



Date: 04/2009

Zenith DS9000 Dispensing System

Installation & Operation Manual

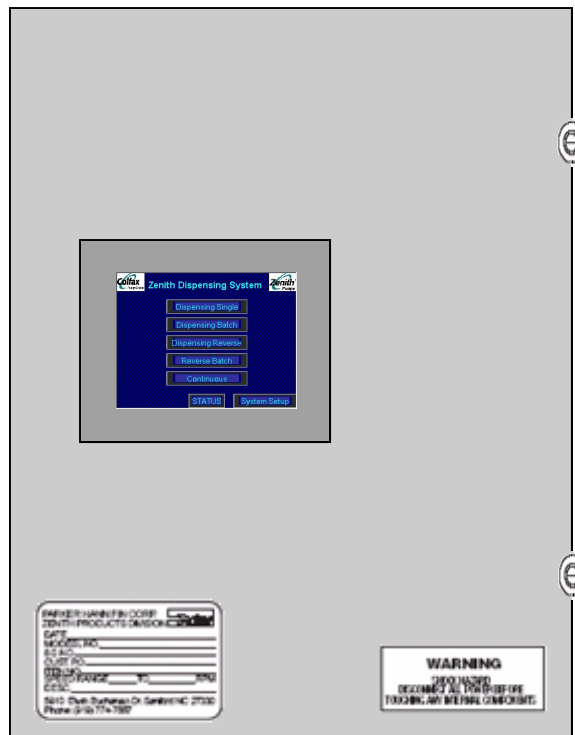




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Introduction

This manual contains information required to complete installation, wiring, and startup operation for Zenith DS9000 Dispensing Control System.

Be sure to follow all WARNINGS, CAUTIONS, and NOTES prior to proceeding with a particular task.

NOTE: Customer is required to make field wiring connections and adjust some parameters dependent on specific applications.

Customer should become familiar with this manual to avoid electromagnetic interference (EMI) noise pickup, damage to equipment, and personal injury.

WARNINGS:

- Do not mount Zenith Dispensing Control System near heat-radiating elements or in direct sunlight.
- Do not install Zenith Dispensing Control System in a place subjected to high temperature, high humidity, excessive vibration, corrosive gases or liquids, or airborne dust or metallic particles.
- Mount Zenith Dispensing Control System vertically and do not restrict the air flow to the drive.
- Allow sufficient space around the unit for heat dissipation. Approximately 6 inches should be allowed above and below the drive and 2 inches on each side.

