DynaPak Gas Sampler

SYSTEM SUPPORT MANUAL

DP-2020ARXN

DynaPak 2020 ARXN System Support Manual

Version 03162005

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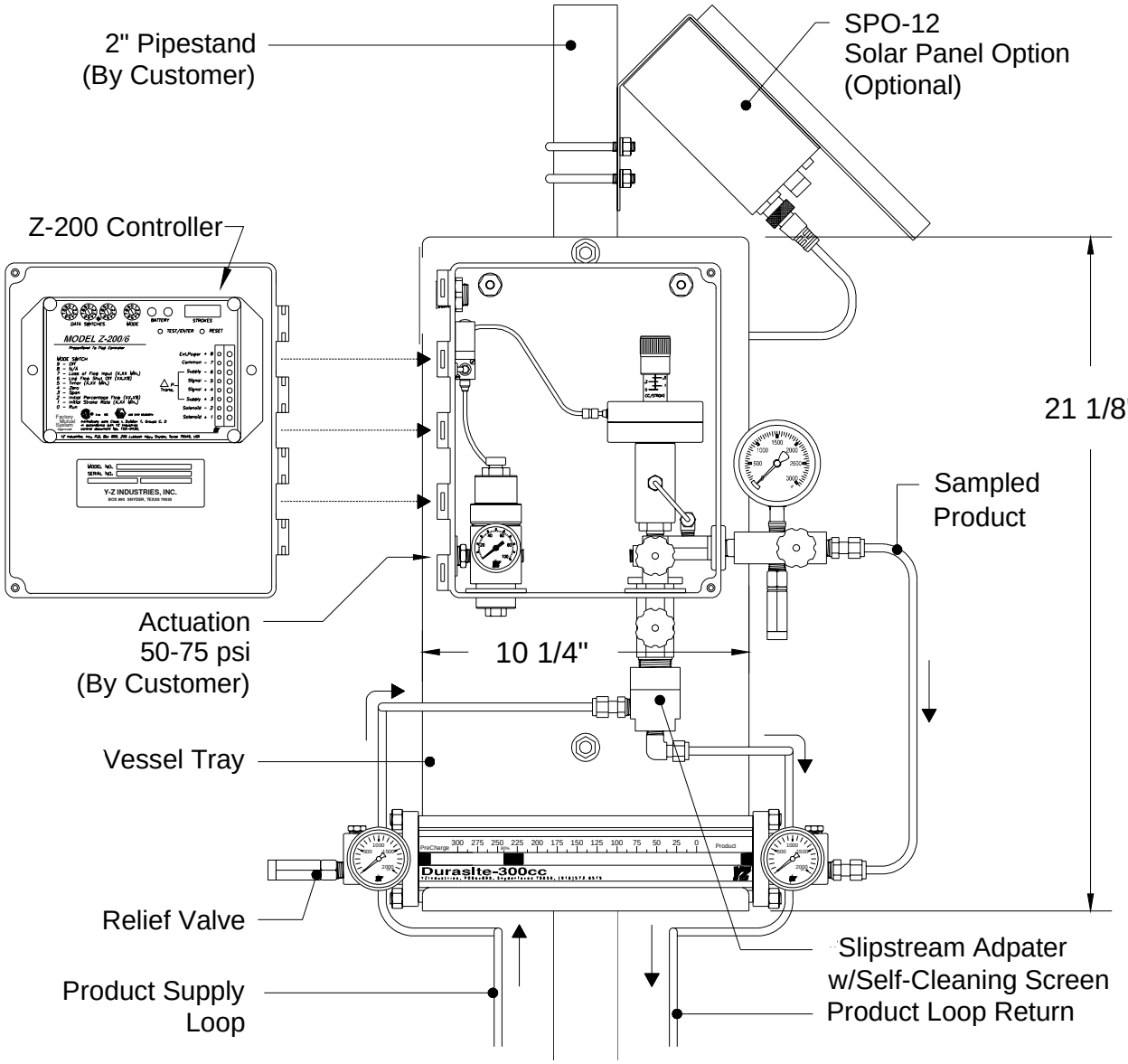
1. Introduction

Congratulations on your purchase of the DynaPak 2020 Sampler.

Before installation, insure that all of the components are present. You may or may not have ordered a sample cylinder with your DynaPak System. Regardless, you will need a cylinder during installation. If you have any questions about installation/operation, contact your YZ representative or YZ Customer Service at 936.788.5593.

2. System Components

The primary components of the DynaPak 2020 Sampler are illustrated here.



3. Theory of Operation

DynaPak 2020 Gas Sampler

The DynaPak 2020ARXN Sampler is a remotely mounted mounted sampling system which uses the pneumatically operated, positive displacement DynaPak 2000 pump, the Z-200 timer/controller, a special differential pressure transmitter, the YZ filter/regulator and a low power solenoid valve to obtain gas samples. The 2020 has two modes of operation:

A. Proportional-to-flow sampling: in this mode of operation, the 2020 extracts a gas sample from the pipeline at time intervals proportional to the pipeline flow rate. The volume of the sample is set by the operator using the volume adjustment feature of the DP-2000 pump. The Z-200 periodically energizes a low power solenoid valve, which allows actuation gas to stroke the DP-2000 pump.

The DynaPak 2020 uses a Rosemount differential pressure transmitter to convert the pressure signal into a 1 - 5 VDC output signal. The Z-200 controller uses this 1 - 5 VDC signal to determine the percentage of flow that is present in the pipeline.

The Z-200 operates as a recycling timer with exception that the off time is adjusted to account for variations in pipeline flow conditions, as indicated by the pressure differential transmitter. In the event that flow increases in the pipeline the time between solenoid actuations will be shortened. If the flow in the pipeline decreases the time between solenoid actuations will lengthen. This allows the time between solenoid actuations to be directly proportional-to-flow in the pipeline.

B. Proportional-to-time sampling: in this mode of operation, the Z-200 controller operates as a recycling timer, energizing the solenoid valve at an interval pre-selected by the operator. As in the other mode of operation, solenoid actuation allows the DP-2000 pump to stroke.

In either mode of operation, the number of solenoid actuations is recorded by the onboard LCD indicator. The Z-200 timer/counter operates using a replaceable internal battery pack. The battery pack condition is monitored using 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.

The **External Power Option** can be used in lieu of the internal battery pack. The External Power Option (model No. EPO-120) consists of an AC to DC convertor and intrinsically safe barrier to convert 120 AC power to 28 VDC to operate the controller without the use of the internal battery pack.

The **Solar Power Option** would be used in lieu of the internal battery pack. The **Solar Power Option** (model #SPO-12) consists of a 5 watt solar panel with RM-12 charger regulator module and internal 12V, 5 Amp hour battery pack.

4. Sample Probe Location and Installation

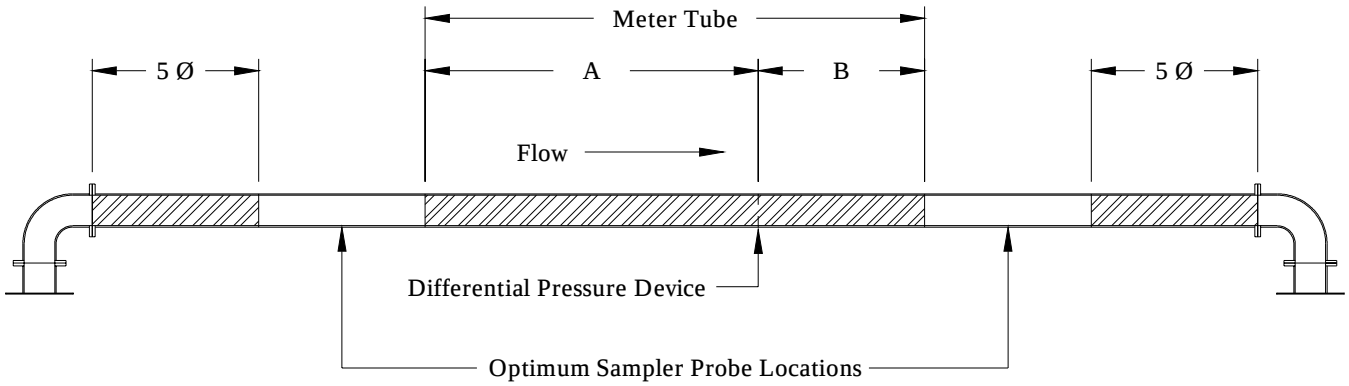
4.1 The sample probe should be a minimum of five pipe diameters from any device which could cause aerosols or significant pressure drops.

