

NJEX 610G

NATURAL GAS ODORIZATION SYSTEM



NJEX 610G

INSTRUCTION & OPERATING MANUAL

Version: 06-2021

610G TABLE OF CONTENTS

610G Table of Contents.....	I
Section 1: First Things To Know About The 610G	1
How to Use this Manual.....	1
Operation Specifications.....	2
Theory of Operation.....	2
System Accessories	3
Section 2: System Installation.....	4
Standard System Components.....	4
System Flow Schematic	5
Standard System Mounting	6
Standard System Connections.....	7
Section 3: Filling the Bulk Odorant Tank	8
Filling the Tank for the First Time.....	8
Refilling the Bulk Odorant Tank	9
Section 4: System Control & Electronics.....	10
Overview.....	10
Section 5: Programming for Proportional-to-Flow Operation.....	11
Setting Operator Input Parameters (Z65/6.1 Controller Setup).....	11
Section 6: Programming for Proportional-to-Time Operation.....	13
Setting Operator Input Parameters (Z65/6.1 Controller Setup).....	13
Section 7: Mechanical System	14
Overview.....	14
NJEX Gas Filter.....	15
Model 6000 pump and Actuation Gas Manifold.....	16
Section 8: System Maintenance.....	17
Preventative Maintenance Schedule	17
Recommended Spare Parts List.....	17
Section 9: 610G System Troubleshooting	18
How to Use This Section	18
Battery Test.....	19
Troubleshooting: Proportional-To-Time Mode	20
Troubleshooting: Proportional-To-Flow Mode.....	22
Troubleshooting: Pump Performance.....	23
Appendix A: Illustrations	25
NJEX Model 6000 Pump Assembled.....	26
NJEX Model 6000 Pump Actuation Assembly, Exploded View	27
NJEX Model 6000 Pump Check Valve Assemblies, and Seals, Exploded View	28
NJEX Gas Filter.....	29
Controller (exploded).....	30
Wiring Control Document	31

SECTION 1: FIRST THINGS TO KNOW ABOUT THE 610G

How to Use this Manual

The NJEX-610G Operations Manual is a step-by-step guide containing the procedures needed to work with the 610G System. The NJEX System Series of odorizers implement the most advanced technology available in the industry. It is recommended that the technicians working with the NJEX Odorization Systems study the manual prior to initiating work on the system for the first time.

Typographic Conventions

To aid in readability, this manual uses several typographic conventions. References to illustrations, photographs, and other related content will appear in italicized text along with the location of where to find the item in the manual. Digital versions of the manual, available in Adobe Acrobat™ PDF format, will be highlighted further in blue italic text indicating the copy retains a hyperlink to the referenced item.

Measurement units are listed in italic parenthesis text following their US standard equivalent. As an example, for defining a distance, 15' (4.5 meters), is how the text will appear throughout the manual.

Items that require action, for example the pressing of a key for programming the controller, will feature the action item in sentence case **Test** followed in normal text by the item such as, the **Test** key or **Power** switch.

Starting with [Section 4. System Control & Electronics](#), the manual will begin discussing the in-depth operation of the electronic controller where many of these typographic conventions will be found. In the discussion about the controller, the technician will learn about

the multiple switches used to program the controller for operation. Further discussion on the functions of the controller will take place in [Section 4. System Control and Electronics, on page 10](#).

Getting Help

This manual provides solutions to typical questions about the 610G system. If the answer can not be found within this manual, contact YZ Systems at:

T: 1.281.362.6500

T: 1.800.653.9435

E: techsupport@yzhq.com

When calling, have this manual close at hand. Whether calling or writing, please include in your communicate the following information:

- The serial number of the NJEX System and the version number of this manual. The serial number is located inside the enclosure door. The version number of this manual located at the bottom of each page.
- A description of the problem and, when the problem occurred.

SECTION 1: FIRST THINGS TO KNOW ABOUT THE 610G

Operation Specifications

Maximum recommended Odorant Output:	0.5 gallons/day (200 cc/day)
Maximum Operating Pressure:	1,440 psig (99.28 Bar (g))
Operating Temp Range:	0 to 140° F. (-17° C to 60° C)
Power Supply:	LBP-14 Battery
Gas Flow Input Signal:	Pulse (Dry contact or voltage pulse)

Theory of Operation

Proportional-To-Time Operation: In this mode of operation, the 610G injects odorant into the pipeline at regular time intervals. The volume injected per stroke is set by inserting a stroke spacer into the actuation plug of the 6000B pump. The Z-65 controller operates as a recycling timer, periodically energizing a low power solenoid valve. Energizing the solenoid valve allows actuation gas to stroke the 6000B pump. The rate at which this occurs is set by the operator using two 10-position switches on the controller. The number of times the solenoid output is activated is recorded by the onboard LCD indicator.

Proportional-To-Flow Operation: In this mode of operation, the controller operates as a dividing counter. The counter periodically energizes a low power solenoid valve. The rate at which this occurs is a function of operator input as well as the host computer or other device that inputs pulses per volume metered. The volume injected per stroke is set by inserting a stroke spacer into the actuation plug of the 6000B pump. The two 10-position switches are used to set the number of pulses the counter will count before activating the solenoid output. The number of times the solenoid output is activated is recorded by the onboard LCD stroke indicator.

Power Options:

Long-Life Battery: The controller timer/counter operates using a replaceable internal battery pack. As the standard power source, the battery pack condition is monitored by way of two indicator LEDs. When the battery pack needs replacement, the red LED will illuminate when the solenoid output is activated. If the battery pack is good, the green LED will illuminate when the solenoid is activated. Typical battery life is one year based on a two minute/stroke rate.

SECTION 1: FIRST THINGS TO KNOW ABOUT THE 610G

System Accessories

- **Odorant Injection Probe**, includes a 316 stainless steel probe and isolation valve for location at the pipeline. When ordering, please specify pipeline connection required, 1/2" or 3/4".
- **Odorant Injection Probe with Sightglass**, (P/N A1-0238) 1/8" drop adapter includes a 316 stainless steel probe, visual odorant sight indicator, and an isolation valve for location at the pipeline. When ordering, please specify pipeline connection required, 1/2" or 3/4".
- **1/8" stainless steel discharge tubing Inline Check Valve**. For placement in the odorant discharged tubing line immediately preceding the probe assembly, (P/N A3-0438).
- **1/4" stainless steel tubing Dielectric Isolator Union**. These should be installed in every tubing line that attaches the odorizer to the pipeline in any manner. For example the supply gas, odorant discharge, and differential pressure switch connections, (P/N A1-0182).
- **NJEX Scrubbers**. These filters are designed to scrub the exhaust gas vented from the pumps. They are available by ordering P/N C4-0018, 15 gallon scrubber.

A complete line of odorization accessories ranging from pre-odorized gas scrubbers to injection probes is available through YZ. Please contact your local representative or YZ toll free at 800.344.5399. For technical support call 800.653.9435.

Application Notes

- When installed and operated properly we can consistently perform at the smallest pump displacement of 0.02 cc/stroke with as much as 30 minutes between strokes; therefore time intervals will be approved between 6 second 30 minutes.
- Keep in mind that with the LVO there is no internal microprocessor to do calculations, or make adjustments; therefore, the LVO must be operated in Proportional to Time mode (0.1 min., to 30 min.), or in the Flow mode as a slave to counting "XX" number of pulses. The pulses cannot come faster than 1.5 Hz or approximately 670 ms between pulses, and each pulse must have a minimum dwell time of 21 ms, and you cannot count more than 99 pulses before stroking the pump.
- Finally remember the battery life on the LVO will be limited by stroke frequency and temperatures. The faster it runs and the colder it gets, the shorter the battery life will be.

SECTION 2: SYSTEM INSTALLATION

Standard System Components

Standard primary components of the NJEX-610G include the following:

- A. System Odorant Tank. The odorant tank is tested and pre-assembled with a valve package including a visual level indicator.
- B. System Controller. Controller with internal battery assembly.
- C. Odorant Injection Pump. The NJEX 6000 is a pneumatically actuated, positive displacement plunger pump.
- D. System Enclosure. Houses the Model 6000B pump, the Z-65 Controller, the actuation gas manifold and the odorant discharge manifold. NEMA rating 4X.
- E. NJEX Gas Filter. Installed between the actuation gas regulator and the actuation gas manifold, this filter provides a 25 micron coalescent filtration to insure a clean pneumatic supply.

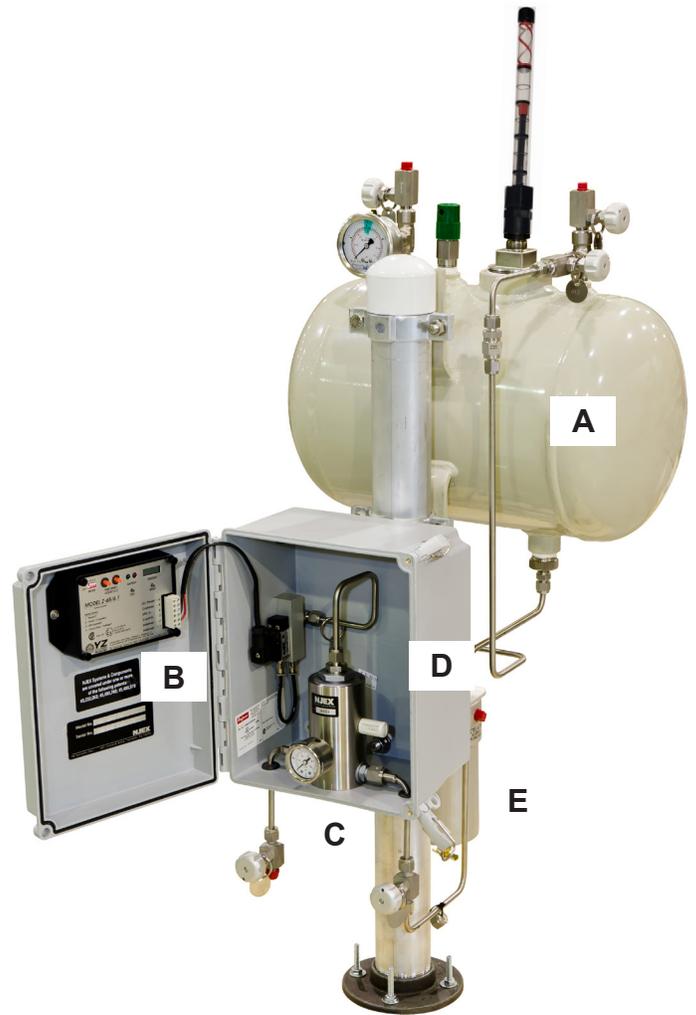
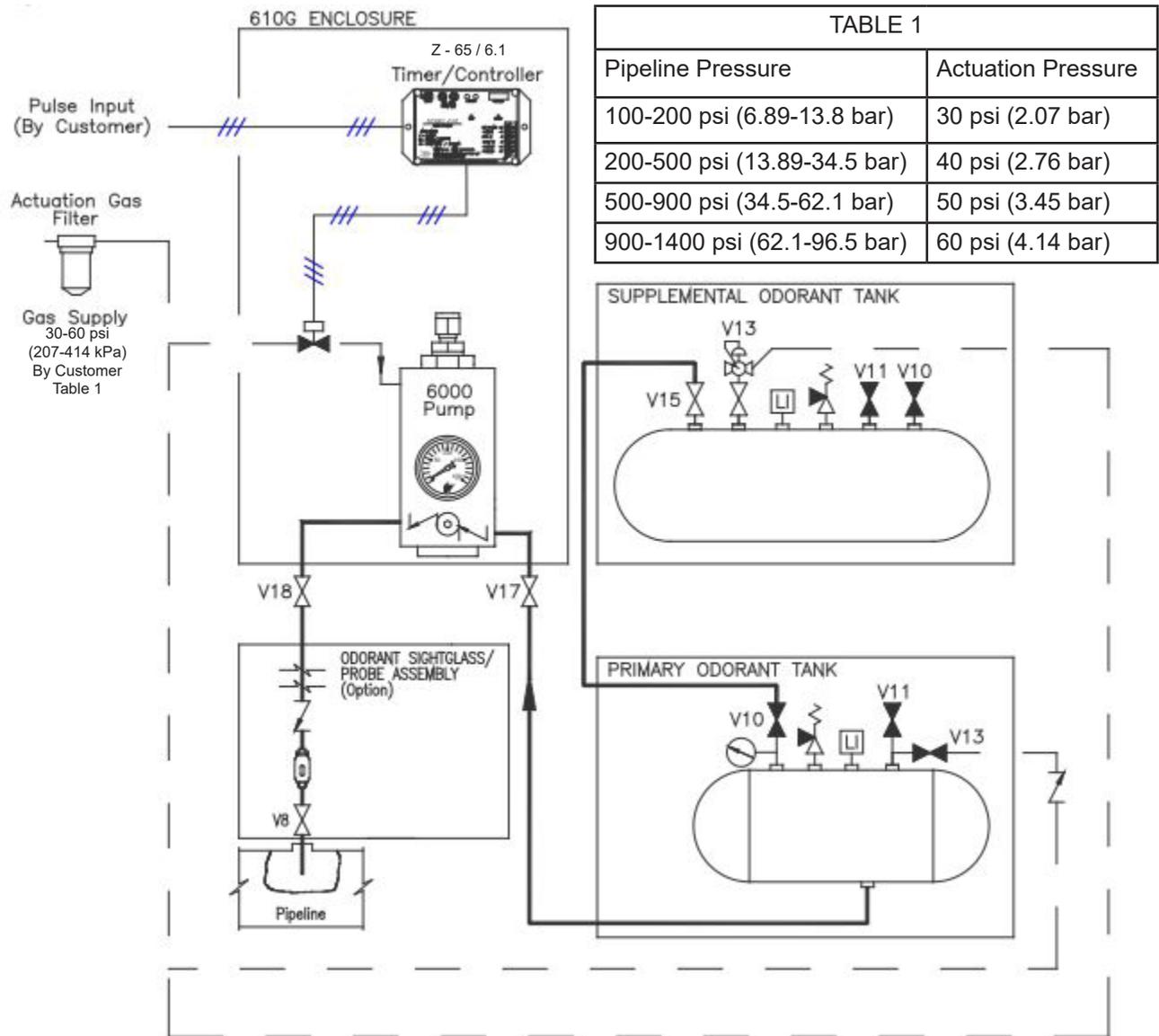