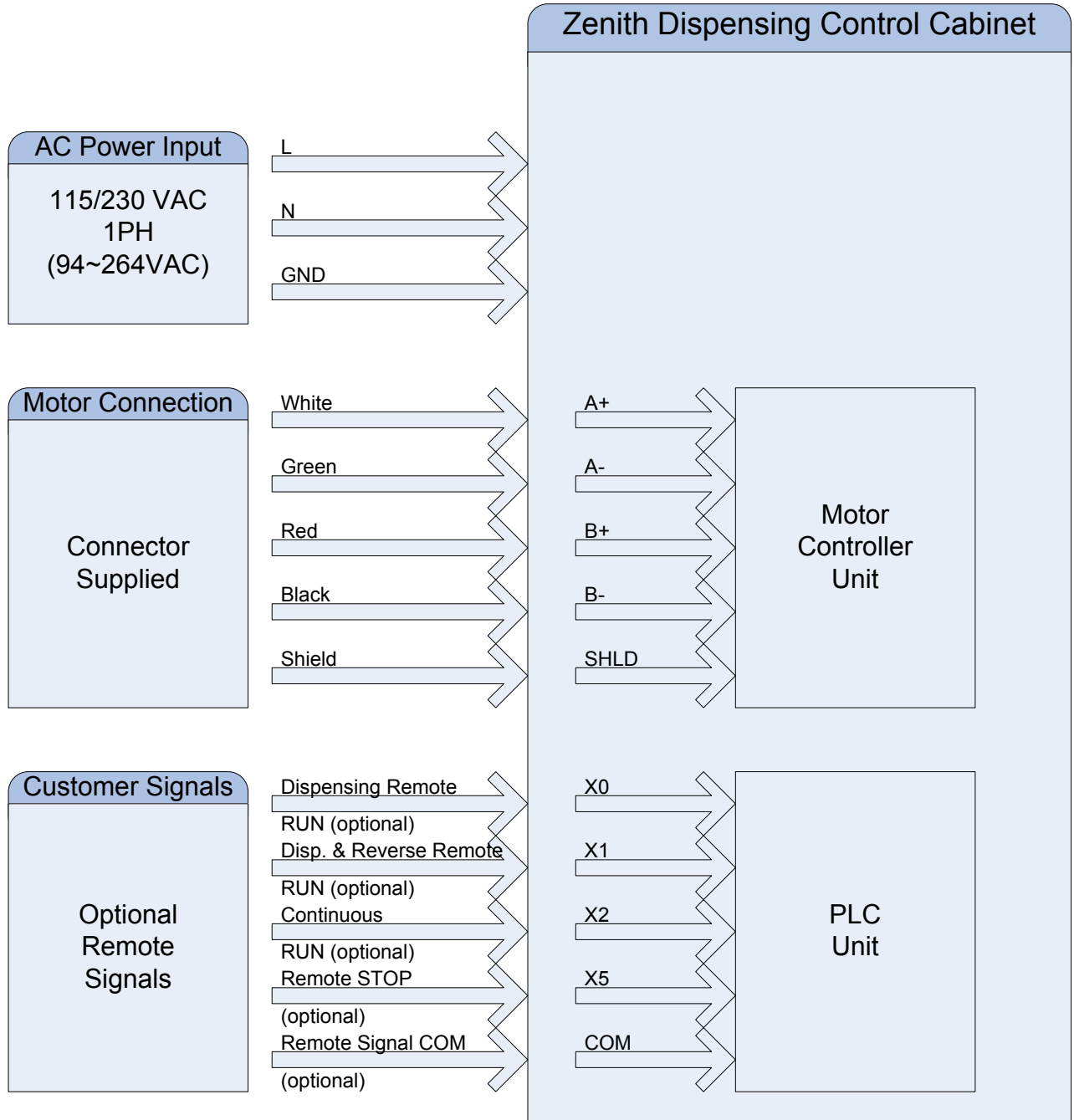


Control Specification

	Unit	
Power		
Rated Input Voltage	VAC	115 / 230, 1 Phase
Rated Input Frequency	Hz	60/50
Input Voltage Range	VAC	94 ~ 264
Output Current	A	0.5 ~ 3.2 Peak
DC Bus Voltage	VDC	165 Nominal
Operation Interface		
Control Interface		4.7" LCD touch screen, 256 color, with backlight
Languages		English (can support Spanish, German, French, Italian, Turkish, Korean, Chinese, Japanese)
Input / Output		
Drive Digital Inputs		2 High Speed Inputs: 5VDC (STEP, DIR) 5 Standard Digital Inputs: 12/24VDC (Enable, Alarm Reset, CW Limit, CCW Limit)
Drive Digital Outputs		3 Digital Outputs: 5~24VDC (Brake, Motion, Fault)
Drive Analog Input		1 Analog Input: ±10VDC
PLC Digital Inputs		6 Digital Inputs: 24VDC (RUN, STOP, Dispensing, Dispensing & Reverse, Continuous)
PLC Digital Outputs		3 Digital Outputs: 5~24VDC
Protection		
Protection		Over-voltage, Under voltage, Over-temperature, External Output Shorts (Phase-to-Phase, Phase-to-Ground), Internal Amplifier Shorts
Idle Current Reduction		Reduction to any integer percent of full-current after delay
Motor Regeneration		Build in regeneration circuit—25W max.
Diagnostic		
Drive Status		Bi-color Status Light
PLC Status		LED Lights for Inputs and Outputs
Programming & Communication		
Preloaded Software		Zenith® Dispensing System
Programming Software		PLC Programming Software (optional), Touch Screen Programming Software (optional)
Communication		RS232
Environment		
Environment		IP65, Dust-proof and drip-proof
Drive Ambient	°C	0°C ~ 55°C
Motor Ambient	°C	0°C ~ 50°C
Motor Insulation Class	°C	130°C Class B
Storage	°C	-20°C ~ 60°C
Relative Humidity		Maximum 90% at 25°C, Non-condensing
Cooling		Natural, air cooled
Certification		
NEMA Ratings		NEMA 4/12
Classifications:		UL/cUL