4.2 The sample probe should not be located within the defined meter tube region (AGA 3-1985 ED.).

4.3 The sample probe should be located upstream of the differential pressure device.

4.4 The end of the sampler probe should penetrate the center 1/3rd of the pipeline.

4.5 The end of the sample probe should be cut parallel to the pipeline.



A = The number of unobstructed, straight pipe diameters upstream (see AGA - 3 manual).
B = The number of unobstructed, straight pipe diameters downstream (see AGA - 3 manual).

5. System Installation

5.1 DynaPak 2020 With Slipstream Kit

a. Mount the DP-2020 with slipstream kit on a vertical 2" pole.

b. Connect the slipstream adapter to the pipeline product supply and product return connections as shown in the diagram.

c. Connect the actuation gas supply (50 - 65psi) to the actuation gas connection located on the left hand side of the sampler.

d. Connect the sample out connection to the sample vessel.

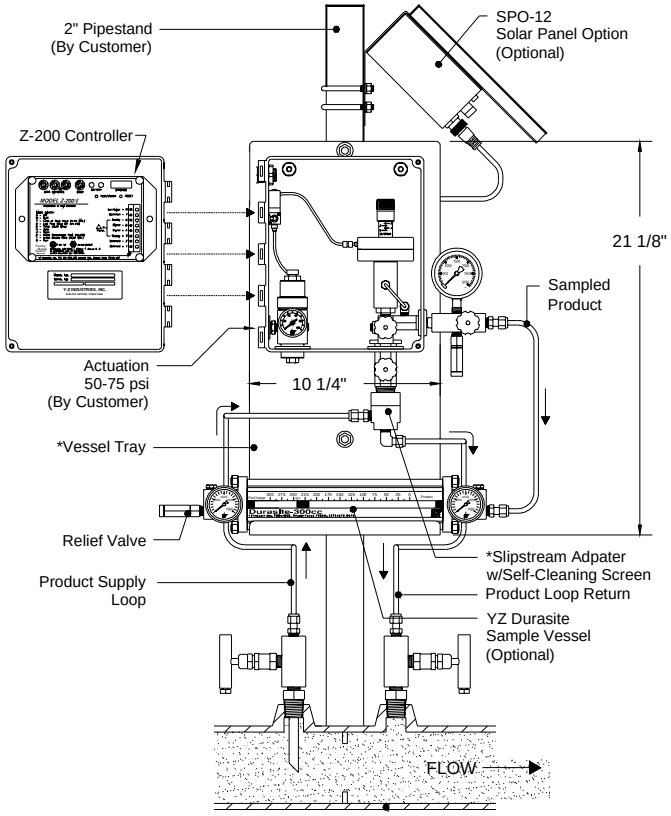
e. Wire the Z-200 to the flow input device (DPT) to be used. Wiring instructions are found in sections 12 and 13.

f. Before applying pipeline pressure to the DP-2020, ensure that the product supply valve is closed.

g. After pipeline pressure has been applied to the sampler, check the slipstream tubing connections for leaks.

h. Open the product supply valve.

i. Follow the "Operational Check and Leak Testing Procedures" detailed in Section 7.



*Denotes Items Included in
DP-2020 Slipstream Adapter Kit

CAUTION:

Incorrect operation of valves (over tightening) can result in damage to the valve components (isolation valve bonnet assembly) which might result in the valve stem being screwed out of the probe body. This of course results in product at pipeline pressure being vented continually through this port until this section of the pipeline is shut in. Be aware of the following procedures and information.

· DynaPak valves are of soft seat design and should only be closed or opened with fingers. No wrenches should ever be used.

·If a valve will not seal off with finger tight operation the valve should have maintenance performed to allow proper operation of the valve.

5.2 Differential Pressure Transmitter (DPT)

a. With the low pressure supply valve closed and the high pressure supply valve closed, connect the DPT to the orifice connection tubing.

b. Open the equalization valve.

c. Open the low pressure supply valve or the high pressure supply valve.

NOTE: Do not open either the low pressure supply valve or the high pressure supply valve without ensuring that the equalization valve is open.

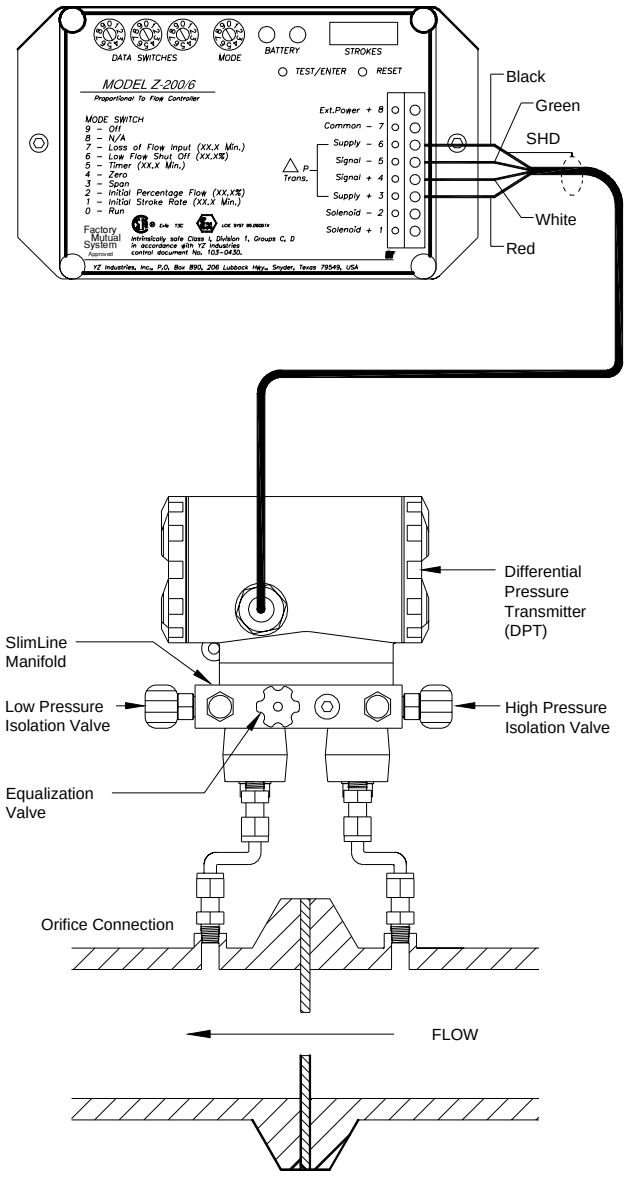
d. Open the other supply valve.

e. Close the equalization valve.

f. Run the free end of the DPT cable through the cable entry connector located on the upper left side on the DynaPak 2020 enclosure.

g. Connect the DPT cable as shown in the diagram.

h. Tighten the cable entry connector, allowing for enough cable length to open the enclosure.



Maximum Pressure 2000 PSIA

6. Sample Vessel Installation

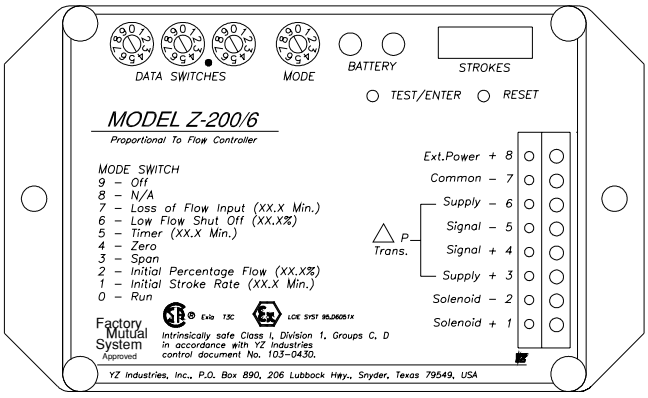
Variable volume/constant pressure cylinder.
A free-floating piston cylinder (DuraSite) may be installed in a horizontal position on an optional vessel rack. Free-floating piston cylinders should **NOT** be installed on the DynaPak BackRack vessel rack.

Install 1/8" tubing from the sample discharge port of the manifold to the product end of the vessel. Avoid traps in this line.

See diagram #9 for DuraSite portable sample vessel instructions.

7. Operational Check &Leak Testing

7.1 When all of the tubing connections have been completed, close the purge valve on the front of the sampler probe body. Open the sample probe supply valve to allow pipeline pressure into the sampler. Check all connections using a liquid leak detector.

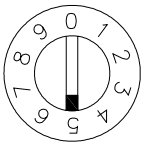


7.2 Adjust the filter/regulator from the following ranges:

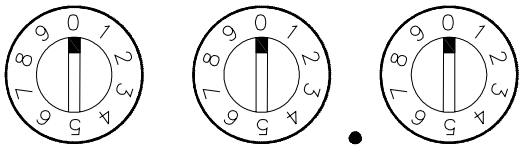
Pipeline Pressure	Actuation Pressure
Under 700 psig (48 Bar)	50 psig (3.5 Bar)
Over 700 psig (48 Bar)	65 psig (4.5 Bar)

7.3 Turn the stroke adjustment knob on the top of the pump counterclockwise to set the pump displacement at .4 cc/ stroke.