Figure 1

SECTION 2: SYSTEM INSTALLATION

System Flow Schematic

Figure 2



Pipeline Pressure	Actuation Pressure
100-200 psi (6.89-13.8 bar)	30 psi (2.07 bar)
200-500 psi (13.89-34.5 bar)	40 psi (2.76 bar)
500-900 psi (34.5-62.1 bar)	50 psi (3.45 bar)
900-1400 psi (62.1-96.5 bar)	60 psi (4.14 bar)

L e g e n d

Actuation Gas ———
 Odorant —————
 Electrical ———//———

☒ Normally Closed Valve
 ☒ Normally Open Valve
 ▽ Check Valve
 ☒ Solenoid Valve

⊙ Pressure Gauge
 □ Level Indicator
 ⚠ Pressure Relief Valve
 ☒ Pressure Regulator w/ Gauge

V8 Injection Probe Pipeline Isolation Valve
 V10 Odorant Storage Tank Fill Valve

V11 Odorant Storage Tank Vapor Return Valve
 V13 Odorant Storage Tank Blanket Gas Isolation Valve

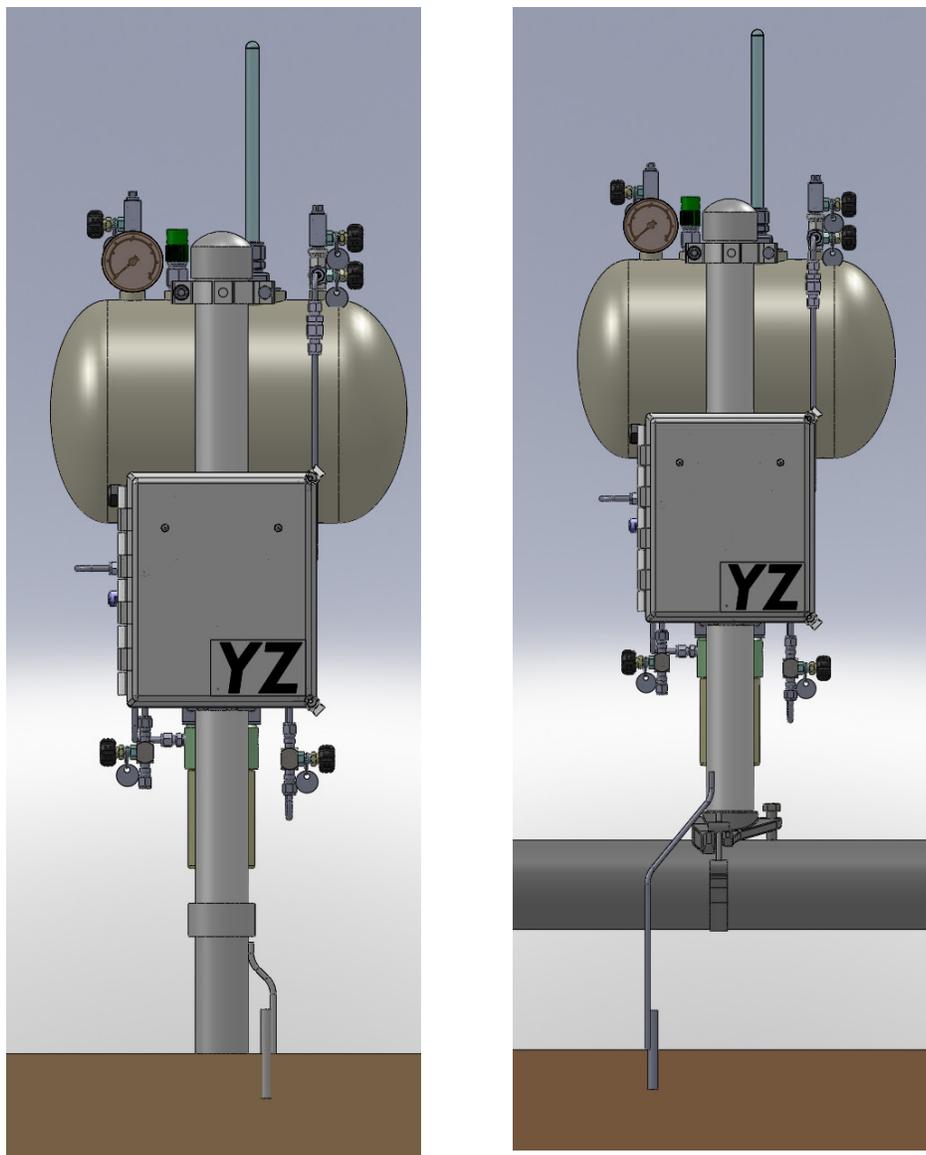
V15 Odorant Storage Tank Supply Isolation Valve
 V17 Odorant Inlet Isolation Valve
 V18 Odorant Discharge Line Isolation Valve

SECTION 2: SYSTEM INSTALLATION

Standard System Mounting

1. Securely attach a section of 2" pipe in a vertical configuration at the location where the NJEX 610G is to be installed. Using the mounting clamps provided with the NJEX 610G system, attach the system to the pipe.
2. Connect a ground wire from the 2" pipe to a properly installed ground rod, located adjacent to the pipe.

Figure 3



SECTION 2: SYSTEM INSTALLATION

Standard System Connections

Required field connections to place the 610G into operation are as follows:

1. Connect the regulated actuation gas source (30-60 psi, 2.1-4.1 bar, by customer, refer [Table 1, Page 5](#)) to the NJEX gas filter inlet.

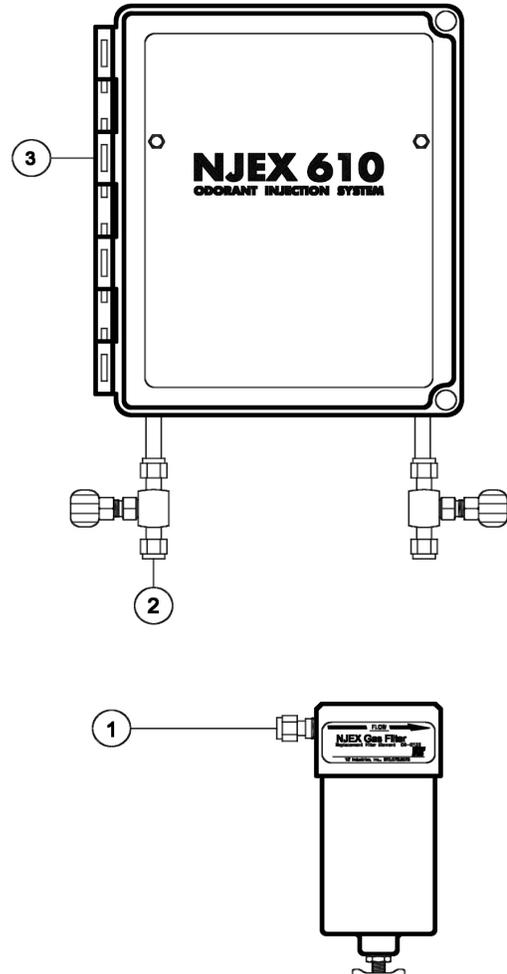
NOTE: At temperatures below 32°F (0°C), conditioning of the actuation gas supply may be required. Where the actuation gas supply has a high water content and/or a low hydrocarbon dew point, additional actuation gas filtration or heating of the actuation gas supply may be necessary. Bottled nitrogen can also be used during cold operating conditions to avoid condensation in the actuation gas supply line. In addition, operation at extreme temperatures will affect seal and o-ring performance. To prolong the service of seals and o-rings, adequate heat should be provided to maintain an operating environment above 32°F (0°C).

2. Connect the pump discharge valve fitting to the pipeline connection.
3. Connect the flow signal device to the termination strip located in the system control enclosure (see Wiring Control Document, page 32).

Installation Guidelines

- We recommend that the tubing from the 610 LVO be adapted to 1/8" tubing before it reaches the sight glass.
- A 50 lb. in-line check valve should be located just before the sight glass. (1/8" in-line C.V. P/N A3-0438)
- The sight glass should be fitted with a 1/4" MNPT x 1/8"t bore through fitting (P/N A1-0283) and 1/8" S.S. tubing extending through the bore of the sight glass fitting until it just protrudes from the 1/4" dripper point.