Wiring Diagram





Wiring Instructions

Zenith Dispensing Control System requires customers to wire to the terminal strips in the control cabinet.

CAUTION: TO PREVENT PERSONNEL ELECTROCUTION OR DAMAGE TO THE EQUIPMENT, MAKE SURE ALL POWER TO DISPENSING CONTROL SYSTEM IS REMOVED BEFORE MAKING ANY WIRING CONNECTIONS OR CHANGES.

Wiring practices must conform to applicable local electric codes and the National Electric Code (NEC). If installed in a country outside USA, wiring practices should conform to the electric codes of the country Zenith Dispensing Control System is installed in.

- Input power to the control cabinet must be supplied through an appropriately sized circuit breaker or fused disconnect that is within easy reach of control cabinet.
- Control cabinet ground must be a single point termination and be at a resistance of less than 1 ohm with relation to true earth. All grounds within control cabinet must be connected to the single point ground termination.
- High voltage wiring (> 50 V) must be run in separate conduit from low voltage (<50 V) or signal wiring. If run parallel to each other, high voltage wiring should be separated from low voltage and signal wiring by 12 inches or as much as physically possible. If they must cross each other, they should cross perpendicularly.
- Shielded cable should be used for signal wiring to prevent electrical noise contamination. The shield should be terminated at Zenith Dispensing Control System only. (**NOTE:** Terminating the shield at both ends causes ground loops and defeats the purpose of using shielded cable).
- Low voltage wiring making long runs outside a control cabinet should use shielded cable also. Shield termination should be at the end of the cable connected to the equipment requiring the most noise protection. (**NOTE:** In some cases, this may be the PC or PLC, rather than Zenith Dispensing Control System).



Field Wiring

1. Connect Input Power

WARNING:

ALWAYS UNPLUG LINE CORD FROM THE WALL BEFORE ATTACHING IT TO THE CONTROL CABINET!

Customer supplies input AC power.

The controller supports 115/230VAC single phase, all you need to do is install a power cord and plug it in 115/230VAC single phase power source.

- **Install A Power Cord**

- Remove 5 mm (3/16") of insulation from each wire of a power line cord.
- Connect black wire to "L" terminal on PLC in control cabinet
- Connect white wire to "N" terminal on PLC in control cabinet
- Connect green wire to "G" terminal on PLC in control cabinet

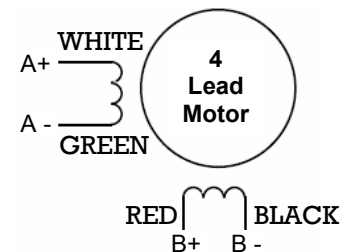
2. Connect Stepper Motor

WARNING:

**NEVER CONNECT MOTOR TO CONTROL CABINET WHEN AC POWER IS ON
ALWAYS SECURE ANY UNUSED MOTOR LEADS
NEVER DISCONNECT MOTOR WHILE AC POWER IS ON
NEVER CONNECT MOTOR LEADS TO GROUND OR TO A POWER SUPPLY**