7.4 Set the mode switch to position #5.



7.5 Set the data switches to 00.0 to enter the diagnostic mode of operation.



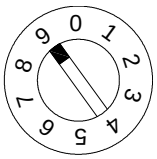
7.6 Depress the enter switch to load the value into memory.

7.7 Pump actuation will begin as the solenoid valve is energized by the Z-200. In this mode, pump actuation should occur every two seconds.

7.8 Each time the solenoid actuates, the LCD stroke indicator on the Z-200 should increment.

7.9 Allow the sampler to operate until the desired stabilized pressure is achieved at the sample discharge.

7.10 Return the mode switch to position 9 (off position).



7.11 Check all connections from the sampler discharge to the connection on the sample cylinder and the connection from the pump to the manifold at the discharge tubing using a liquid leak detector.

7.12 If no leaks are found, the pump and tubing should be considered tested and functional.

8. Sampler Set-Up

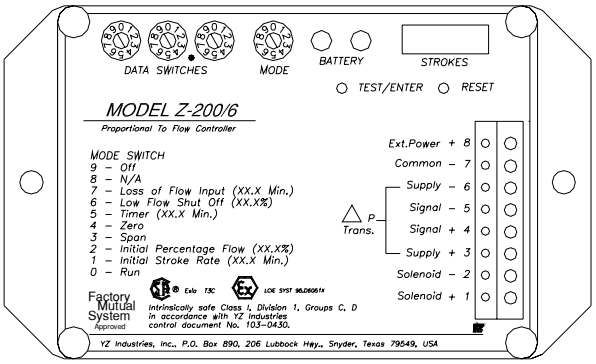
Proportional-to-flow sampling

In this mode of operation, the Z-200 uses two operator inputs in conjunction with the 1 - 5 VDC flow input to vary the time that will transpire between pump strokes.

8.1 Adjust the pump volume adjustment knob to the value used in the calculation in step 9.1.

Sample pump displacement per stroke	Number of turns open on the pump volume knob
.1cc	3
.2cc	6
.4cc	12

In order for the Z-200 controller to operate in the proportional-to-flow mode of operation it will be necessary to enter the following parameters:



8.2 Loss of flow input:
(XX.X min) Mode #7 Default 20.0 min

The loss of flow input setting is a predetermined amount of time that the operator would like to see transpire between pump strokes in the event that the 1 - 5 VDC flow input signal is lost.

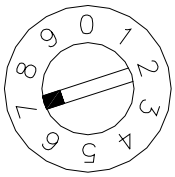
To set the loss of flow input:

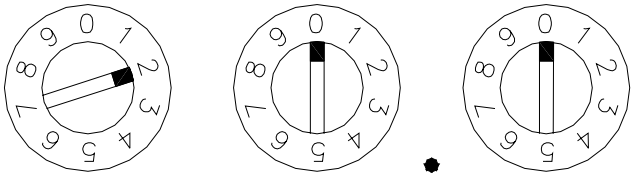
1. Set the mode switch to position #7.
2. Set the data switches to the desired time in minutes XX.X minutes.

   Ex: 20 minutes = 20.0

3. Depress the enter switch to load the value into memory.

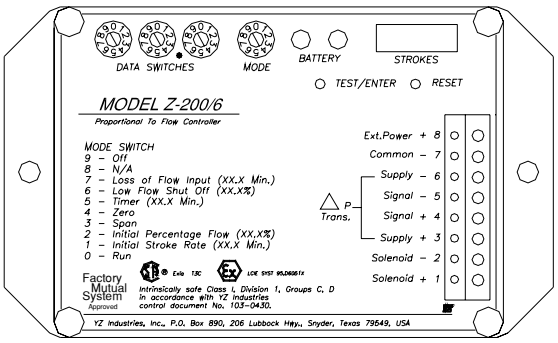
NOTE: the green LED will flash if entry is accepted; the red LED will flash if not accepted.





NOTE: Time (20.0 minutes) above corresponds to dial setting shown for the Z-200.1 model. (For the Z-200.10, the time would be 2.00 minutes - the decimal moves one place to the left).

8. Sampler Set-Up



8.3 Low flow shut-off:

(XX.X%) Mode #6 Default 2.0%

The low flow shut-off setting allows a preset point in % of flow to be set that the operator would like the Z-200 to stop operating. This allows thecontroller to sense low flow conditions that might exist in the pipeline where operation of the Z-200 controller is not wanted. When flow again increases above this point the Z-200 will again resume operation.

To set the low flow shut-off:

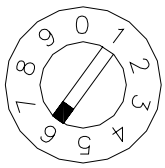
1. Set the mode switch to postion #6.

2. Set the data switches to the desired % flow XX.X%.

   Ex: 2% = 02.0

3. Depress the enter switch to load the value into memory.

NOTE: the green LED will flash if entry is accepted; the red LED will flash if not accepted.



8.4 Zero calibration:

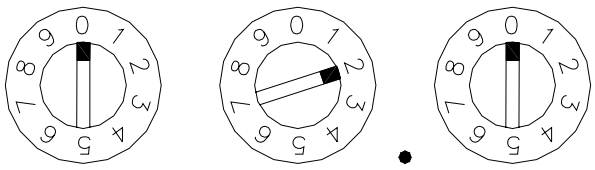
Mode #4 (1.00VDC @ 0% of metered flow)

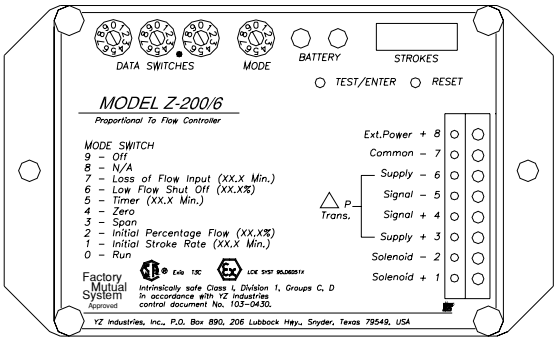
The zero calibration adjustment is used to calibrate the Z-200 controller for 0% of metered flow in the pipeline (1 VDC). The Z-200 controller is calibrated at the factory for 0% of flow to directly correspond to 1.00VDC at the flow input terminals #4, #5.

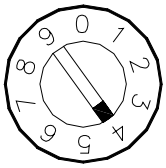
To set zero calibration:

1. Set the mode switch to position #4.
2. Apply 1.00VDC to the terminal strip terminal #4 (+signal input); terminal #5 (-signal input) (if a DPT is being used, output from the transmitter should be 1.00VDC @ 0" (0 cm) differential pressure. See section 13.3 (DPT calibration).
3. Depress the enter switch to load the zero setting into memory.

NOTE: the green LED will flash if entry is accepted; the red LED will flash if not accepted.

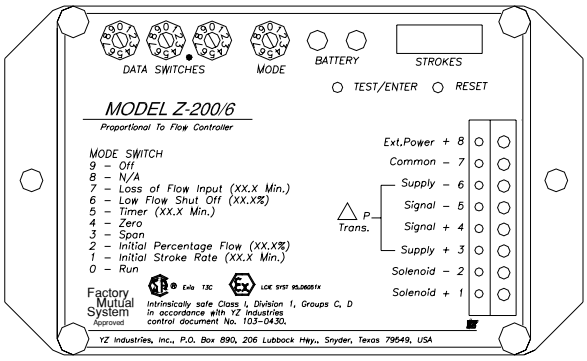




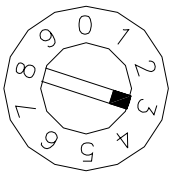


8. Sampler Set-Up

8.5 Span calibration:
Mode #3 (5.00VDC @ 100% of metered flow)
The span calibration adjustment is used to calibrate the Z-200 controller for 100% of metered flow in the pipeline (5VDC). The Z-200 controller is calibrated at the factory for 100% flow to directly correspond to 5.00VDC at the flow input terminals #4, #5.