Figure 4



CAUTION:

Excessive tubing lengths should be avoided. Installation of the NJEX Odorization system should be as close to the point of injection and Odorant Storage Tank as possible. Maximum tubing length should not exceed 15' (4.5 meters) with the tubing size maintained as indicated in this manual. If longer tubing lengths are required consult YZ Systems Technical Services at 800.653.9435 or 1.281.362.6500

SECTION 3: FILLING THE BULK ODORANT TANK

Filling the Tank for the First Time

CAUTION:

Odorant has a very strong odor, which if allowed to escape to the atmosphere, may cause problems in the local community. Take necessary precautions when filling an odorant storage tank to assure that the local community is not disrupted during the filling process. Verify that the entire system has no pressure in it before beginning. Additionally, all personnel should wear protective clothing, and use equipment as recommended by the chemical manufacturer during this time. If you are uncertain about any aspect of the odorant itself, you should contact the manufacturer of your chemical prior to proceeding. **The MAXIMUM amount of odorant in the standard tank should never exceed 4 gallons.**

1. Verify correct position of valves before beginning, *figure 5*.
Closed: V10, V11 and V13
2. Attach inert or natural gas supply to V10.
3. To purge the tank open valve V10 to introduce inert or natural gas to the tank to begin displacing any ambient air from the empty tank. Continue until pressure on the gage located directly below V10 is observed, then partially open V11 to allow ambient air from the tank to begin flowing out. Allow this process to continue until all ambient air from the tank is

purged, and only inert gas or natural gas is emitting from this valve, then close V11 and V10. The time required to accomplish this task will vary with the tank size.

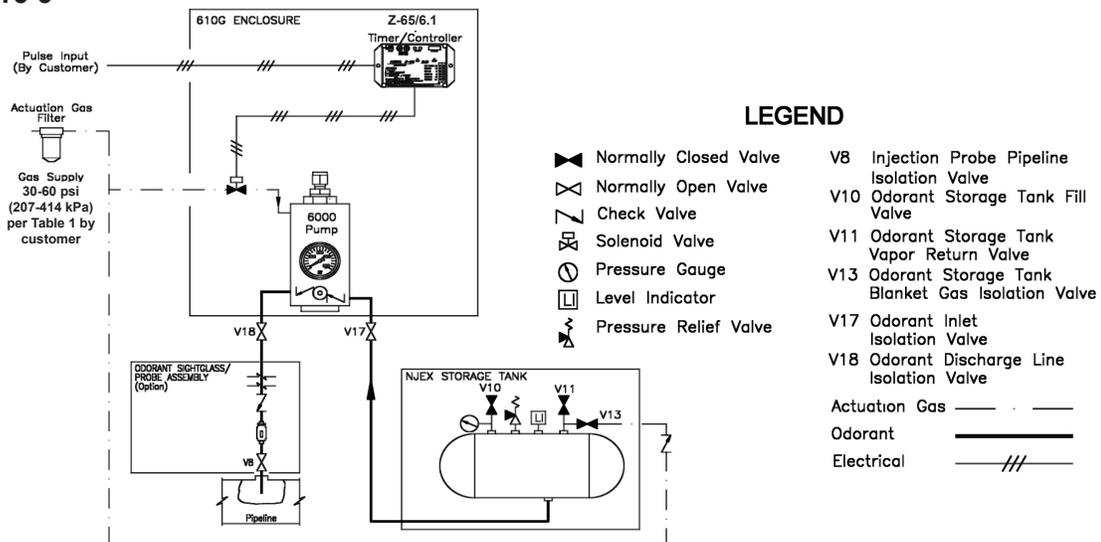
4. Vent purge gas by opening V11 partially until tank pressure just reaches zero, and then close V11.
5. Attach odorant supply to V10, open V10, and begin transferring odorant to the bulk tank.
 - The tank level indicator will not start to rise until approximately 0.5 gallons of odorant is in the tank.
 - 1 gallon is approximately the thin line above the fitting.
 - 2.5 gallons is approximately the next thick line below the red keep-out.
 - 4 gallons is about where the red diagonal keep-out mark starts.
6. Connect a line from V11 to a flare or vapor recovery device, and open V11.

CAUTION:

Fill tank to a maximum level of 80% of the tank capacity (4 gallons). Stay below the red-diagonal keep-out.

7. Close V10 and V11, and remove odorant transfer equipment, and line to flare or vapor recovery device.
8. Continue through the remaining procedures in this manual.

Figure 5



SECTION 3: FILLING THE BULK ODORANT TANK

Refilling the Bulk Odorant Tank

CAUTION:

Odorant has a very strong odor, which if allowed to escape to the atmosphere, may cause problems in the local community. Take necessary precautions when filling an odorant storage tank to assure that the local community is not disrupted during the filling process. Verify that the entire system has no pressure in it before beginning. Additionally all personnel should wear protective clothing, and use equipment as recommended by the chemical manufacturer during this time. If you are uncertain about any aspect of the odorant itself, you should contact the manufacturer of your chemical prior to proceeding.

1. Place the Z-65 controller in the OFF Mode by placing Mode Switch #1 in the Down position.
2. Verify correct position of valves before beginning, Figure 6.
Closed: V10, V11, V13

3. Connect a line from V11 to a flare or vapor recovery device, and open V11.
4. Attach odorant supply to V10, open V10, and begin transferring odorant to the bulk tank.

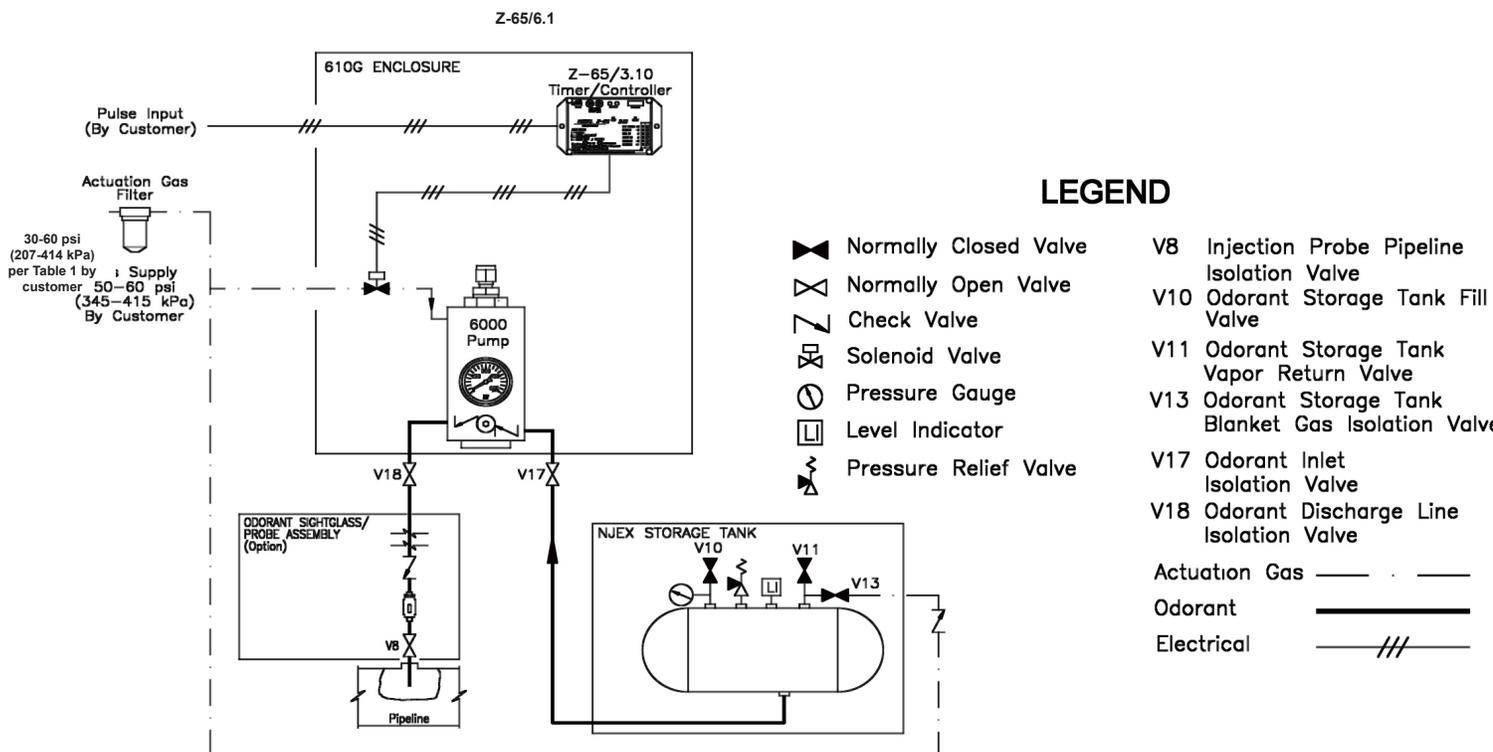
CAUTION:

Fill tank to a maximum level of 80% of the tank capacity. Stay below red keep-out zone.

- The tank level indicator will not start to rise until approximately 0.5 gallons of odorant is in the tank.
- 1 gallon is approximately the thin line above the fitting.
- 2.5 gallons is approximately the next thick line below the red keep-out.
- 4 gallons is about where the red diagonal keep-out mark starts.

5. Close V10 and V11, and remove odorant transfer equipment, and line to flare or vapor recovery device
6. Open V13 until the storage tank pressure is 10 psig.
7. Place the Z-65 controller in the ON Mode by placing Mode Switch #1 in the Up position.

Figure 6



SECTION 4: SYSTEM CONTROL & ELECTRONICS

Overview

The electronic control package provided with your 610G odorizing system consists of a solid state Z-65 Controller and a Low Powered Solenoid powered by an internal battery. The Z-65 energizes the solenoid which in turn sends a pneumatic actuation signal to the Odorizer Pump, every time a sample is required either Proportional-To-Flow, or Time.

SAFETY NOTES:

Always use extreme care when performing maintenance on the odorization system. Always take necessary measures to assure that electrical classification in the area is considered, before, and during all repairs, and that necessary steps are taken to maintain proper electrical procedures for the classification of the area.

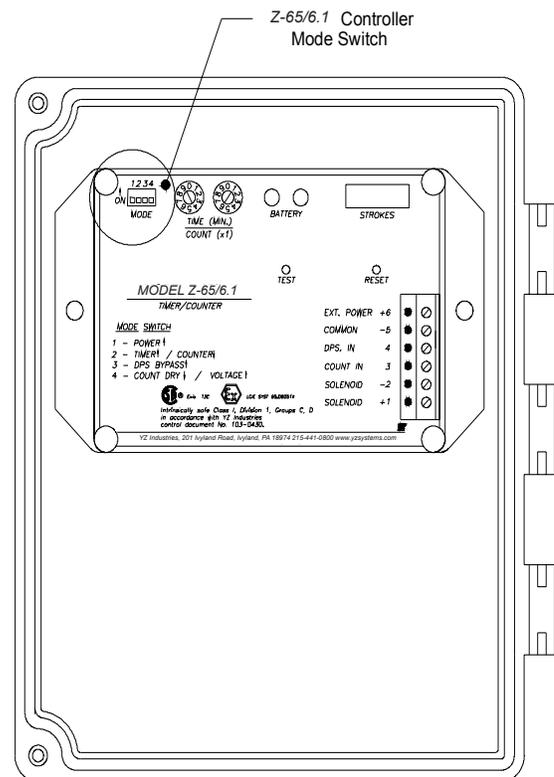
The control package requires you to configure the Z-65 controller to operate in a Proportional To-Flow mode, refer [Section 5, to page 11](#), or a [Proportional-To-Time mode refer Section 6, page 13](#).