- **Standard Motor — 4-Lead Stepper Motor**

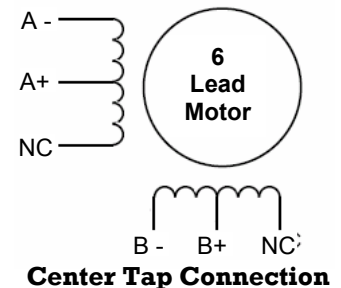
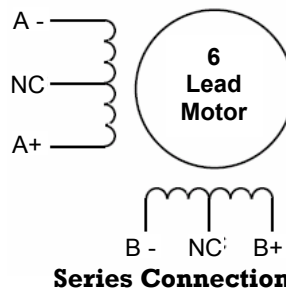
Zenith Dispensing Control System uses a 4-lead motor. Connect 4 wires of the motor cable based on the diagram shown at right.



- **6-Lead Stepper Motor**

These motors can be connected in series or center tap.

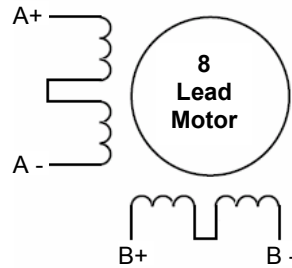
Note: NC means not connected to anything.



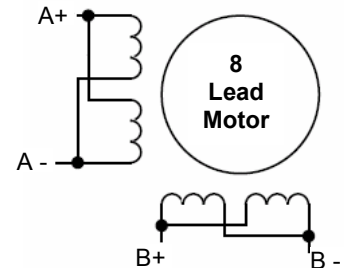


Field Wiring (cont'd)

- 8-Lead Stepper Motor**
 These motors can be connected in two ways: series and parallel.
Note: NC means not connected to anything.



Series Connection

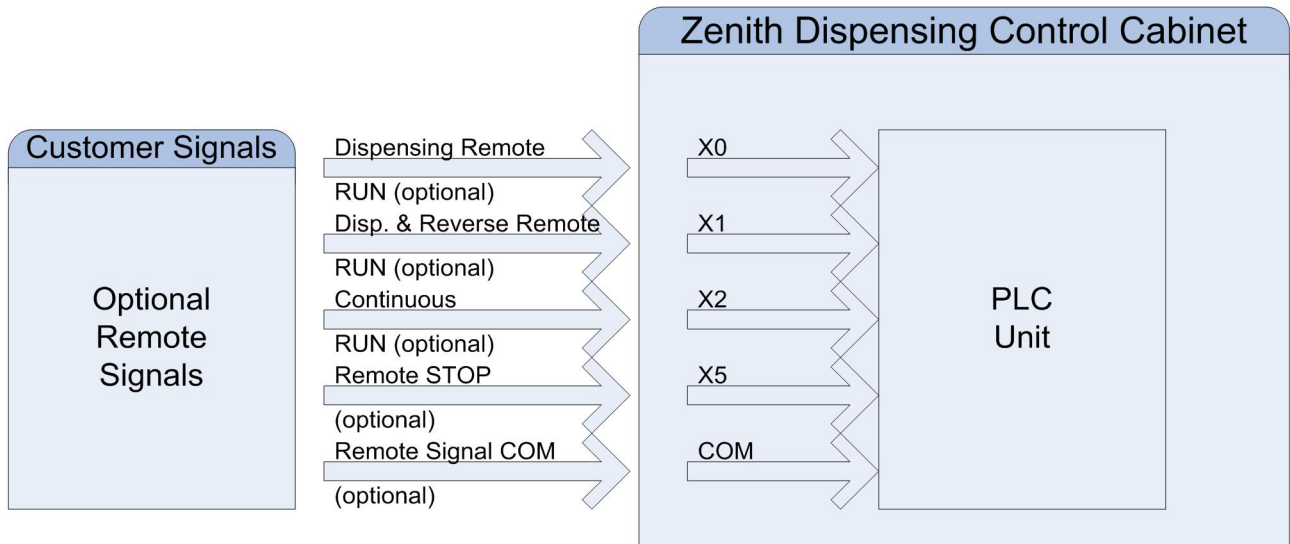


Parallel Connection

3. Connect Remote Control Signals (Optional):

Zenith Dispensing Control System supports remote signal controls, such as Dispensing Remote Run, Dispensing & Reverse Remote Run, Continuous Remote Run, and Remote Stop. The remote control signal common is 0VDC, and these remote signals should be 24VDC (at least 21.6VDC).