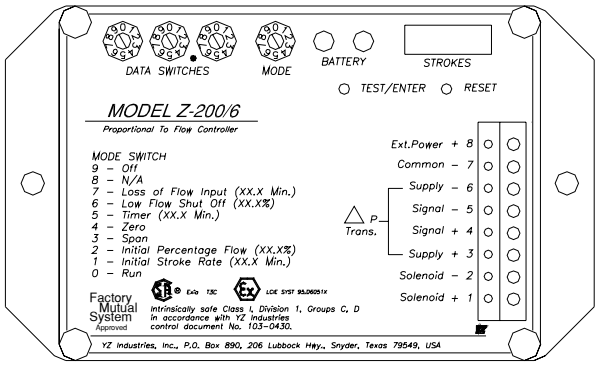
To set the span calibration:
1. Set the mode switch to postion #3.
2. Apply 5.00VDC to the terminal strip terminal #4 (+signal input); terminal #5 (-signal input)
(if a DPT is being used, output from the transmitter should be 5.00VDC @ maximum range of meter. Ex.: 5.00 VDC @ 100" (254 cm) water differential pressure, See section 13.3 DPT calibration).
3. Depress the enter switch to load the span setting into memory.



NOTE: the green LED will flash if entry is accepted; the red LED will flash if not accepted.

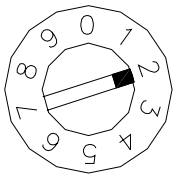
NOTE: for maximum accuracy, after setting the span, return to zero calibration section and repeat both zero and span procedures in that order.

8.6 Initial percentage flow:
(XX.X%) Mode #2 Default 50.0%
The initial percentage flow shoud be set by the operator to the typical or average % of metered flow that exists in the pipeline. This should be based upon historical flow measurement records from the metering device being used. If the history is not known, use an anticipated value.

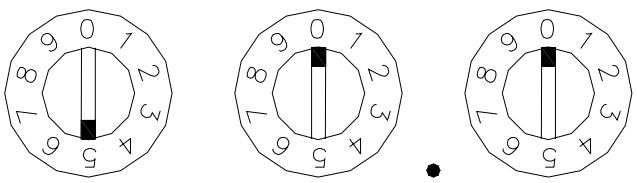


To set initial percentage flow:
1. Set the mode switch to position #2.
2. Set the data switches to the desired % of flow X.XX%.

Ex.: 50% = 50.0



3. Depress the enter switch to load the value into memory.
NOTE: the green LED will flash if entry is accepted; the red LED will flash if not accepted.



8. Sampler Set-Up

8.7 Initial stroke rate:
(XX.X min) Mode #1 Default 20.0 min
The initial stroke rate is set by the operator to the amount of time that would be desired to transpire between pump strokes if the % of flow measured in the pipeline was equal to that set in mode position #2 (initial percentage flow).

To set the initial stroke rate:
1. Set the mode switch to position #1.

2. Set the data switches to the desired time minutes X.XX min.

Ex.: 20 minutes = 20.0

3. Depress the enter switch to load the value into memory.

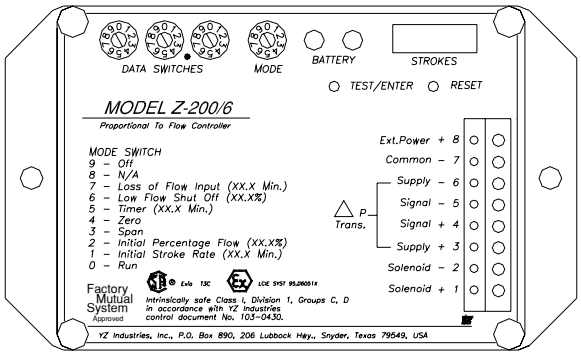
NOTE: the green LED will flash if entry is accepted; the red LED will flash if not accepted.

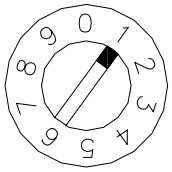
8.8 Run Mode: the run mode position is the position that the mode switch should be in to start the Z-200 controller in proportional-to-flow mode of operation. When in this mode of operation the Z-200 controller will monitor the flow input and adjust the time interval between pump strokes to be proportional to the % of flow measured in the pipeline.

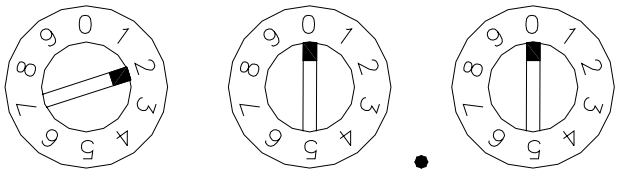
To start the Z-200 controller:
1. Set the mode switch to position #0.

2. Depress the enter switch to begin operation.

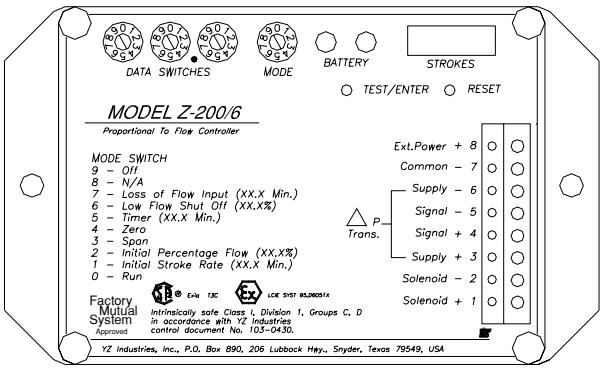
NOTE: if all parameters (mode #'s 7, 6, 4, 3, 2, 1) have not been entered properly, a red LED will illuminate and stay on and the controller will not start in the run mode position #0 when the enter switch is depressed. See the LED indicator chart in the trouble shooting section of the manual if the Z-200 controller does not seem to operate properly.

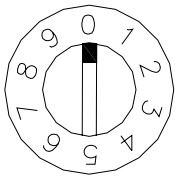






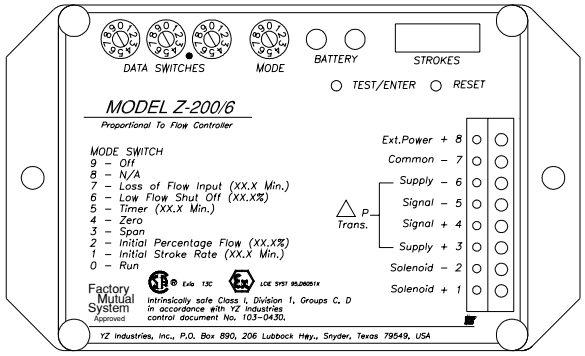
NOTE: Time (20.0 minutes) above corresponds to dial setting shown for the Z-200.1 model. (For the Z-200.10, the time would be 2.00 minutes - the decimal moves one place to the left).





9. Sampler set-up time-based sampling

The Z-200 controller operates as a recycling timer. The time between solenoid actuations is set by the operator and does not change in respect to pipeline flow conditions.



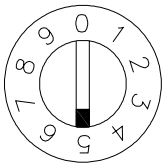
9.1 Calculate the sampling rate using the following 30 day chart:

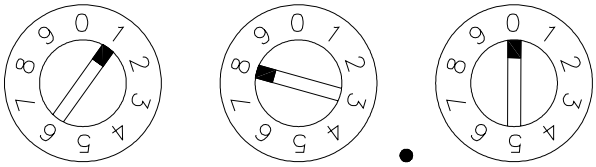
Number of turns open on pump stroke knob	sample pump displacement per stroke	Sample cylinder volumes		
		1000 cc	500 cc	300 cc
3	**.100**	**4**	**9**	**15**
6	**.200**	**9**	**18**	**30**
9	**.300**	**13**	**27**	**45**
12	**.400**	**18**	**36**	**60**

Sample rate (minutes)

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

9.2 Adjust the pump volume adjustment knob to the value used in the calculations in step 9.1.
9.3 Set the mode switch to position #5.
9.4 Set the data switches to the desired time in minutes XX.X minutes.
Ex.: 18 minutes = 18.0
9.5 Depress the enter switch to load the time into memory to start operation.
NOTE: see the LED indicator chart in the trouble shooting section of the manual if the Z-200 controller does not seem to operate properly.





NOTE: Time (18.0 minutes) above corresponds to dial setting shown for the Z-200.1 model. (For the Z-200.10, the time would be 1.80 minutes - the decimal moves one place to the left).

10. Sampler maintenance

10.1 Recommended preventative maintenance schedule
Every sampling situation is unique. Below are our recommendations for average conditions. A higher BTU content will necessitate more frequent pump/filter maintenance.

a. Clean and lubricate the sample pump every six months.

b. Check the filter element every six months replacing as necessary.

c. Test the battery monthly.

d. Test the system for leaks each time a fitting or connection has been made.

10.2 Cleaning and lubricating the DP-2000 pump

a. Close the isloation valve.

b. Disconnect the plastic tubing from the solenoid valve to the pump diaphragm housing by depressing the tubing release sleeve on the diaphragm housing fitting while pulling out the tubing. It is not necessary to remove the fitting from the diaphragm housing.

c. Remove the sample discharge (1/8" stainless steel tubing) from the pump body.

d. Screw the stroke adjustment knob all the way down to the 0 cc setting.