All wiring connected to the Z-65 controller must be done in accordance with the Wiring Control Document, refer to [Appendix A, page 30](#). NJEX 610G electronics are rated for use in Class I, Division 1, Groups C and D hazardous locations.

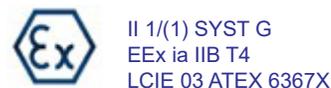
WARNING:

- Electrostatic Discharge Hazard – Wipe with a damp cloth only.
- System is top-heavy. Lift cabinet with rigging to support weight and prevent it from tipping.
- The Z-65 controller is in a housing with more than 10% aluminum. Non-sparking tools must be used while servicing the Z-65 controller to avoid an ignition hazard due to impact or friction.
- Customer to ensure inlet actuation supply pressure does not exceed 90 psi (6.2 bar).

Figure 7



APPROVALS:



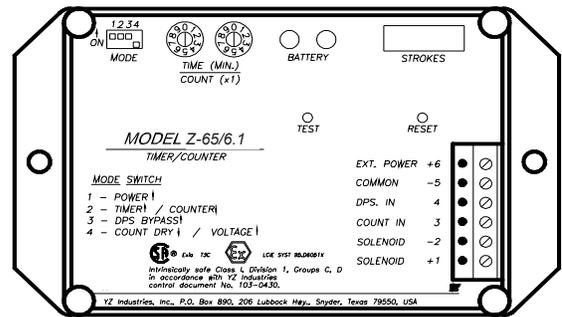
Intrinsically safe Class 1, Division 1, Groups C, D
in accordance with YZ Systems Doc. No. 103-430

SECTION 5: PROGRAMMING FOR PROPORTIONAL-TO-FLOW OPERATION

Z-65/6.1 Controller Setup:

Figure 8

In this mode, the Z-65/6.1 controller is used as a dividing counter to control the rate at which the solenoid output is activated. The desired time between solenoid activation is controlled by the host computer or other device that will give an input pulse to the count input terminals #3 (+) input and #5 (-) input. Use the chart below to calculate the counter setting needed.



1. Pump displacement (from .02 to .1 cc)	=	a
2. Odorant density (lb/gal or g/cc)	=	b
3. Pulse/Volume metered (pulses/MCF or pulses/m ³)	=	c
4. Desired Injection rate (lb/MMCF or mg/m ³)	=	d
5. Counter setting		
a. English	=	$\frac{a \times b \times c \times .264172^*}{d}$
a. Metric	=	$\frac{a \times b \times c \times 1000^*}{d}$
	Example #1	Example #2
	English Gas Flow	Metric Gas Flow
Pump displacement	(a) = .05 cc	.05 cc
Odorant density	(b) = 6.80 lb/gal	.815 g/cc
Pulses/volume metered	(c) = 100 pulses/MCF	10 pulses/m ³
Injection rate	(d) = .5 lb/MMCF	8 mg/m ³
Example #1 Counter setting	= $\frac{.05\text{cc} \times 6.80 \text{ lb/gal} \times 100 \text{ pulses/MCF} \times .264172^*}{.5 \text{ lb/MMCF}}$	= 18 pulses
Example #2 Counter setting	= $\frac{.05\text{cc} \times .815 \text{ g/cc} \times 10 \text{ pulses/m}^3 \times 1000^*}{8 \text{ mg/m}^3}$	= 51 pulses
* conversion constant		

NOTE: If the calculated counter setting is less than 1 or greater than 99, the pulses per volume metered will need to be adjusted. This can be programmed in most flow meters to the desired rate. If the calculated counter setting is less than 1, increase the pulses per volume metered. If the calculated counter setting is greater than 99, decrease the pulses per volume metered.

Figure shown below reflects Example # 1 setting of 18 pulses counted before stroking the pump

Figure 9



SECTION 5: PROGRAMMING FOR PROPORTIONAL-TO-FLOW OPERATION

Z-65/6.1 Controller Setup:

A. Determine if the incoming input is either a dry contact or voltage pulse.

1. **If the input is a dry contact:**

a. Terminate the incoming connections to the Z-65/6.1 terminal strip (see Figure 10).

- b. Turn mode switch #1 to on.
- c. Turn mode switch #2 to off.
- d. Turn mode switch #3 to on.
- e. Turn mode switch #4 to off.

2. **If the input is a voltage pulse:**

a. Terminate the incoming connections to the Z-65/6.1 terminal strip (see Figure 12).

- b. Turn mode switch #1 to on.
- c. Turn mode switch #2 to off.
- d. Turn mode switch #3 to on.
- e. Turn mode switch #4 to on.

Counter Mode of Operation: (setting the counter)

A. Once you have determined your incoming input as either being a dry contact or voltage pulse, turn the count dials to the appropriate number of pulses you want to count before activating the solenoid output. (Example: 18 pulses, turn the dials to 18).

1. Press the test button once to load the value into memory.

Figure 10

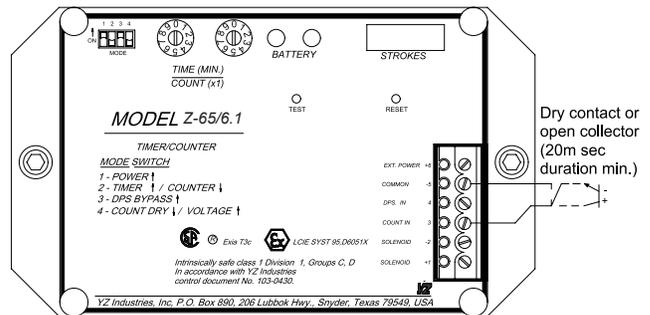


Figure 11

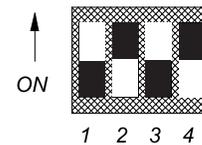


Figure 12

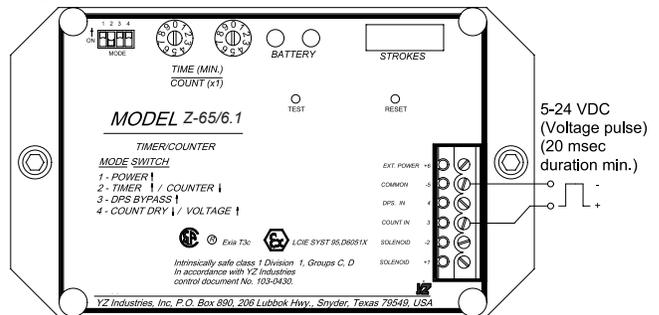


Figure 13

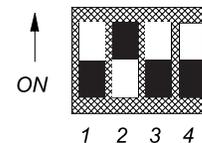
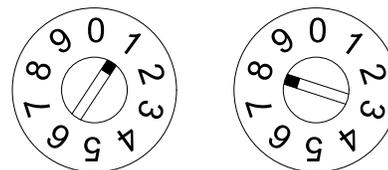


Figure 14

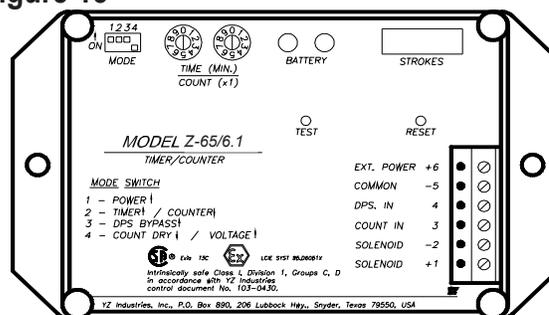


SECTION 6: PROGRAMMING FOR PROPORTIONAL-TO-TIME OPERATION

Setting Operator Input Parameters: Z65/6.1 Controller Setup

The rate at which the solenoid output is activated is controlled by selecting the appropriate time input. This determines the amount of time that will transpire between solenoid actuations. Use the chart below to actuate the timer setting needed.

Figure 15



1. Pump displacement (from .02 to .1 cc)	=	a
2. Odorant density (lb/gal or g/cc)	=	b
3. Desired injection rate (lb/MMCF or mg/m ³)	=	c
4. Average flow rate (MCF/hr or m ³ /hr)	=	d
5. Timer setting		
a. English	=	$\frac{a \times b \times 15.8503^*}{c \times d}$
a. Metric	=	$\frac{a \times b \times 60000^*}{c \times d}$

		Example #1 English Gas Flow	Example #2 Metric Gas Flow
Pump displacement	(a) =	.05 cc	.05 cc
Odorant density	(b) =	6.80 lb/gal	.815 g/cc
Injection rate	(c) =	.5 lb/MMCF	8 mg/m ³
Flow rate	(d) =	6.00 MCF/hr	170 m ³ /hr
Example #1 Time setting	=	$\frac{.05\text{cc} \times 6.80 \text{ lb/gal} \times 15.8503^*}{.5 \text{ lb/MMCF} \times 6.00 \text{ MCF/hr}}$	= 1.80 minutes
Example #2 Timer setting	=	$\frac{.05\text{cc} \times .815 \text{ g/cc} \times 60000^*}{8 \text{ mg/m}^3 \times 170 \text{ m}^3/\text{hr}}$	= 1.80 minutes

* conversion constant

NOTE: To obtain maximum battery life, choose the longest time interval and the largest pump displacement setting possible.

Timer mode of Operation: (operating as a timer)

1. Set the timer dials to the desired time.
2. Turn mode switch #1 to on.
3. Turn mode switch #2 to on.
4. Turn mode switch #3 to on.
5. Turn mode switch #4 to off.
6. **Press** the test button once to initiate the timer sequence.