To make connections, connect the remote signal wires to corresponding terminals on PLC unit in control cabinet as shown in the following diagram:



WARNING:

**MAX. VOLTAGE THAT CAN BE APPLIED TO AN INPUT TERMINAL IS 26.4 VDC
 NEVER APPLY AC VOLTAGE TO AN INPUT TERMINAL
 MAXIMUM CURRENT IS 8mA PER INPUT**



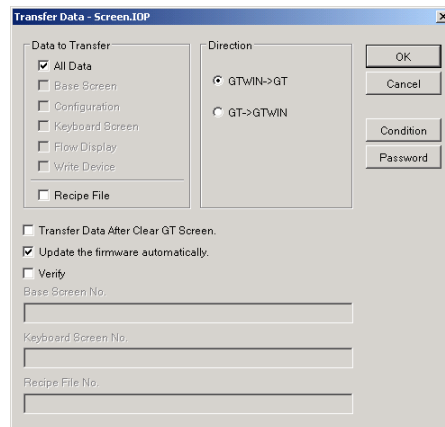
Program Loading

Zenith Dispensing System control software should be preinstalled before shipment.

Whenever the control program has to be loaded unto the system, the software FPWIN PRO^{NOTE 1} for PLC control program, and GTWIN^{NOTE 1} for touch screen interface program, are needed. Additionally, STAC6 Configurator^{NOTE 1} may also be needed for configuring stepper motor drive in the control cabinet.

To use FPWIN PRO and GTWIN, please follow:

- Install Zenith Dispensing System
- Connect any inputs or outputs that the process may require
- Connect the programming cable between RS232 serial communication port on a PC and Tool Port at the back of the touch screen
- Install FPWIN PRO and GTWIN on PC
- Connect and apply power to Zenith Dispensing System
- Use GTWIN to open Zenith touch screen interface program
- To download Zenith touch screen interface program, select “File” - “Transfer” and the following window will show up. On this window, make sure to select “All Data” and “GTWIN->GT”, and click “OK” button. Wait until the screen data has been completely transferred to



the touch screen

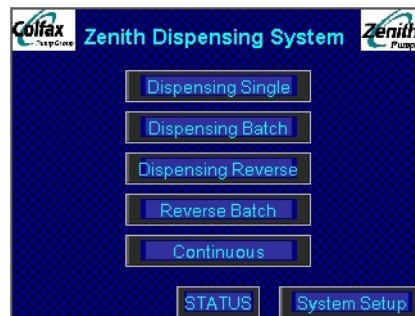
- Use FPWIN PRO to open Zenith Dispensing control program
- To download Zenith Dispensing control program, select “Online” - “Download Program Code and PLC Configuration”.

^{NOTE 1} Software has to be ordered separately from the system.



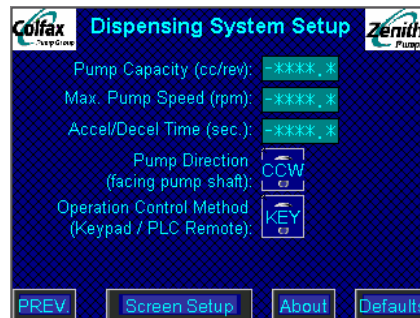
System Setup

System Setup screen can be accessed by clicking “System Setup” button at lower right corner of Main Control screen.



Zenith Dispensing System has to be properly configured, immediately after the system is installed, and before any tests and operations are performed.

