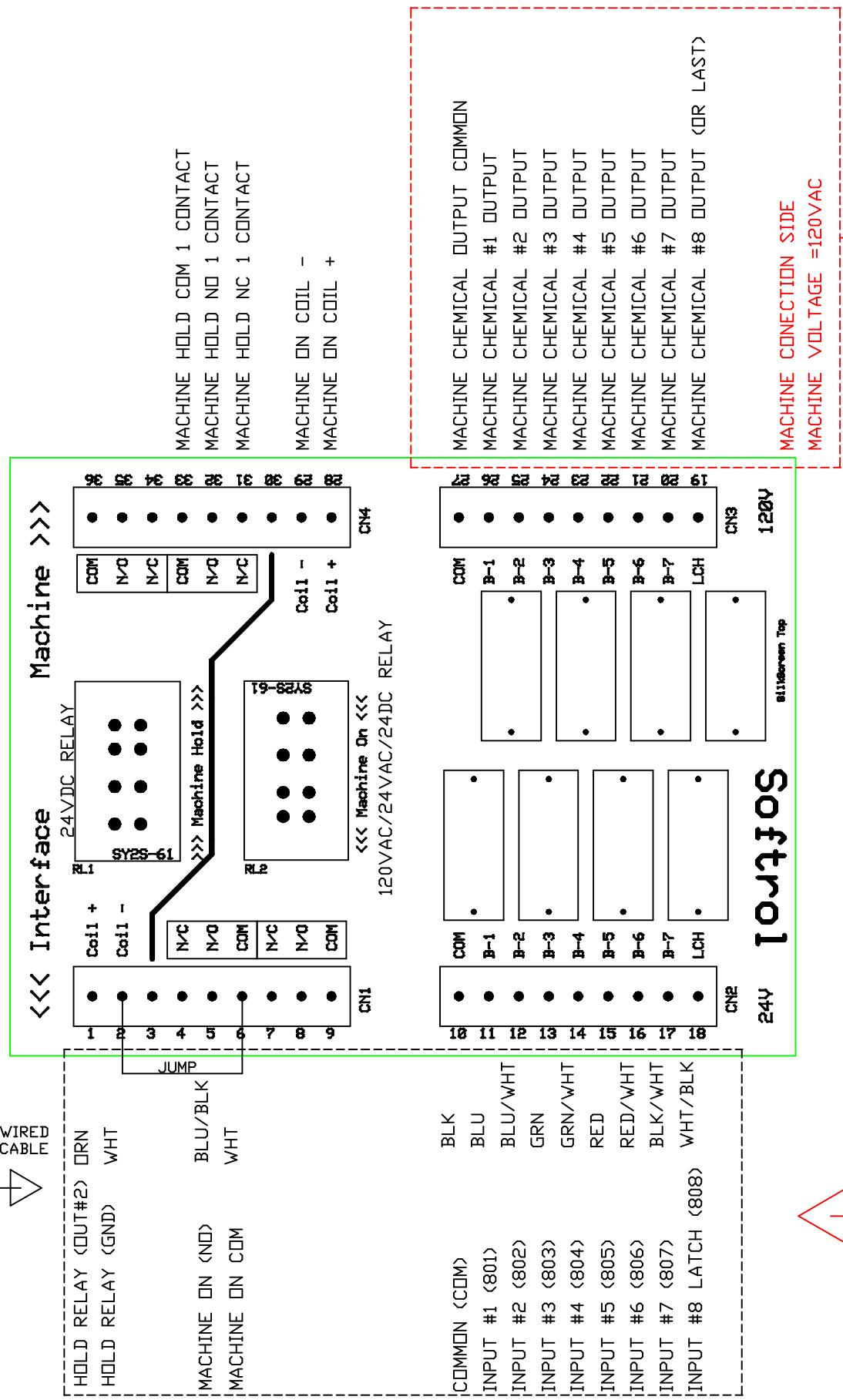
FPD WIRES 5' LONG

*USE THIS PAGE IF MACHINE VOLTAGE=120VAC

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17



CATALYST CHEMICAL INTERFACE RELAY BOARD



ATTACH PREWIRED CATAPULSE CABLE HERE

MACHINE CONNECTION SIDE
MACHINE VOLTAGE =120VAC

CONNECT ON INTERFACE SIDE IF MACHINE VOLTAGE = 24VAC/DC

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17

THE FOLLOWING CONNECTIONS ARE
BASED ON PREVIOUS INSTALLATIONS.
**VERIFY THE CONNECTIONS WITH THE
ACTUAL MACHINE SCHEMATIC FIRST.**
THESE TERMINAL CONNECTIONS
SHOULD BE USED A GUIDELINE ONLY.

Lavatec Washer
 LATCH TIME = 5 SEC
 OUTPUT = 24 VDC

NOTES: USE TERMINALS 32 & 33 ON INTERFACE BOARD TO BREAK THE ALARM CIRCUIT (WIRE NUMBER 190- Verify on machine schematic). USE CHEM FAULT FOR HOLD. PROGRAM CHEMICAL 7 (SUPPLY G) FOR 30 SECONDS TO HOLD. RUN WIRE FROM +24 TO TERMINAL 140 FOR DRY CONTACTS ON THE SUPPLY OUTPUTS. This uses the Lavatec 24 VDC for the supply outputs.