Figure 16



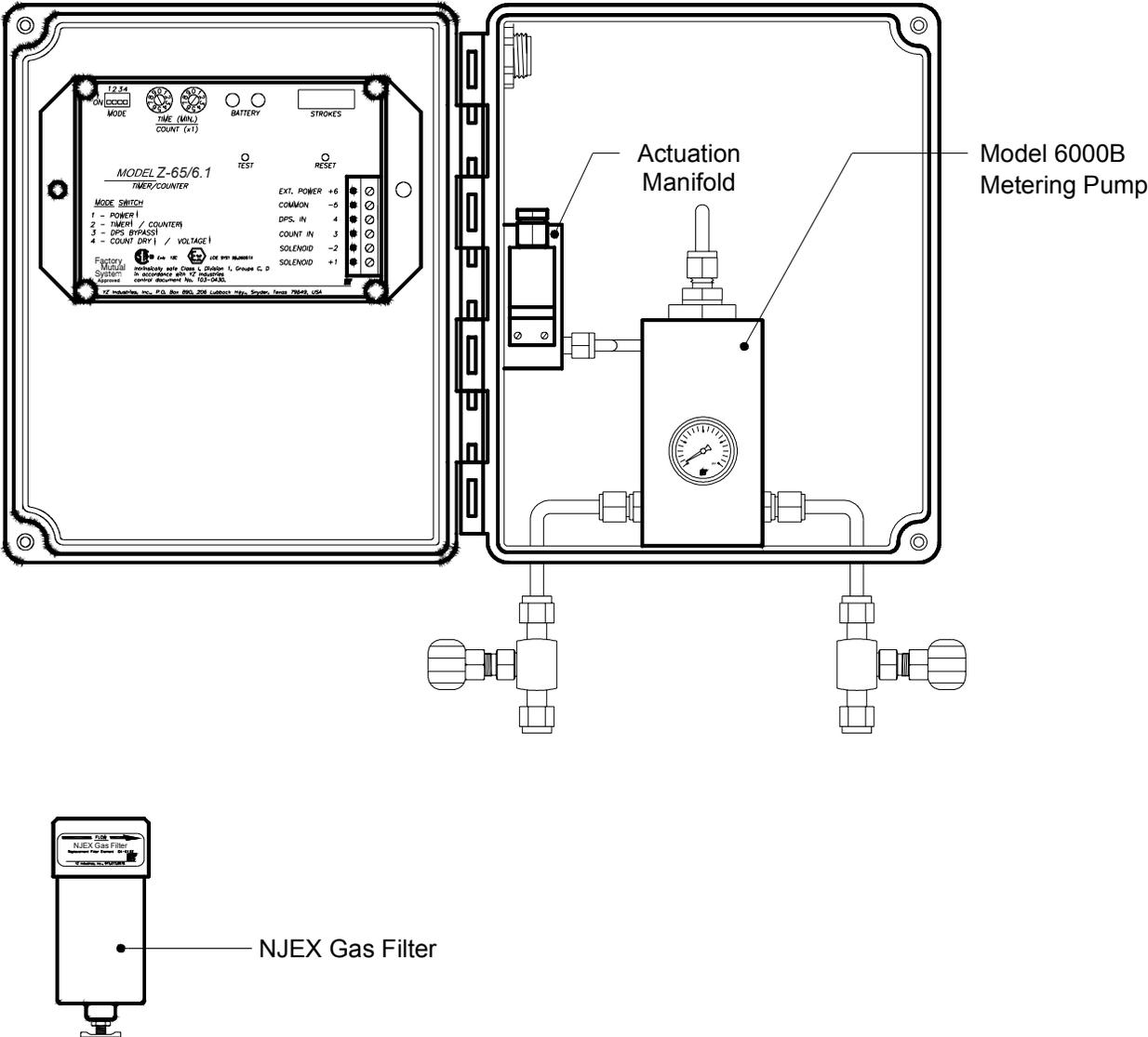
NOTE: The time (1.8 minutes from Example #1) shown corresponds to the factory set timing range. See [Section 9 / Troubleshooting: Timer Mode, Timer Range setting, Page 21.](#)

SECTION 7: MECHANICAL SYSTEM

Overview

The 610G mechanical system is composed of the mechanical/electrical enclosure. Individual components of the system are shown below and described in the following pages.

Figure 17



SECTION 7: MECHANICAL SYSTEM

NJEX Gas Filter

A 25 micron coalescent filter is provided with each 610G. This filter, as shown, is installed on the back outside of the enclosure and should be connected to the regulated (30-60 psi / 2.1-4.1 bar, per [Table 1, Page 5](#)) actuation gas supply provided by the system operator. By conditioning the incoming actuation gas, a clean pneumatic supply will be provided to the solenoid valves. This will ensure a longer operational life for the pneumatic control system. If the actuation gas supply has a high water content and / or a low hydrocarbon dew point, additional filtration and heating of the actuation gas supply may be necessary. Bottled nitrogen can also be used as an alternate gas supply source if gas conditioning is a problem.

Figure 18



SECTION 7: MECHANICAL SYSTEM

Model 6000 Pump

The NJEX 6000 pump, as shown, is a pneumatically actuated, positive displacement, plunger pump. The 6000 is actuated with compressed air or pipeline gas at a pressure of 30-60 psi (2.1 – 4.1 Bar) - refer [Table 1, page 5](#), refer to [Section 2, the System Flow Schematic, Figure 2](#). The pump has an adjustable displacement of 0.1cc to 0.02cc. It achieves proportional-to-flow injection through adjustment of the stroke rate. The 6000 is rated for a maximum stroke rate of 60 strokes per minute. Each time the pump strokes, the plunger displaces odorant through the discharge check valve. The pump is configured with two sets of plunger seals, segregated from each other with a trapped air space, minimizing the risk of odorant escape into the atmosphere.

The 6000 incorporates a cartridge design in key areas that may require maintenance.

They are: the inlet check valve, the discharge check valve, and the plunger bushing / seal assembly. The cartridge design provides easier maintenance resulting in less down-time.

The gage on the front of the pump reflects any pressure between the two sets of seals in the pump in case of primary seal failure. Normally this gage should be reading “0 psi” and should show no movement. If the gage shows a sudden swing upward in pressure with each stroke of the pump, this is an indication that the pump should be rebuilt due to primary seal damage.

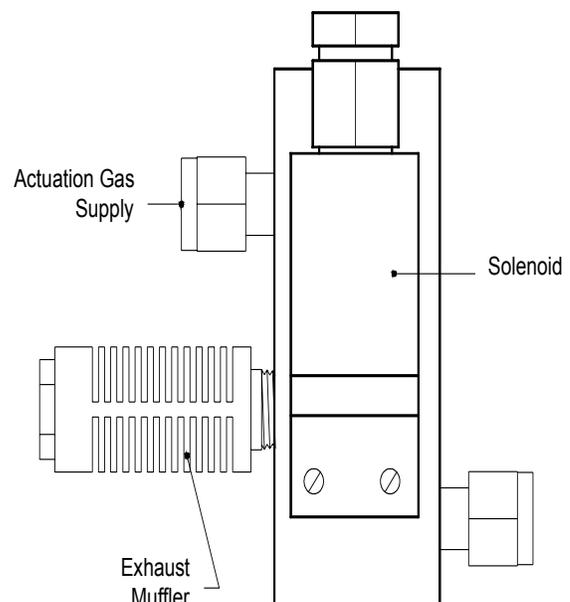
Actuation Gas Manifold:

The actuation gas manifold houses the actuation gas supply connection and the pneumatic exhaust connection for the 610G system. These openings are located on the left side of the mechanical enclosure and are ported through the enclosure wall. The upper manifold connection is for the actuation gas supply, while the lower connection is for the exhaust connection. The actuation gas manifold also serves as the mounting location for the solenoid valve.

Figure 19



Figure 20



SECTION 8: SYSTEM MAINTENANCE

Preventative Maintenance Schedule Recommended Spare Parts List

A preventative maintenance program serves to anticipate maintenance issues prior to waiting until the system requires service. Like changing the oil & filters in an automobile, by choosing to service the various parts and operation in the NJEX System at regular intervals, the technician can perform the maintenance service when desired, rather than when required, such as in the middle of night.

Part #	Description	Recommended Quantity
A4-0003	3-way solenoid valve	1
C4-0133	NJEX gas filter replacement filter element	1
D3-0140	Model 6000B pump seal replacement kit	1
D3-0142	Z-65/200 fuse replacement kit	1
E3-2001	LBP-14 internal Z-65 battery	1

The key is to perform maintenance before it is required. The preventive maintenance schedule implemented should consider the application of the odorizer. Many of these considerations include: the weather environment, the condition of, the actuation gas, the odorant and the odorant bulk storage tank, and the pump stroke frequency. All of these issues must be considered when establishing a preventative maintenance schedule.

Recommended Maintenance Schedule

Weekly Inspection

1. Verify gas pressures
2. Check for gas and odorant leaks
3. Visually inspect for obvious external problems

Semi-Annual Inspection

1. Inspect overflow protector and service as needed
2. Inspect tube fittings and valve packings for leaks.

Annual Inspection

1. Change filters
2. Rebuild pump
3. Replace solenoids
4. Test regulators and service, as needed
5. Condition the odorant, as needed
6. Test the NJEX System performance.
7. Replace the battery (More frequent replacement may be required if the odorizer strokes more than 5 times per hour)

SECTION 9: 610G SYSTEM TROUBLESHOOTING

How to Use This Section

The recommendations contained in this section should be used as a preliminary information resource to remedy operational issues with the NJEX System. It is important to read all of the definitions and notes prior to initiating work. Each sub-section contains a description of the alarm and non-alarm indicators followed by a step-by-step trouble shooting procedure. Assistance is available 24 hours a day, 7 days a week, 365 days a year, via the telephone numbers listed above.

For Additional Help

Any issue that can not be resolved through the use of this reference, please contact YZ Technical Service at:

T: 1.800.653.9435

T: 1.281.362.6500, International Calls

E: Techsupport@yzhq.com

Assistance is available 24 hours a day, 7 days a week, 365 days a year, via the telephone numbers listed above

SAFETY NOTES

- Always use extreme care when performing maintenance on an odorization system. Check to ensure the removal of liquid odorant and pressure from the portion of the system on which work will be performed prior to removing components or fittings.
 - Inspect all tube fittings and valve packings semi-annually to ensure that liquid odorant remains within the system.
-

Step-by-Step Resolution

Using a step-by-step method to resolve issues on the NJEX System will reduce maintenance time and assist in returning the odorization system to service quicker.

The following represent the recommended chronology to resolve issues:

1. Re-establish the correct pressures
 - a. Bulk Storage Tank, 10 psi (0.7 Bar)
 - b. Actuation Supply, 30-60 psi (2.1 - 4.1 Bar), refer to [Table 1, Page 5](#).
2. Verify that the odorant storage tank has sufficient odorant in it to supply the NJEX 610G with odorant.

SECTION 9: 610G SYSTEM TROUBLESHOOTING

Battery Power

The Z-65 controller and the low powered solenoid are normally powered by the Z-65 Battery assembly. The battery assembly is not a rechargeable type battery. Under normal conditions this battery may last 2 years. A built in warning LED is provided to advise the operator when the battery needs changing.

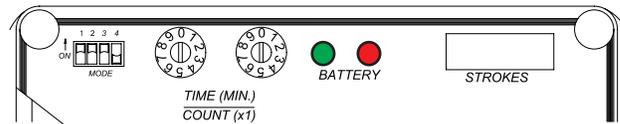
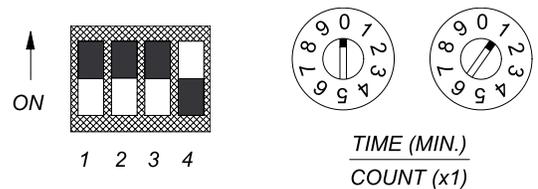
Battery Power Troubleshooting Steps

1. **Set** the mode switches 1, 2, 3 to ON and 4 to OFF as shown.
2. **Set** the **time switches** to the 01 position. This will set the solenoid output rate to one actuation every one minute (based on the factory set time range for the Z-65 model, refer Figure xx, page xx)
3. Depress the **test switch** to test the battery. A green LED will illuminate if the battery is good and a red LED will illuminate if the battery is low.

NOTE: Time switches must not be in 00 position to test the battery.

NOTE: The solenoid must be connected to test the battery condition. Battery condition cannot be tested with a volt meter.

Figure 21



SECTION 9: 610G SYSTEM TROUBLESHOOTING

Proportional-To-Time Mode

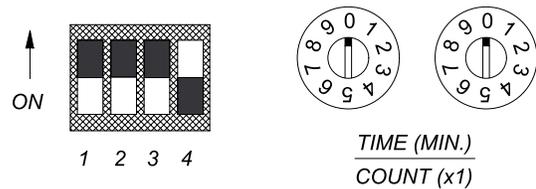
If the Z-65 controller is to be operated in the timer mode, it acts as a simple recycling timer. Set up is detailed in [Section 6, page 13](#). If a sample is not taken when expected in this mode the following should assist in restoring the sampler to proper operation.