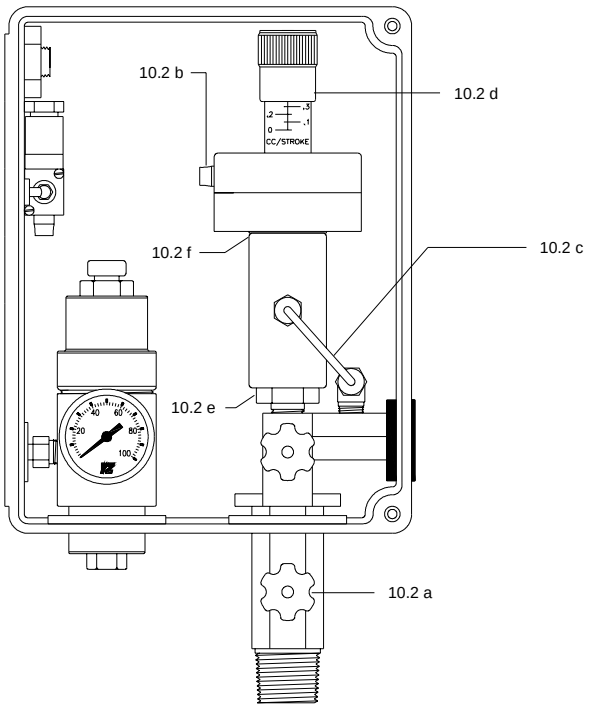
e. Unscrew the pump body by hand from the inlet check valve assembly. Separation at this point is recommended to maintain proper tubing location and alignment between the pump body and the probe body. Do not remove the inlet check valve body from the manifold unless cleaning is necessary. To replace the inlet check valve o-ring, cut the o-ring off the head of the dart and stretch the new o-ring over the head of the dart using a light coat of assembly grease.

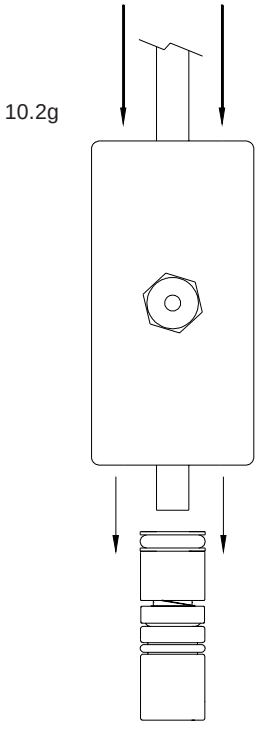
f. Remove the diaphragm housing from the pump body by unscrewing the diaphragm housing and carefully pulling the plunger out of the pump body. Inspect the plunger shaft for damage or wear. The diaphragm chamber houses the diaphragm, return spring and plunger assembly. The diaphragm chamber should not be disassembled unless one of these items needs replacing.

g. Remove the internal bushings and o-rings from the pump body by inserting a non-metallic rod (larger than 1/4", smaller than 1/2") into the top of the pump body. Gently tap to remove all bushings and o-rings out the bottom of the pump body.

h. Clean and inspect all components. Replace if necessary.

NOTE: normal service generally requires only the replacement of the o-rings and seal. A seal repair kit (part number D3-0002) is available from YZ.





10. Sampler maintenance

i. Apply a light coat of non-soluble assembly grease on all o-rings and bushings to prevent damage.

j. Install the body bushing into the bottom of the pump body.

k. Insert all other bushings, springs, and o-rings in their respective sequence on the plunger shaft.

l. Carefully install the diaphragm housing into the top of the pump body.

NOTE: apply a light coat of assembly grease on the plunger shaft prior to installation.

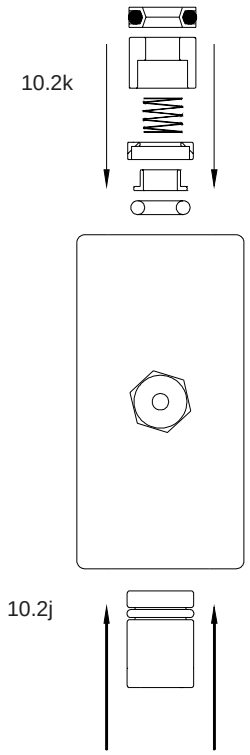
m. Install the pump assembly on the inlet valve assembly. Tighten firmly by hand.

n. Connect the 1/8" stainless steel tubing to the pump body and 1/8" plastic tubing to the diaphragm housing.

o. Open the isolation valve.

p. Adjust the strokes adjustment knob to its original setting.

q. Pressure test the pump as previously described for proper operation.



10. Sampler maintenance

10.3 Battery Test: with the mode switch in the mode position #5, depress the test switch. When the solenoid fires, the green LED signifies a good battery. The red LED signifies a depleted battery.

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

Replacing a Depleted Battery

1. Remove the four thumb screws, cover plate and terminal strip.

2. The battery is located in the lower left hand corner of the Z-200 controller assembly.

3. Unclip the battery plug from the battery receptacle.

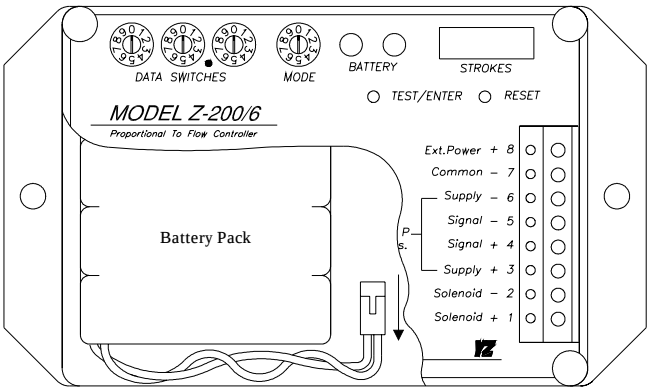
4. Replace the depleted battery with a fresh battery pack (part No. E3-2001).

NOTE: follow the illustration to assure proper battery wire placement in the Z-200 enclosure.

5. Return the mode switches to their original positions.

6. Dispose of old battery properly.

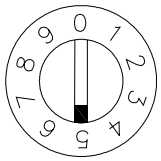
NOTE: Battery packs contain small amounts of Lithium which must be disposed of and handled in accordance with Federal, and State statutes.



10.4 Recommended spare parts for the DynaPak 2020 gas sampler:

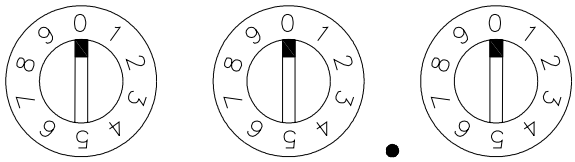
Part Number	Description	Qty	Location
D3-0002	DP-2000 pump seal kit	1	diagrams #1, #2
D3-0003	YZ filter/regulator repair kit	1	diagrams #3, #4
D3-0004	filter element	1	diagrams #3, #4
D3-0142	Z-65/200 fuse replacement kit	1	diagram #5
E3-2001	battery pack	1	diagram #5

11. Troubleshooting
timer mode #5
Proportional-to-time



A. Set the mode switch to position #5.

B. Set the data switches to 00.0 to enter the diagnostic mode of operation.



C. Depress the enter switch to load the value into the memory.

D. This mode of operation enables the operator to increase the solenoid output rate to one actuation every two seconds.

NOTE: the LCD stroke indicator should increment each time the solenoid actuates.

LED Indicator Chart (proportional-to-time only)		
green	red	condition
on	off	solenoid on, good battery
off	on	solenoid on, low battery

NOTE: on means for approximately one half second.

To test the LED indicators, depress the test switch located on the front of the controller.

Timer Setting
A. Z-200/6.1 - all time settings are xx.x minutes
B. Z-200/6.10 - all time settings are x.xx minutes.

11. Troubleshooting

Proportional-to-flow:run mode #0

A. Refer to the controller set-up section in the manual and make sure the following parameters have been set:
1. mode #7 loss of flow input (XX.X min)
(X.XX min for Z-200.10)
2. mode #6 low flow shut off (XX.X%)
3. mode #4 zero calibration (1.0V @ 0% flow)
4. mode #3 span calibration (5.0V @ 100 % flow)
5. mode #2 initial percentage flow (XX.X%)
6. mode #1 initial stroke rate (XX.X min)
(X.XX min for Z-200.10)

NOTE: if all parameters have not been entered properly, a red LED will illuminate and stay on and the controller will not start in run mode position #0 when the enter switch is depressed.