System Setup screen includes the following parameters:



- Pump Capacity (cc/rev), input range: 0.001-100.0, default: 2.4
- Max. Pump Speed (rpm)*, input range: 0-600, default: 300
- Accel/Decel Time (sec), input range: 0.01-600.0, default: 1.0
- Pump Direction (facing pump shaft), selection: CCW / CW, default: CCW
- Operation Control Method, selections: Keypad / PLC Remote, default: Keypad

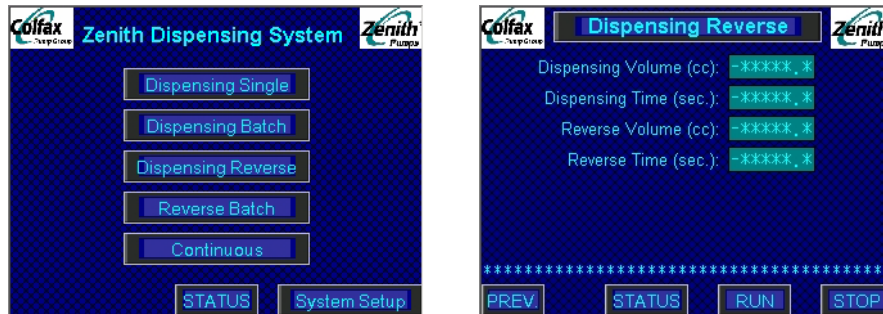
WARNING:

SYSTEM HAS TO BE PROPERLY CONFIGURED, IMMEDIATELY AFTER THE SYSTEM IS INSTALLED, AND BEFORE ANY TESTS AND OPERATIONS ARE PERFORMED.

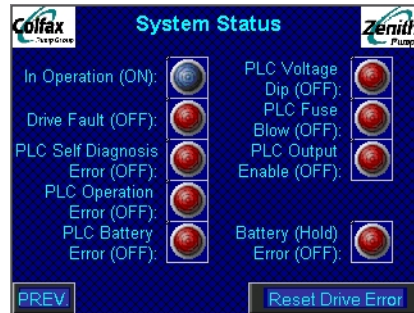


System Status

Status screen can be accessed by clicking “STATUS” button at bottom of Main Control screen and each dispensing operation screen.



System Status screen shows the following status of Zenith Dispensing System:



- In Operation
- Drive Fault
- PLC Self Diagnosis Error
- PLC Operation Error
- PLC Battery Error
- PLC Voltage Dip
- PLC Fuse Blow
- PLC Output Enable
- Battery (Hold) Error



Operations

Zenith Dispensing System is shipped with interface/control program pre-installed unto the nonvolatile memory inside of PLC and touch screen.

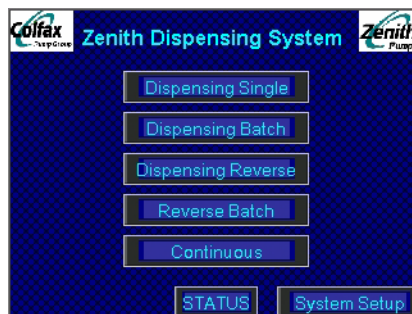
The control program supports five typical fluid delivery applications: dispensing, batch dispensing, dispensing and reverse, batch dispensing and reverse, and continuous dispensing.

Install Zenith pump system, and follow the installation instructions in “Fielding Wiring” on page 7 to set up the control system. The interface/control program will be loaded automatically once the power is applied to the system. The basic operation procedures are:

- At power up, the following information screen is displayed



- After about three seconds of power up, the Main Control screen will be displayed as follow



- Select the desired fluid delivery applications by touching corresponding button on the touch screen
- On each fluid delivery control screen, input the required parameters by clicking each parameter field. A numeric keypad will be shown on the screen when a parameter field is touched. Input value for this parameter, and click “DONE” to go back to the control screen
- To initiate operation, click “RUN” button on the touch screen
- To stop operation, click “STOP” button on the touch screen
- To check the status of the system, click “STATUS” button on the touch screen
- To obtain help for each screen, click the title showing on the touch screen



Operations (cont'd)

1. Dispensing Mode

Dispensing Mode operates the pump system based on user defined Dispensing Volume and Dispensing Time. Pump will run and stop in the defined Dispensing Time. Once pump stops, the total output volume matches the define Dispensing Volume, and the system will wait for next command

To initiate operation, click “RUN” button on the touch screen; Or, set HIGH for remote run signal to X0 terminal on PLC unit in the control cabinet, and set LOW for remote stop signal to X5 terminal on PLC unit in the control cabinet.