Proportional-To-Time Mode Troubleshooting Steps

Mechanical Operation Test:

1. **Set** the mode switches 1, 2 and 3 to ON position and 4 to OFF.
2. **Set** the time switches to 00 to enter the diagnostic mode. This mode enables the user to increase the solenoid output rate to one pulse every two seconds.

Figure 22



LCD Stroke Indicator Test Mode:

1. **Set** the mode switches 1, 2 and 3 to ON position and 4 to OFF.
2. **Set** the time switches to 00.
3. **Unscrew** the thumbscrews and **remove** the six position terminal strip and cover. This will expose the battery pack and the three position configuration jumper (located in the lower right corner of the Z-65 controller assembly).
4. **Set** the configuration jumper to the far right position marked stroke indicator test as shown.
5. This will cause all six digits to become active on the stroke counter. **Depress** the reset. The stroke counter should increment 000000, 111111, etc., up to 999999 each time the solenoid fires. When the counter display reads 999999, the test is complete.

Figure 23

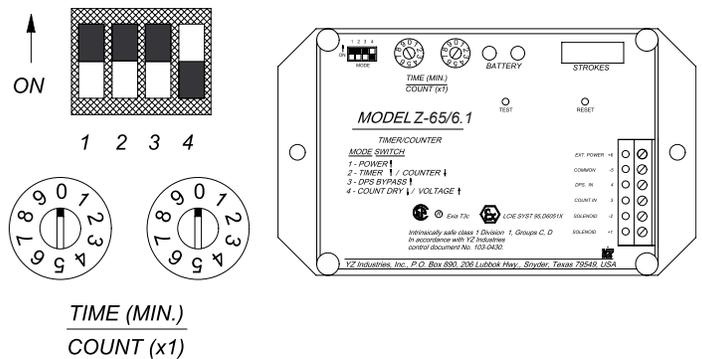
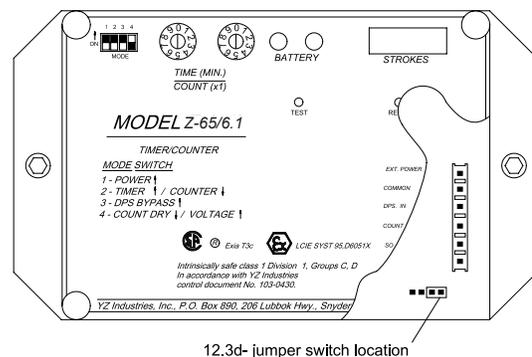


Figure 24



NOTE: When the test is complete, move the jumper back to the factory position (far left position).

SECTION 9: 610G SYSTEM TROUBLESHOOTING

Proportional-To-Time Mode

Timer Range Setting:

The Z-65 timer mode has two ranges for the timer setting dials.

1. Range Setting xx minutes: Set the configuration jumper to the far left position (factory setting), as shown.
2. Range Setting x.x minutes: Set the configuration jumper to the center position, as shown.

NOTE: To obtain maximum battery life, choose the longest solenoid stroke rate possible.

Figure 24

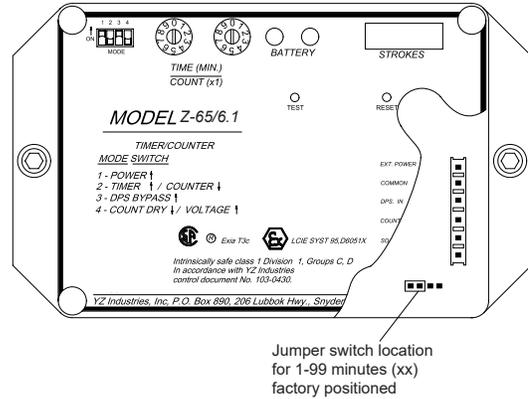
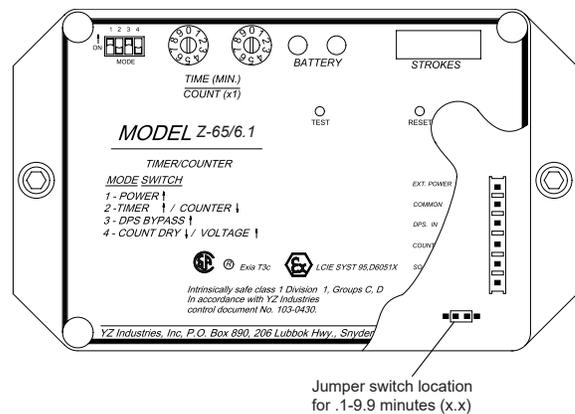


Figure 25



SECTION 9: 610G SYSTEM TROUBLESHOOTING

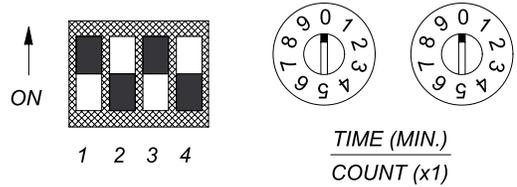
Proportional-To-Flow Mode

If the Z-65 controller is to be operated in the counter mode, an input pulse from some other flow monitoring device must be received by the Z-65. These pulses are then totalized, and the low powered solenoid is energized when a sample is needed.

Proportional-To-Flow Mode Troubleshooting Steps

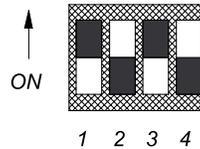
1. **Set** the mode switches 1, 3 to ON and 2, 4 to OFF position as shown.
2. **Set** the count switches to 00 to enter the diagnostic mode as shown. This mode enables the user to determine if the proper input pulses are being received at the count input (ter. #3).

Figure 26



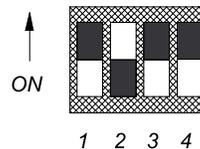
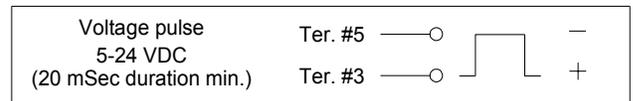
- A. **Dry Contact Input:** Mode switch 4 should be in the off position as shown. **Depress** the test switch and **hold**. A red LED should illuminate. When the dry contact input is received at the counter input (ter. #3) the green LED will turn on and off and the red LED will illuminate again. This will normally occur very quickly and give the appearance that the green LED blinks on when the pulse input is received and removed.

Figure 27



- B. **Voltage Pulse Input:** Move mode switch 4 to the on position. **Depress** the test switch and **hold**. A green LED should illuminate. When the voltage pulse input is received at the count input (ter. #3) the red LED will turn on and off and the green LED will illuminate again. This will normally occur very quickly and give the appearance that the red LED blinks on when the pulse input is received and removed.

Figure 28



SECTION 9: 610G SYSTEM TROUBLESHOOTING

Troubleshooting: Pump Performance

1. Verify operating conditions. Correct as needed.
2. Check to see if the pump operation sounds the same as previously. A distinct bottoming of the plunger piston and a return to the top of the plunger piston housing should be audible with each actuation. If not, remove the actuation cylinder. Inspect for a broken return spring, or a stuck / sticking actuator piston or plunger. Replace the spring if broken. Clean and lubricate the actuation cylinder and actuation piston assembly. Manually push the plunger into the seal assembly and ensure it returns completely and freely. If sticking continues to occur, the seals should be replaced. Reassemble and see if alarm reoccurs after a system restart.
3. If pump actuation is normal:
 - a. Inspect the discharge lines and valves for a restriction.
 - b. Inspect all the check valves on the discharge side of the pump, from the NJEX System to the pipeline, for proper operation.
 - c. Verify that the operating conditions remain unchanged and correct as needed.
4. Verify that the actuation pressure remains unchanged from previous setting.
5. Verify that all valves and check valves are properly set for system operation. Inspect for valve settings that can restrict pump displacement.
6. Check the actuation gas filter for flow restriction or closure.
7. Ascertain whether the pump is properly stroking.
 - a. If pump actuation does not occur as the test key is pressed, remove the actuation gas line at the top of the pump and test the pump stroke again. As the Test key is pressed, there should be a burst of gas at the open actuation supply connection. If the gas is released from the open actuation supply line skip to subsection 7.e., otherwise continue to 7.b.
 - b. If solenoid discharge to the pump connection does not release gas, remove the pump solenoid wiring cable. Next connect a volt meter to the two parallel posts of the solenoid cable. As the Test key is pressed, observe if a 12VDC current becomes present. If a voltage is detected the solenoid should be replaced.
 - c. If the above test indicates the solenoid is functioning, next determine if the signal is being sent by the controller, or lost in the cabling and connections. Go to the Z-65 Controller terminal strip and connect your volt meter, to terminals 1 and 2, with 1 being the positive wire and 2 being the negative wire. Now, test fire the pump with the test switch. A momentary voltage pulse, approximately .2 seconds in duration, should be observed. This will be a DC voltage pulse, approximately 12VDC. If the pulse is at the termination strip, next check the polarity of connections of the wiring. Try reversing the terminal wiring connections for the terminals #1 and #2, and repeat steps 7a and 7b. If this does not correct the problem the cable assembly to the solenoid should be replaced.
 - d. If no voltage is detected, check the fuses located under the face plate of the Z-65, and replace as necessary.