B. After these inputs have been re-entered, depress enter switch to start operation.

LED indicator chart (proportional-to-flow mode only)		
Green	Red	Condition
on	off	solenoid on, good battery
off	on	solenoid on, low battery
blink	off	lowflow shut off imposed
off	blink	loss of flow input alarm

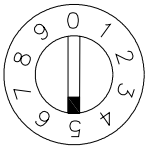
NOTE: on means for approximately one half second. Blink means on for approximately 20 milliseconds.

To test the LED indicators, depress the test switch located on the front of the controller.

11. Troubleshooting
LCD stroke indicator test

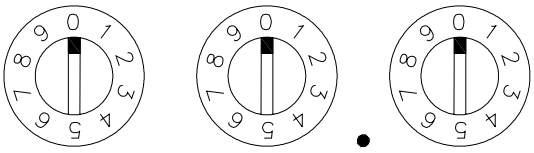
A. Set the mode switch to position #5.

B. Set the data switches to 00.0 to enter the diagnostics mode of operation.



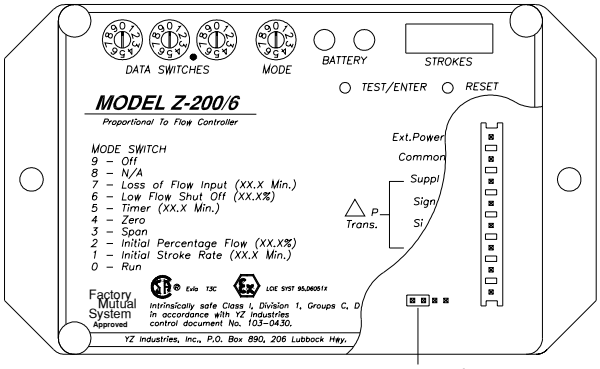
C. Depress the enter switch to load the value into memory.

D. This mode of operation enables the operator to increase the solenoid output rate to one stroke every two seconds.



E. Unscrew the thumb screws and remove the eight position terminal strip and cover. This will expose the battery pack and three position configuration jumper (located in the lower right hand corner of the Z-200 controller assembly).

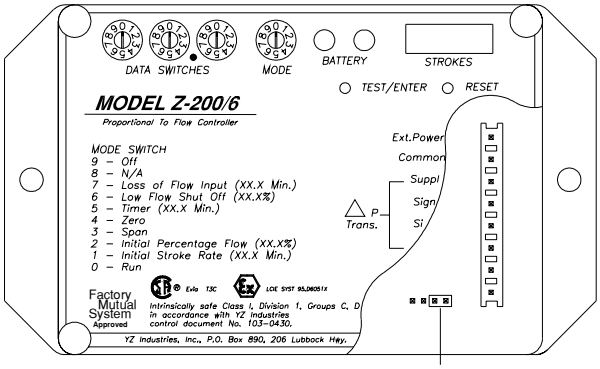
F. Set the configuration jumper to the far right position marked stroke indicator test.



Factory setting for configuration jumper

G. This will cause all six digits to become active or display. Press reset and a display should increment 000000,111111, ets., up to 999999 each time the solenoid actuates. When the display reads 999999, the test is complete.

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



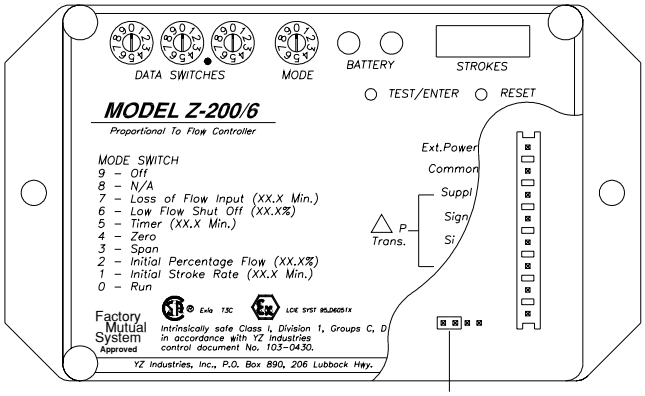
Setting for stroke indicator test configuration jumper

11. Troubleshooting

Non-linear/linear flow input

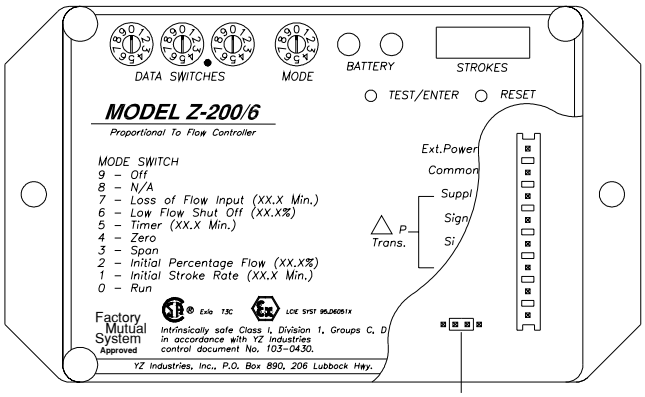
The Z-200 controller is capable of receiving two types of flow outputs: non-linear and linear.

A. Non-Linear: when using differential pressure transmitter inputs that are not linear with respect to flow, the configuration jumper should be in the factory setting to the far left position marked non-linear.



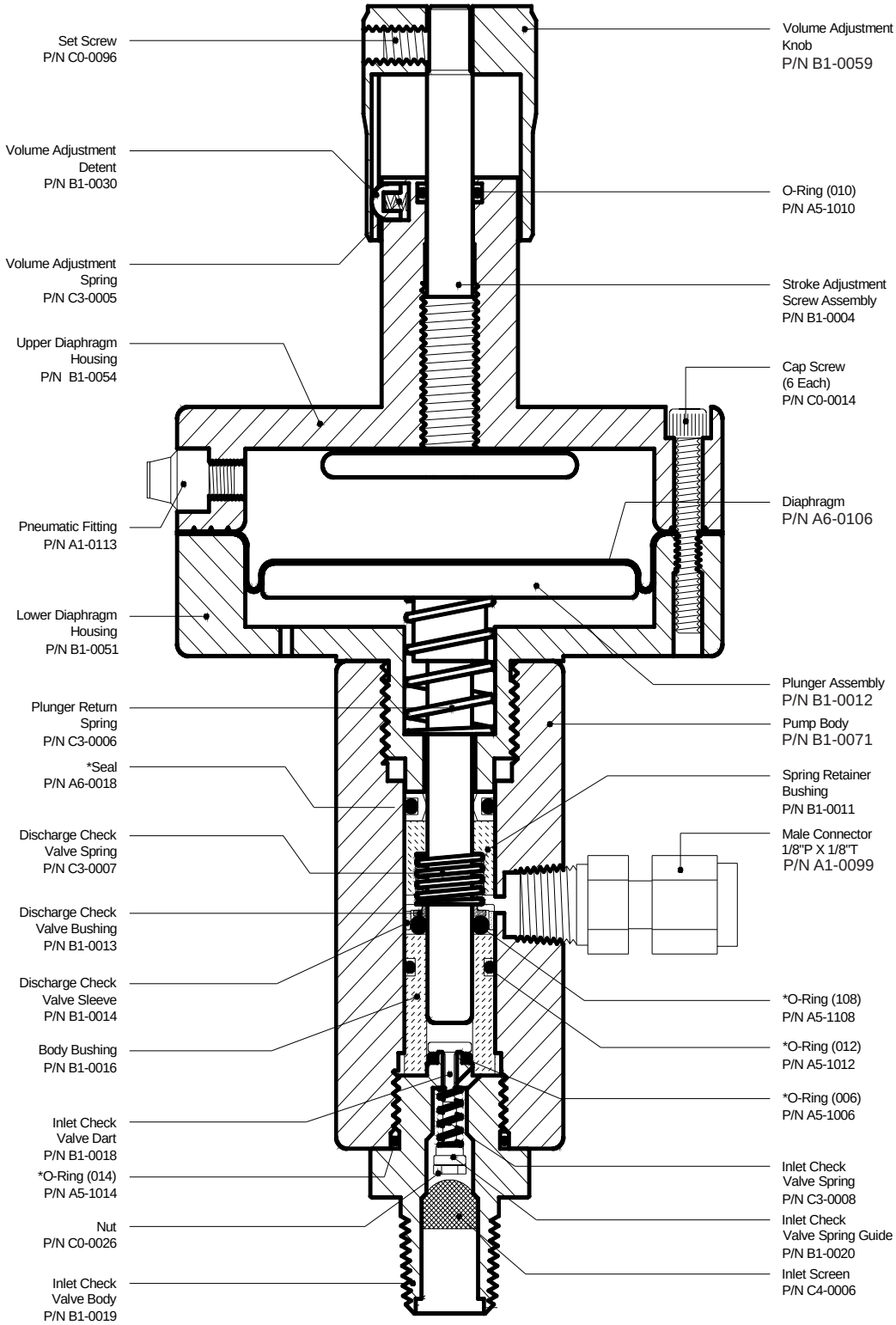
Factory setting for non-linear flow input using the DPT

B. Linear: when using flow computer type flow inputs that are linear with respect to flow, the configuration jumper should be in the middle position marked linear.