To stop operation, click “STOP” button on the touch screen.

Or, set HIGH for remote stop signal to X5 terminal on PLC unit in the control cabinet, and set LOW for remote run signal to X0 terminal on PLC unit in the control cabinet.

There are two parameters under this fluid delivery mode:

- Dispensing Volume (cc)
- Dispensing Time (sec)

Under this fluid delivery mode, the control system will handle the calculation to determine the acceleration, deceleration, and maximum flow rate. If calculated results exceed system limits, one of the following error messages may be generated, accordingly,

- Decrease Dispensing Volume
- Increase Dispensing Time

System recommended values will be shown at screen bottom whenever calculated results exceed system limits.



2. Dispensing Batch Mode

Dispensing Batch Mode operates the pump system based on user defined Dispensing Volume and Dispensing Time. Pump will run and stop in the defined Dispensing Time. Once pump stops, the total output volume matches the defined Dispensing Volume. The system will start again after a preset time (seconds) defined by Batch Delay. After it repeats same operation the number of times defined by Batch Number, the system will completely stop, and wait for next command.

To initiate operation, click “RUN” button on the touch screen.

To stop operation, click “STOP” button on the touch screen.

Dispensing Batch Mode does not support remote control. To use remote control to repeat dispensing operation a number of times, please use Dispensing Mode, and set remote run signal to HIGH a number of times after the completion of each dispensing operation.





Operations (cont'd)

There are four parameters under this fluid delivery mode:

- Dispensing Volume (cc)
- Dispensing Time (sec)
- Batch Number, a positive integer, 1-1000000
- Batch Delay (sec), 0.1-327.2

Under this fluid delivery mode, the control system will handle the calculation to determine the acceleration, deceleration, and maximum flow rate. If calculated results exceed system limits, one of the following error messages may be generated, accordingly,

- Decrease Dispensing Volume
- Increase Dispensing Time

System recommended values will be shown at screen bottom whenever calculated results exceed system limits.

3. Dispensing & Reverse Mode

Dispensing Mode operates the pump system based on user defined Dispensing Volume and Dispensing Time. Pump will run and stop in the defined Dispensing Time. Once pump stops, the total output volume matches the defined Dispensing Volume. After dispensing operation stops, pump will rotate backward for the amount defined by Reverse Volume in certain time range defined by Reverse Time. Then pump will completely stop, and wait for next command.

This operation is very useful for preventing dripping after each dispensing operation.

To initiate operation, click "RUN" button on the touch screen; Or, set HIGH for remote run signal to X1 terminal on PLC unit in the control cabinet, and set LOW for remote stop signal to X5 terminal on PLC unit in the control cabinet.

To stop operation, click "STOP" button on the touch screen. Or, set HIGH for remote stop signal to X5 terminal on PLC unit in the control cabinet, and set LOW for remote run signal to X1 terminal on PLC unit in the control cabinet.

There are four parameters under this fluid delivery mode:

- Dispensing Volume (cc)
- Dispensing Time (sec)
- Reverse Volume (cc)
- Reverse Time (sec)

Under this fluid delivery mode, the control system will handle the calculation to determine the acceleration, deceleration, and maximum flow rate. If calculated results exceed system limits,





Operations (cont'd)

one of the following error messages may be generated, accordingly,

- Decrease Dispensing Volume
- Increase Dispensing Time
- Decrease Reverse Volume
- Increase Reverse Time

System recommended values will be shown at screen bottom whenever calculated results exceed system limits.