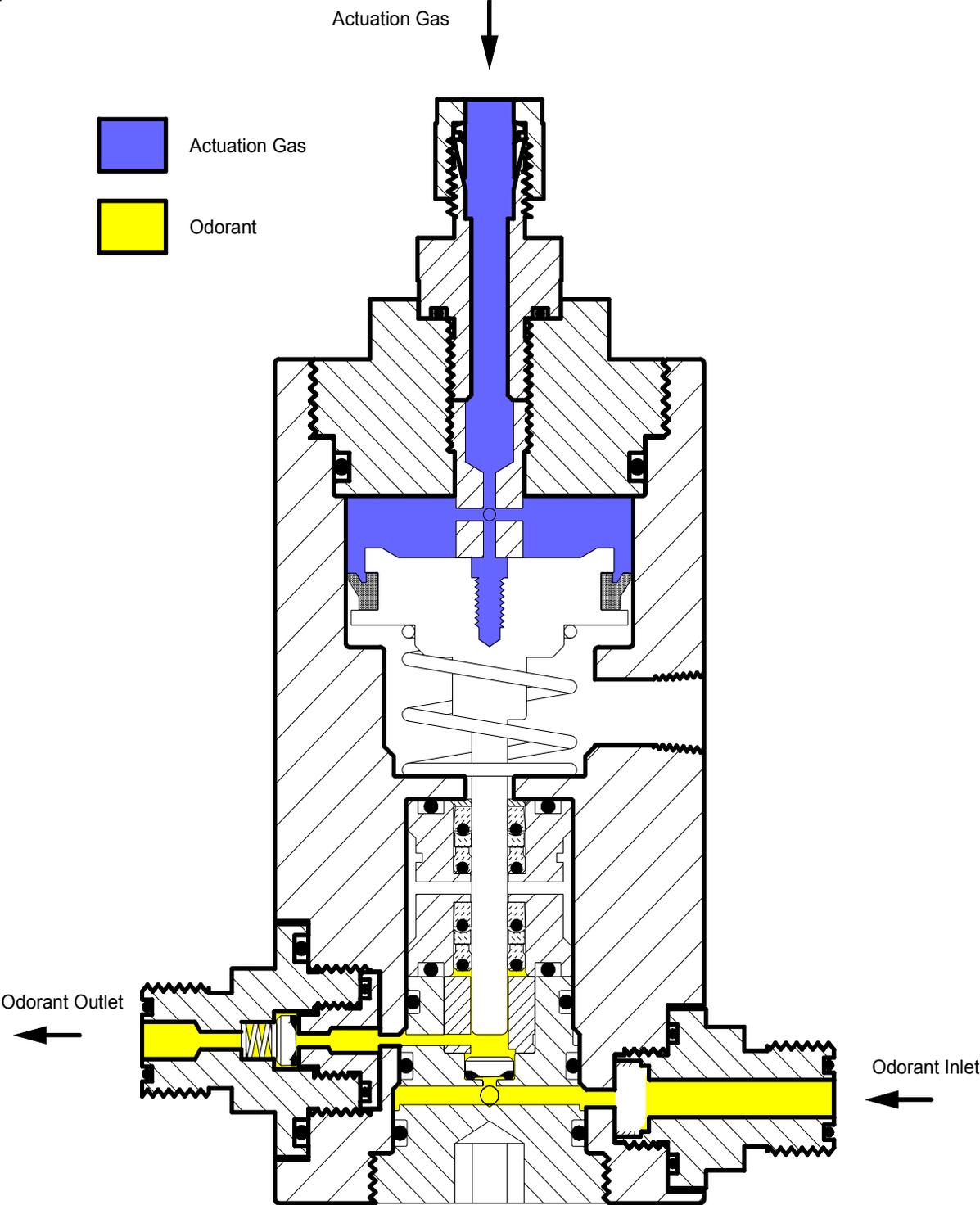
SECTION 9: 610G SYSTEM TROUBLESHOOTING

- e. With the actuation gas line reconnected to the pump, test stroke the pump. Observe if there is an audible pump stroke with the piston bottoming out and returning to the top of the pump housing. If an audible pump actuation is not present, remove the actuation cylinder and inspect for a broken return spring, or a stuck / sticking plunger assembly. Replace the spring if broken, clean and relubricate the plunger assembly and actuation cylinder. Make certain the seals are not sticking to the plunger assembly.
8. If problem persists, contact YZ technical service for additional assistance.

APPENDIX A: ILLUSTRATIONS

NJEX Model 6000B pump Assembled

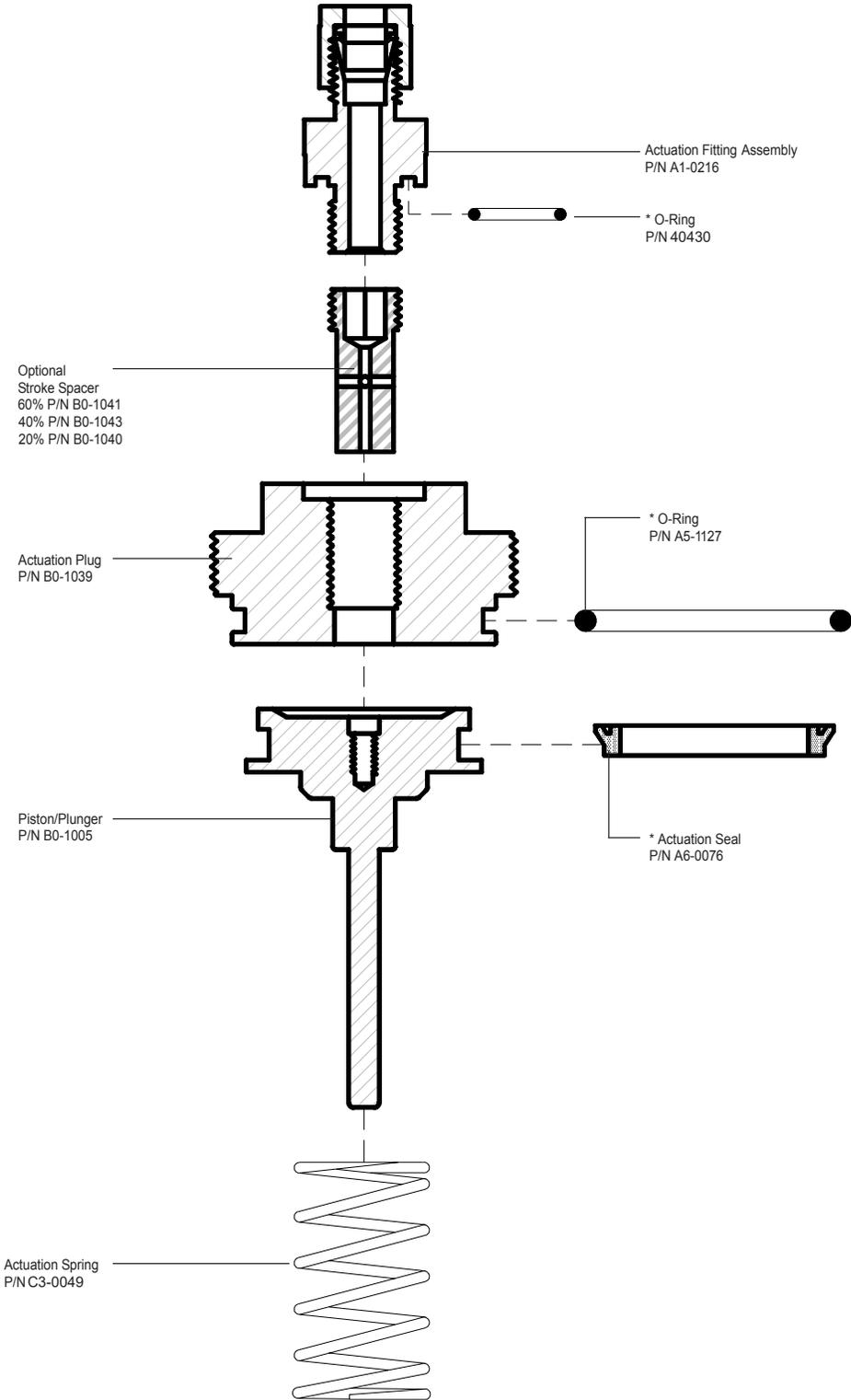
Figure 29



6000B Pump Repair Kit (P/N D3-0140)

APPENDIX A: ILLUSTRATIONS

Figure 30

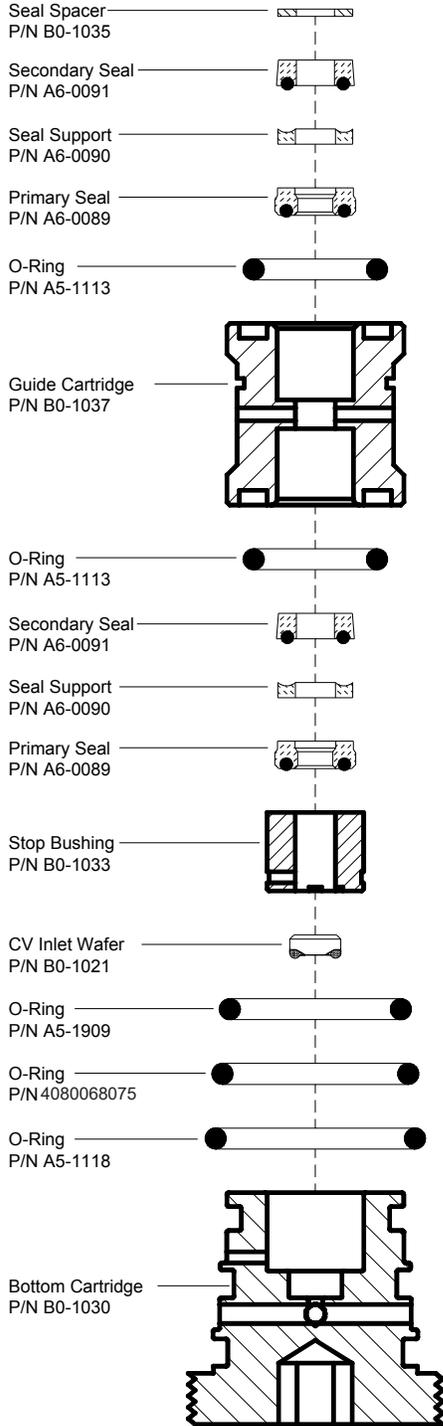


*6000B Pump Repair Kit (P/N D3-0140)