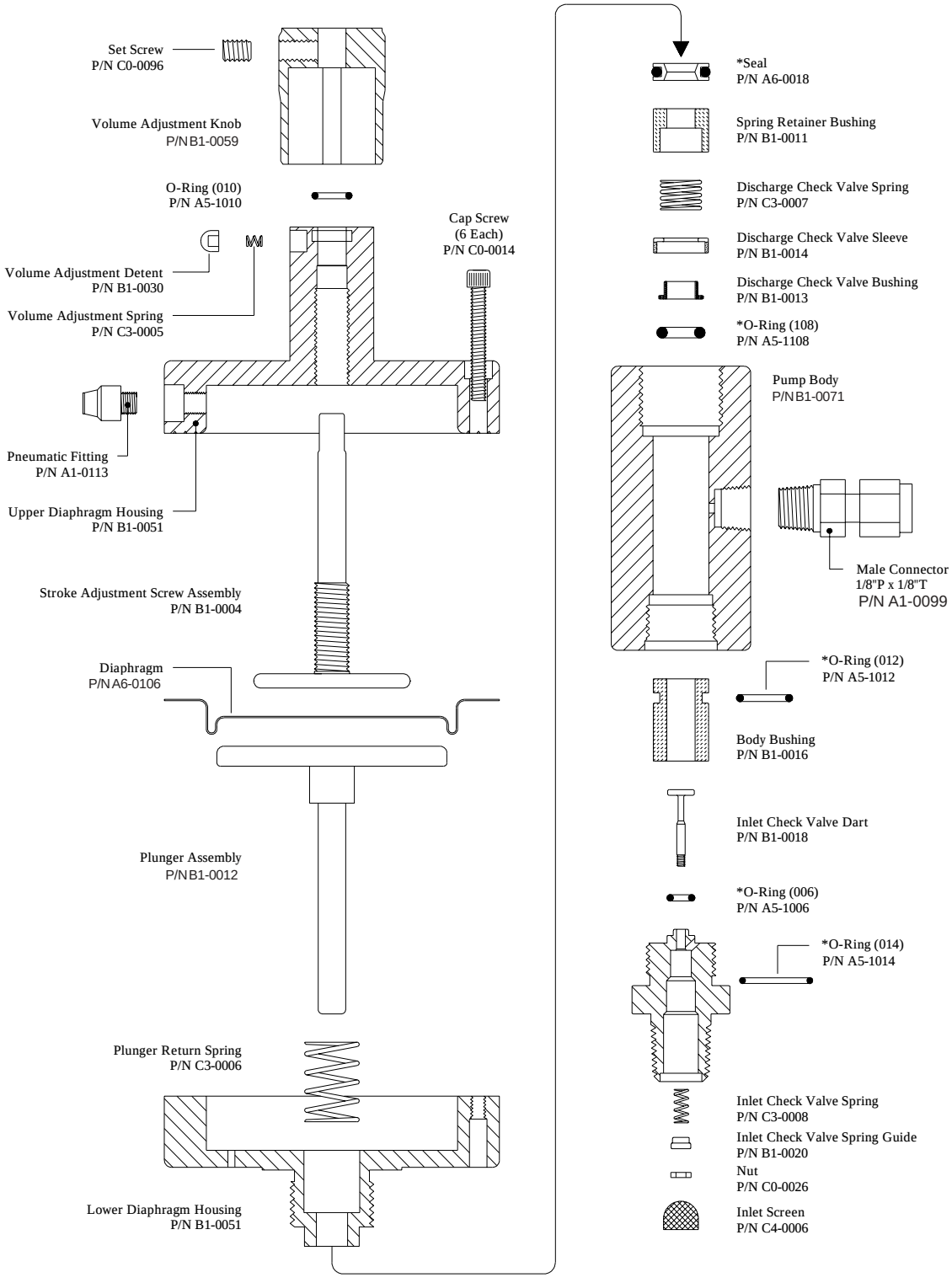
Setting for linear flow input

Diagram #1:
DP 2000N pump (assembled)



*DP-2000N Pump Seal Kit - P/N D3-0002

Diagram #2:
DP 2000N pump (exploded)



*DP-2000N Pump Seal Kit - P/N D3-0002

Diagram #3:
YZ filter/regulator (assembled)

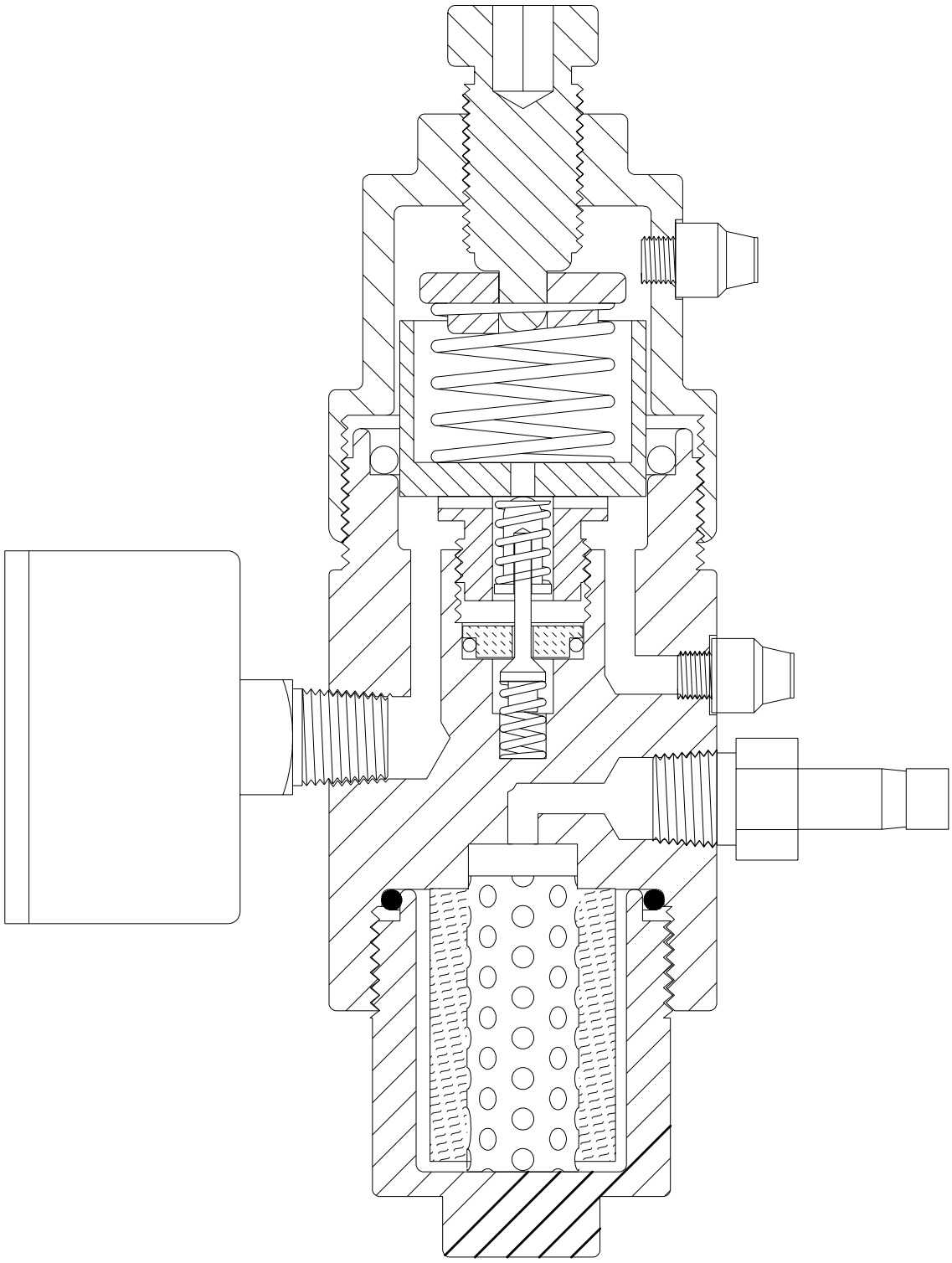
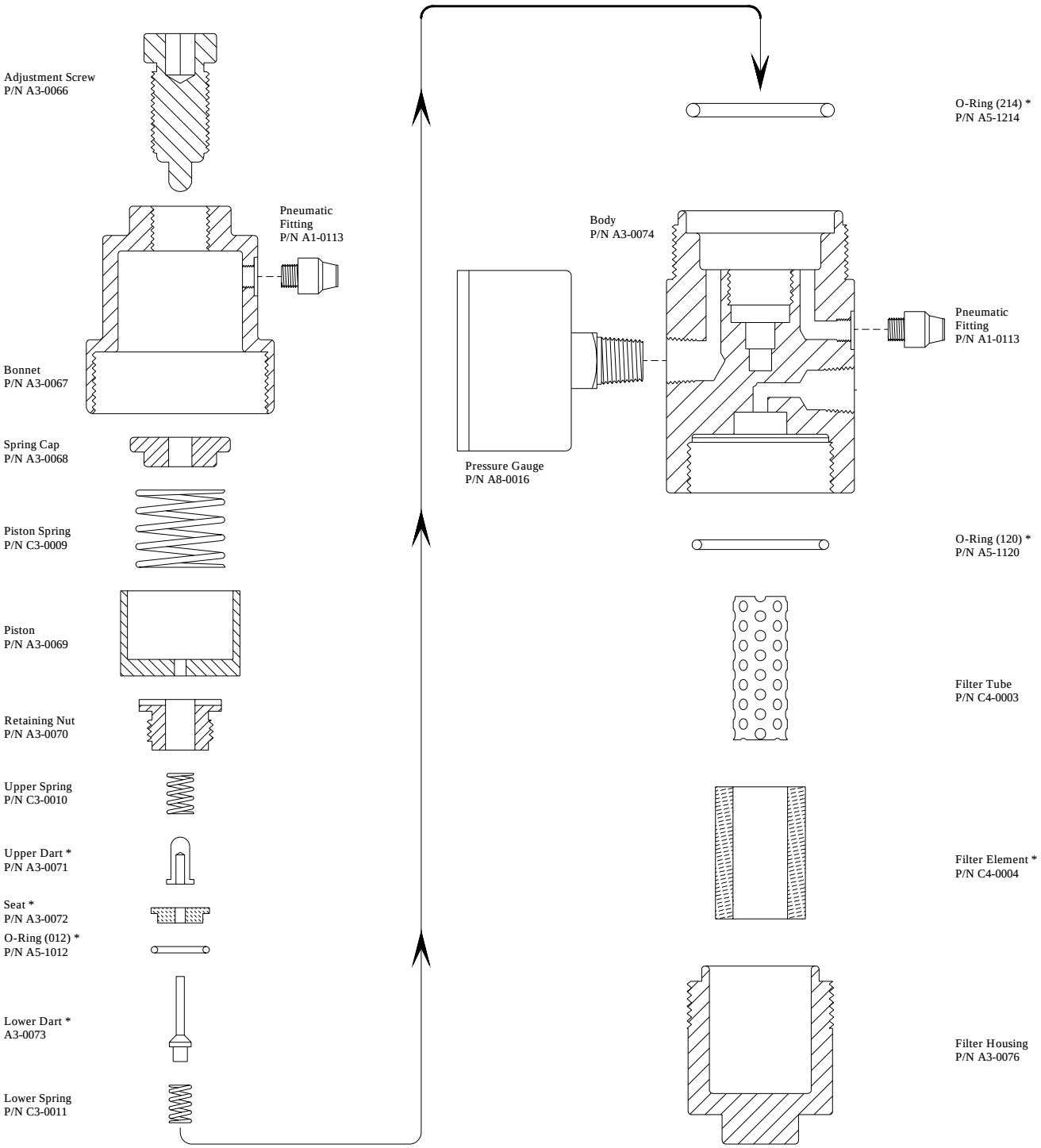