CATAPULSE			LAVATEC	WIRE COLOR
FUNCTION	DESCRIPTION	TERMINAL	TERMINAL	
BINARY 1	INPUT 101	11	141	BLUE
BINARY 2	INPUT 102	12	142	BLUE / WHITE
BINARY 4	INPUT 103	13	143	GREEN
BINARY 8	INPUT 104	14	144	GREEN / WHITE
BINARY 16	INPUT 105	15	145	RED
BINARY 32	INPUT 106	16	146	RED / WHITE
BINARY 64	INPUT 107	17	DO NOT USE	BLACK / WHITE
LATCH	INPUT 108	18	148	WHITE / BLACK
COMMON	COM	10	0VDC	BLACK
HOLD	HOLD COM	36	+24	ORANGE
HOLD	HOLD NC	34	42	ORANGE / BLACK
MACHINE	ON- POWER	28	+24	BLUE / BLACK
MACHINE	ON- COMMON	29	0VDC	RED / BLACK

Ellis Washer w/ ACS Control
 LATCH TIME = 5 SEC
 OUTPUT = 24 VDC

NOTES: All connections to be made in Ellis control. Outputs are dry contacts. Connect +24 VDC (24) to terminal 38. This will make outputs 24 VDC. Common is 0 VDC (25)

CATAPULSE			ELLIS	WIRE COLOR
FUNCTION	DESCRIPTION	TERMINAL	TERMINAL	
BINARY 1	INPUT 101	11	89	BLUE
BINARY 2	INPUT 102	12	88	BLUE / WHITE
BINARY 4	INPUT 103	13	87	GREEN
BINARY 8	INPUT 104	14	86	GREEN / WHITE
BINARY 16	INPUT 105	15	85	RED
BINARY 32	INPUT 106	16	84	RED / WHITE
BINARY 64	INPUT 107	17	83	BLACK / WHITE
LATCH	INPUT 108	18	90	WHITE / BLACK
COMMON	COM	10	25	BLACK
HOLD	HOLD COM	36	60	ORANGE
HOLD	HOLD NC	34	61	ORANGE / BLACK
MACHINE	ON- POWER	28	24	BLUE / BLACK
MACHINE	ON- COMMON	29	25	RED / BLACK

BRAUN OP WASHER
 LATCH TIME = 30 SEC
 OUTPUT = 24 VAC

NOTES: FOR GREATER THAN 15 FORMULAS, MUST HAVE OUTPUT BOARD FOR SIGNALS 6,7,11-17. SET DIP SWITCH S2-4 ON TO ENABLE THESE CHEMICALS

CATAPULSE			BRAUN	WIRE COLOR
FUNCTION	DESCRIPTION	TERMINAL	TERMINAL	
BINARY 1	INPUT 101	11	21	BLUE
BINARY 2	INPUT 102	12	22	BLUE / WHITE
BINARY 4	INPUT 103	13	23	GREEN
BINARY 8	INPUT 104	14	24	GREEN / WHITE
BINARY 16	INPUT 105	15	104	RED
BINARY 32	INPUT 106	16	015	RED / WHITE
BINARY 64	INPUT 107	17	014	BLACK / WHITE
LATCH	INPUT 108	18	013	WHITE / BLACK
COMMON	COM	10	44	BLACK
HOLD	HOLD COM	36	TRS	ORANGE
HOLD	HOLD NC	34	8	ORANGE / BLACK
MACHINE	ON- POWER	28	6	BLUE / BLACK
MACHINE	ON- COMMON	29	44	RED / BLACK

BRAUN "BLUELINE" WASHER
 LATCH TIME = 30 SEC
 OUTPUT = 24 VDC

NOTES: THE HOLD INPUT IS NOW CALLED LSI SIGNAL. CHEMICAL OUTPUT TIME IS PROGRAMMED IN TENTHS OF A SECOND
 ex. SUPPLY A =50 IS SUPPLY A FOR 5 SECONDS

CATAPULSE			BRAUN	WIRE COLOR
FUNCTION	DESCRIPTION	TERMINAL	TERMINAL	
BINARY 1	INPUT 101	11	356	BLUE
BINARY 2	INPUT 102	12	357	BLUE / WHITE
BINARY 4	INPUT 103	13	358	GREEN
BINARY 8	INPUT 104	14	359	GREEN / WHITE
BINARY 16	INPUT 105	15	360	RED
BINARY 32	INPUT 106	16	853	RED / WHITE
BINARY 64	INPUT 107	17	854	BLACK / WHITE
LATCH	INPUT 108	18	855	WHITE / BLACK
COMMON	COM	10	219	BLACK
HOLD	HOLD COM	36	214	ORANGE
HOLD	HOLD NC	34	818	ORANGE / BLACK
MACHINE	ON- POWER	28	214	BLUE / BLACK
MACHINE	ON- COMMON	29	219	RED / BLACK

SOFTROL

Software & Control for Automation

Please visit us on the World Wide Web at www.Softrol.com.

Softrol Catalyst Manual

Entire contents© 1995-2005 Softrol Systems Inc

1st Edition 10/31/96

Revised 07/10/01- Updated for new K4 processor.

Revised 11/16/01- New layout

Revised 05/06/02- Updating Introduction

Revised 11/22/04- Updating Calibration

Revised 06/29/05- Updating Introduction and Maintenance

Revised 07/19/05- Updating Calibration and Maintenance

Revised 01/26/06- Updating Maintenance

Revised 10/16/07- New layout and added pump information

No portion of this manual may be duplicated in any manner without expressed written consent of Softrol Systems, Inc.



4867 North Main Street

Acworth, GA 30101

770.974.2700

www.softrol.com