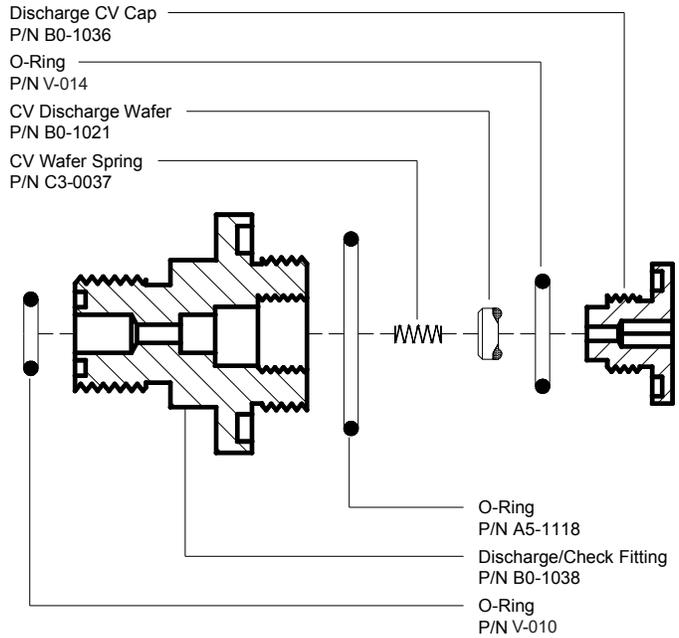
APPENDIX A: ILLUSTRATIONS

Figure 31

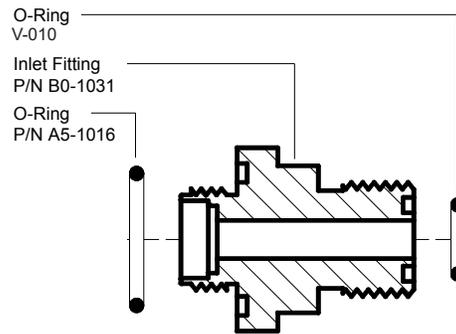
PLUNGER SEAL ASSEMBLY



DISCHARGE CHECK ASSEMBLY



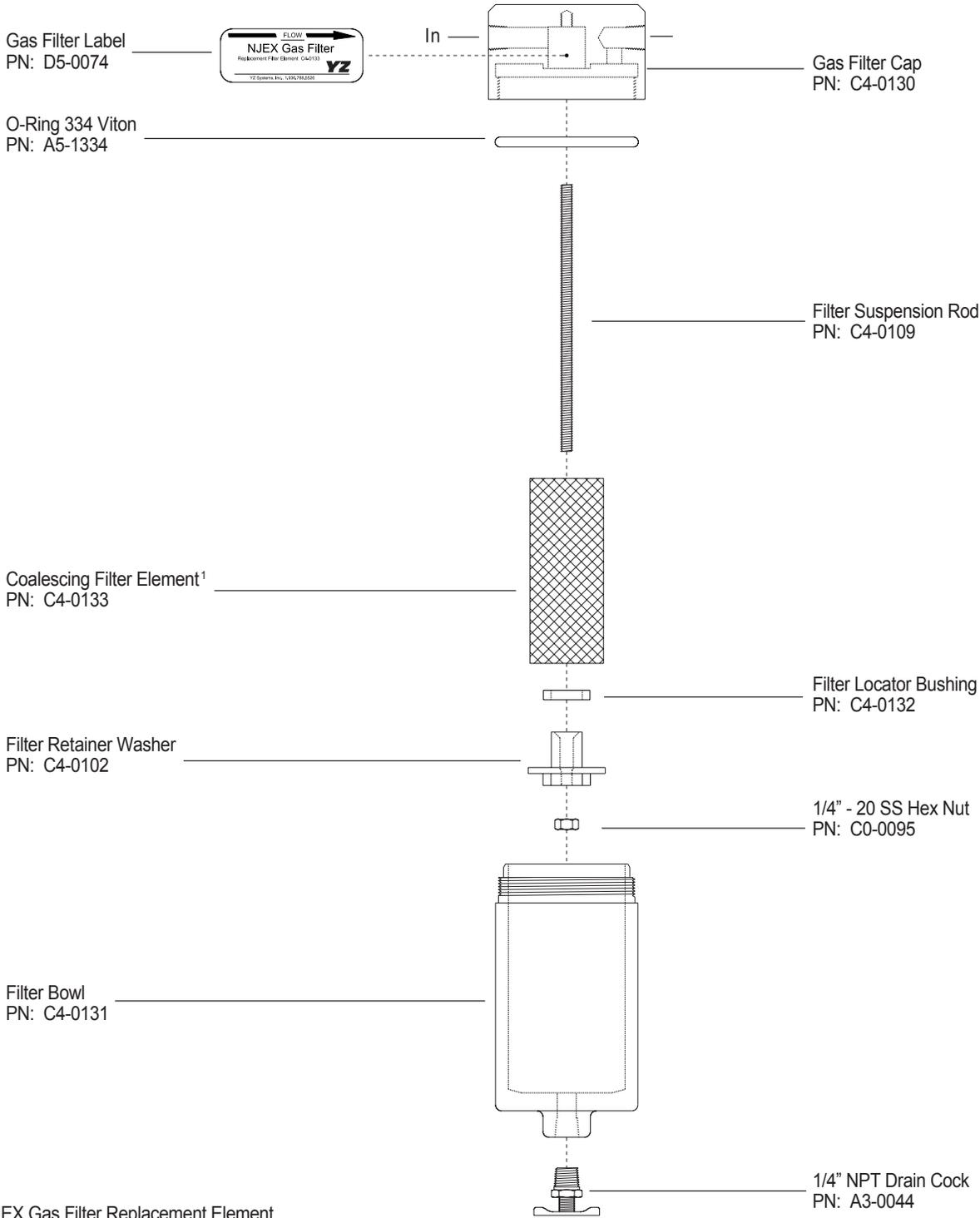
INLET ASSEMBLY



*6000B Pump Repair Kit (P/N D3-0140)

APPENDIX A: ILLUSTRATIONS

Figure 32

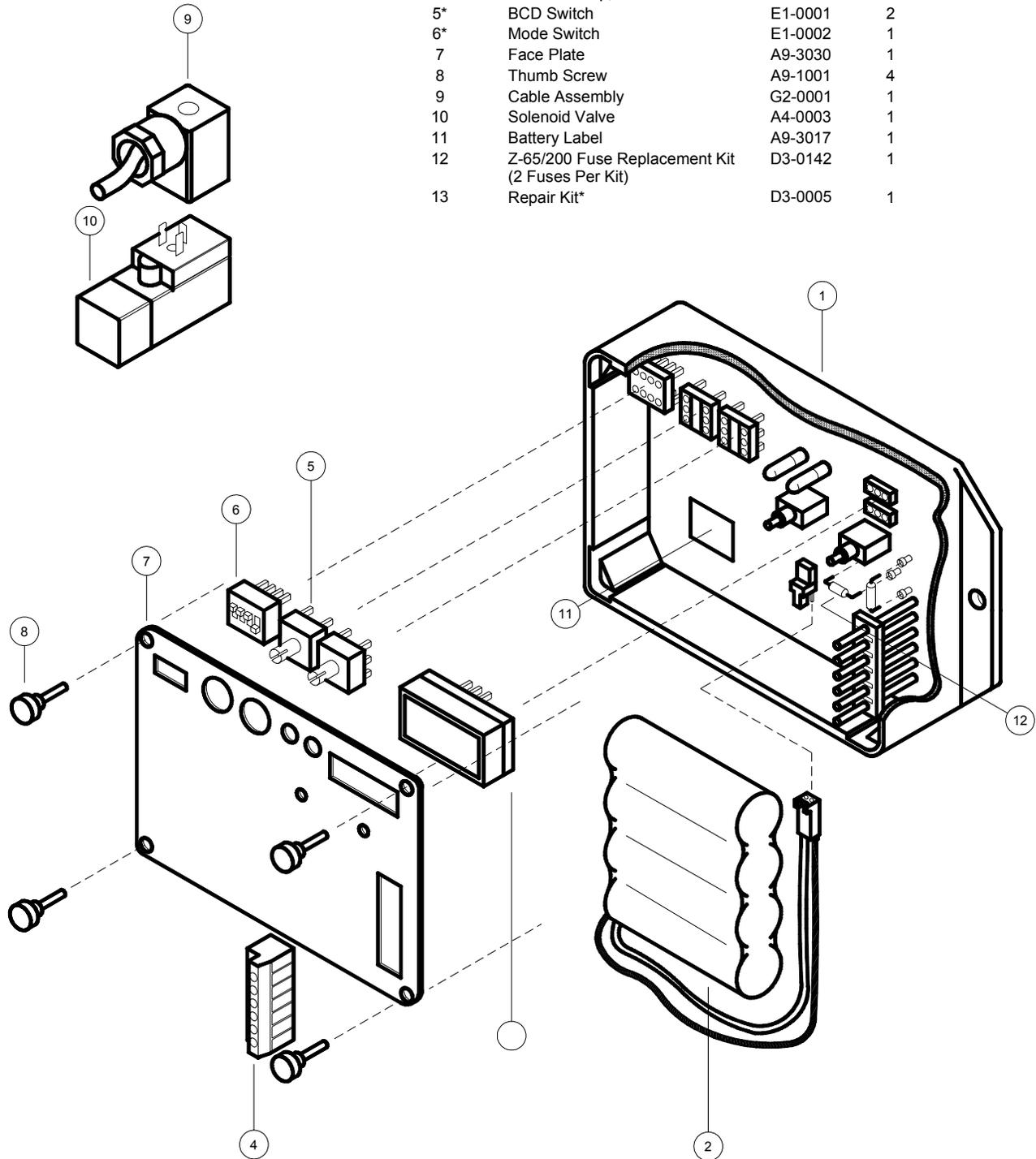


¹ NJEX Gas Filter Replacement Element
PN: C4-0133

APPENDIX A: ILLUSTRATIONS

Figure 33

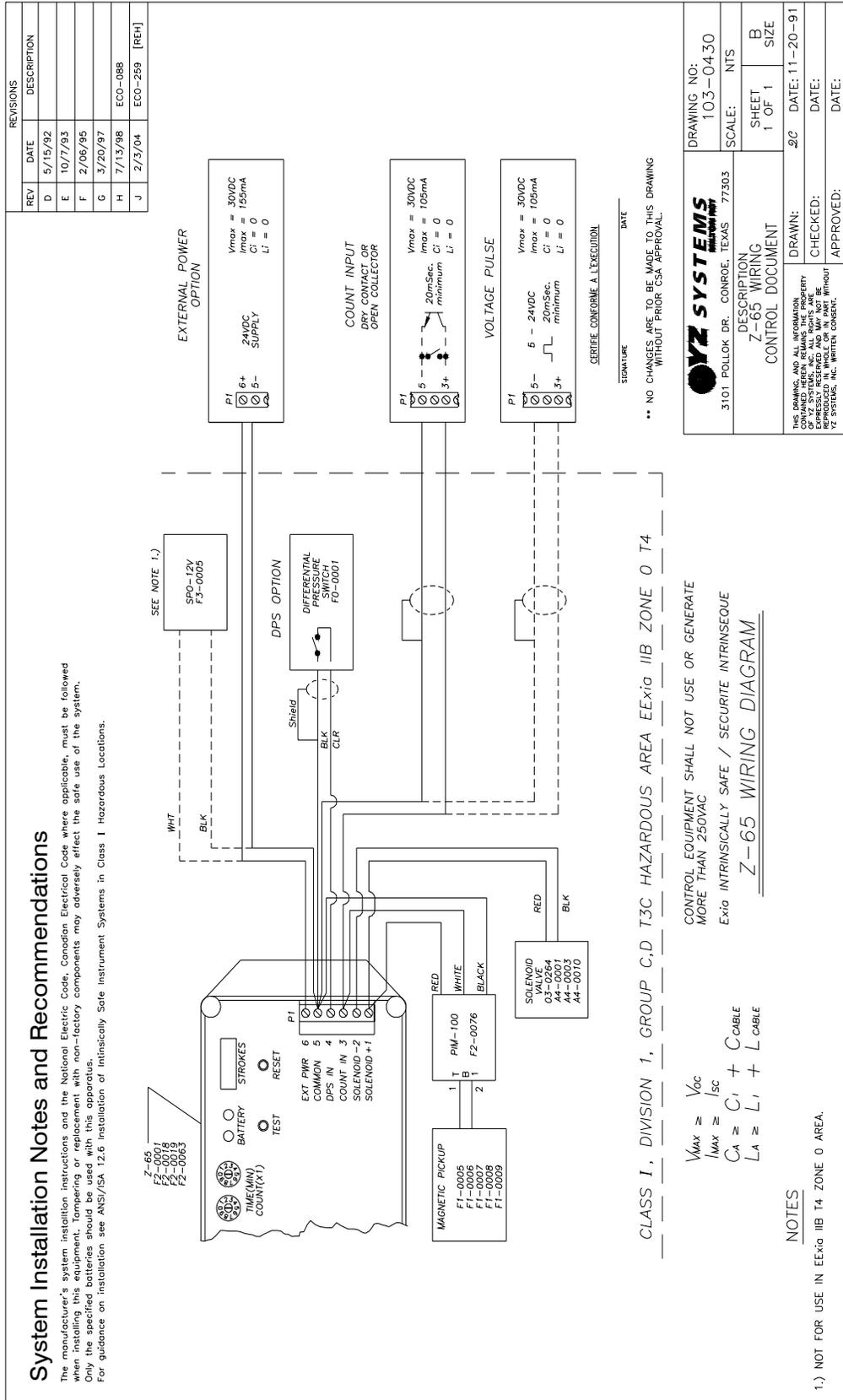
Ref. No.	Description	Part No.	Qty.
1	Z-65/6.1 10 Controller Assembly	F2-0001	1
2	Battery Pack	E3-2001	1
3*	Stroke Counter Assembly	G1-0001	1
4*	Terminal Strip, 6 Position	H1-0001	1
5*	BCD Switch	E1-0001	2
6*	Mode Switch	E1-0002	1
7	Face Plate	A9-3030	1
8	Thumb Screw	A9-1001	4
9	Cable Assembly	G2-0001	1
10	Solenoid Valve	A4-0003	1
11	Battery Label	A9-3017	1
12	Z-65/200 Fuse Replacement Kit (2 Fuses Per Kit)	D3-0142	1
13	Repair Kit*	D3-0005	1



APPENDIX A: ILLUSTRATIONS

Z-65 Wiring Control Document

Figure 34





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