4. Dispensing & Reverse Batch Mode

Dispensing Mode operates the pump system based on user defined Dispensing Volume and Dispensing Time. Pump will run and stop in the defined Dispensing Time. Once pump stops, the total output volume matches the defined Dispensing Volume. After dispensing operation stops, pump will rotate backward for the amount defined by Reverse Volume in certain time range defined by Reverse Time. The system will start again after a preset time (seconds) defined by Batch Delay. After it repeats same operation the number of times defined by Batch Number, the system will completely stop, and wait for next command.



To initiate operation, click “RUN” button on the touch screen.

To stop operation, click “STOP” button on the touch screen.

Dispensing & Reverse Batch Mode does not support remote control. To use remote control to repeat dispensing & reverse operation a number of times, please use Dispensing & Reverse Mode, and set remote run signal to HIGH a number of times after the completion of each dispensing & reverse operation.

There are four parameters under this fluid delivery mode:

- Dispensing Volume (cc)
- Dispensing Time (sec)
- Reverse Volume (cc)
- Reverse Time (sec)
- Batch Number, a positive integer, 1-1000000
- Batch Delay (sec), 0.1-327.2

Under this fluid delivery mode, the control system will handle the calculation to determine the acceleration, deceleration, and maximum flow rate. If calculated results exceed system limits, one of the following error messages may be generated, accordingly,

- Decrease Dispensing Volume



Operations (cont'd)

- Increase Dispensing Time
- Decrease Reverse Volume
- Increase Reverse Time

System recommended values will be shown at screen bottom whenever calculated results exceed system limits.

5. Continuous Operation Mode

Continuous Operation Mode operates the system based on user defined flow rate. Under this fluid delivery mode, the pump will continuously rotate and deliver fluid until operator interrupts the operation.

To initiate operation, click “RUN” button on the touch screen; Or, set HIGH for remote run signal to X2 terminal on PLC unit in the control cabinet, and set LOW for remote stop signal to X5 terminal on PLC unit in the control cabinet.

To stop operation, click “STOP” button on the touch screen. Or, set HIGH for remote stop signal to X5 terminal on PLC unit in the control cabinet, and set LOW for remote run signal to X2 terminal on PLC unit in the control cabinet.

There is one parameter under this fluid delivery mode:

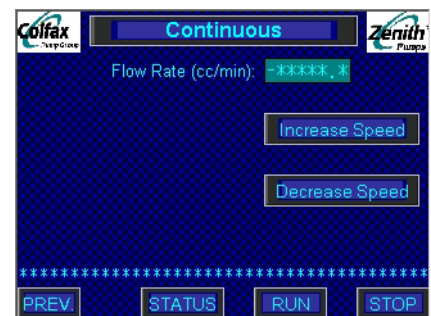
- Flow Rate (cc/min)

Flow Rate value can be changed when the pump system stops or is in operation. If Flow Rate is changed in operation, the pump speed will be changed instantaneously. Flow Rate value can also be changed by clicking “Increase Speed” or “Decrease Speed” button. Click and hold either “Increase Speed” or “Decrease Speed” button to make changes much quicker.

Under this fluid delivery mode, the control system will handle the calculation to determine the acceleration, deceleration, and maximum flow rate. If calculated results exceed system limits, one of the following error messages may be generated, accordingly,

- Decrease Flow rate

System recommended values will be shown at screen bottom whenever calculated results exceed system limits.





Customer Programming & Support

To create customer's unique pump control programs. Customer can utilize FPWIN PRO for creating PLC control program and GTWIN for creating touch screen interface program. Please follow the procedures in the section of "Program Loading" for establishing communication between a computer and touch screen and PLC.

If you have any question during programming, please contact Panasonic Technical Support line (877) 624-7872 or Panasonic Automation Control website: <http://pewa.panasonic.com/acsd>.

Colfax Zenith offers supports for customer programming and modification, please contact Zenith Application Engineering at (877)857-7867.



ZENITH PUMPS

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