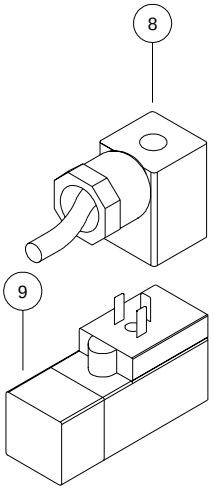
Diagram #4:
YZ filter/regulator (exploded)



* Filter/Regulator Repair Kit P/N D3-0003

Diagram #5:
Z-200 Controller

Ref. No.	Description	Part No.	Qty.
1	Z-200/6 Controller Assembly		1
	Model Z-200/6.1	F2-0002	
	Model Z-200/6.10	F2-0020	
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	4
6	Face Plate		1
	Model Z-200/6.1	A9-3002	
	Model Z-200/6.10	A9-3031	
7	Thumb Screw	A9-1001	4
8	Cable Assembly	G2-0001	1
9	Solenoid Valve	A4-0001	1
10	Repair Kit*	D3-0006	1
11	Z-65/200 Fuse Replacement Kit (2 Fuses Per Kit)	D3-0142	1



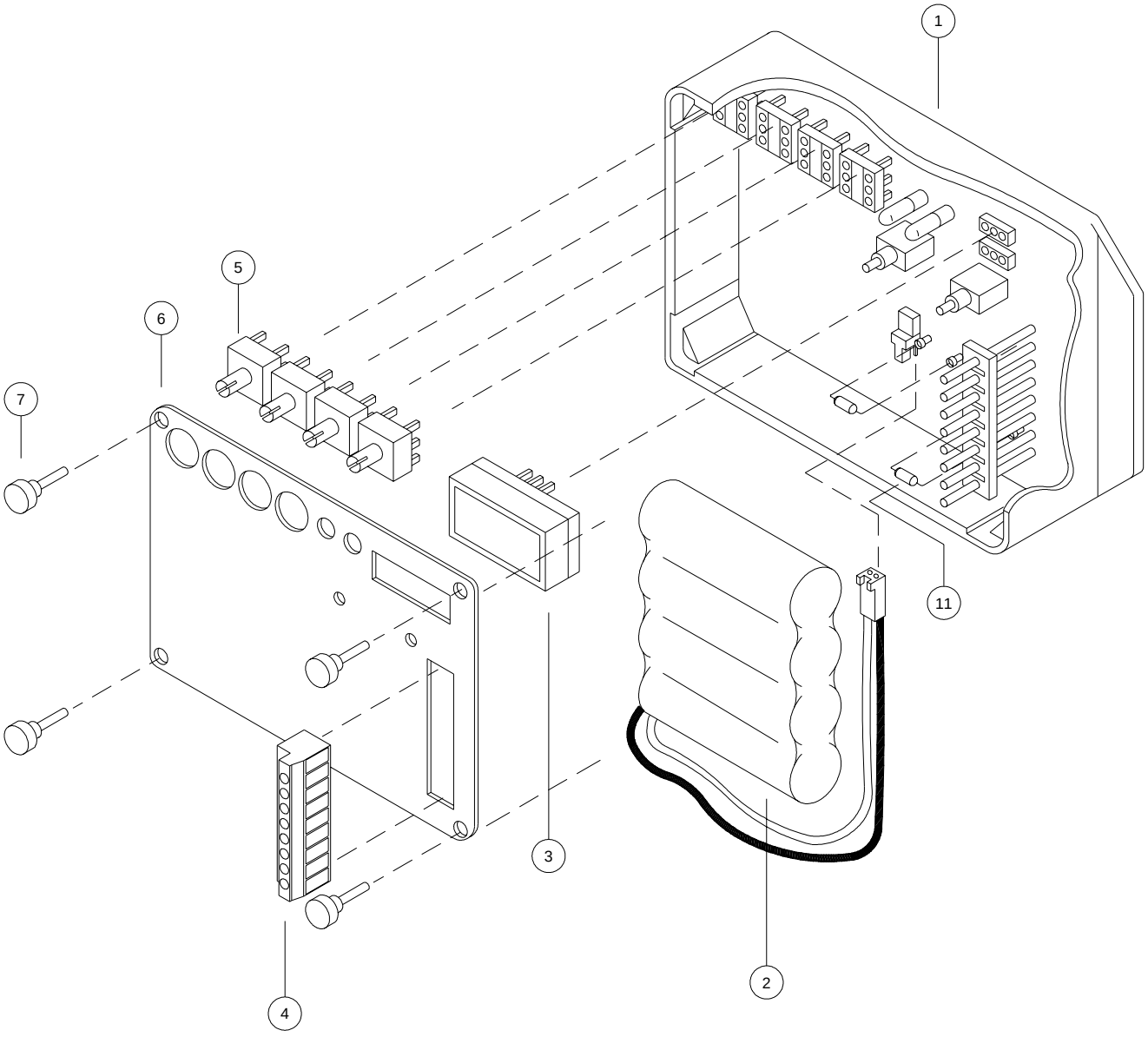


Diagram #6:
Optional LinkPlus

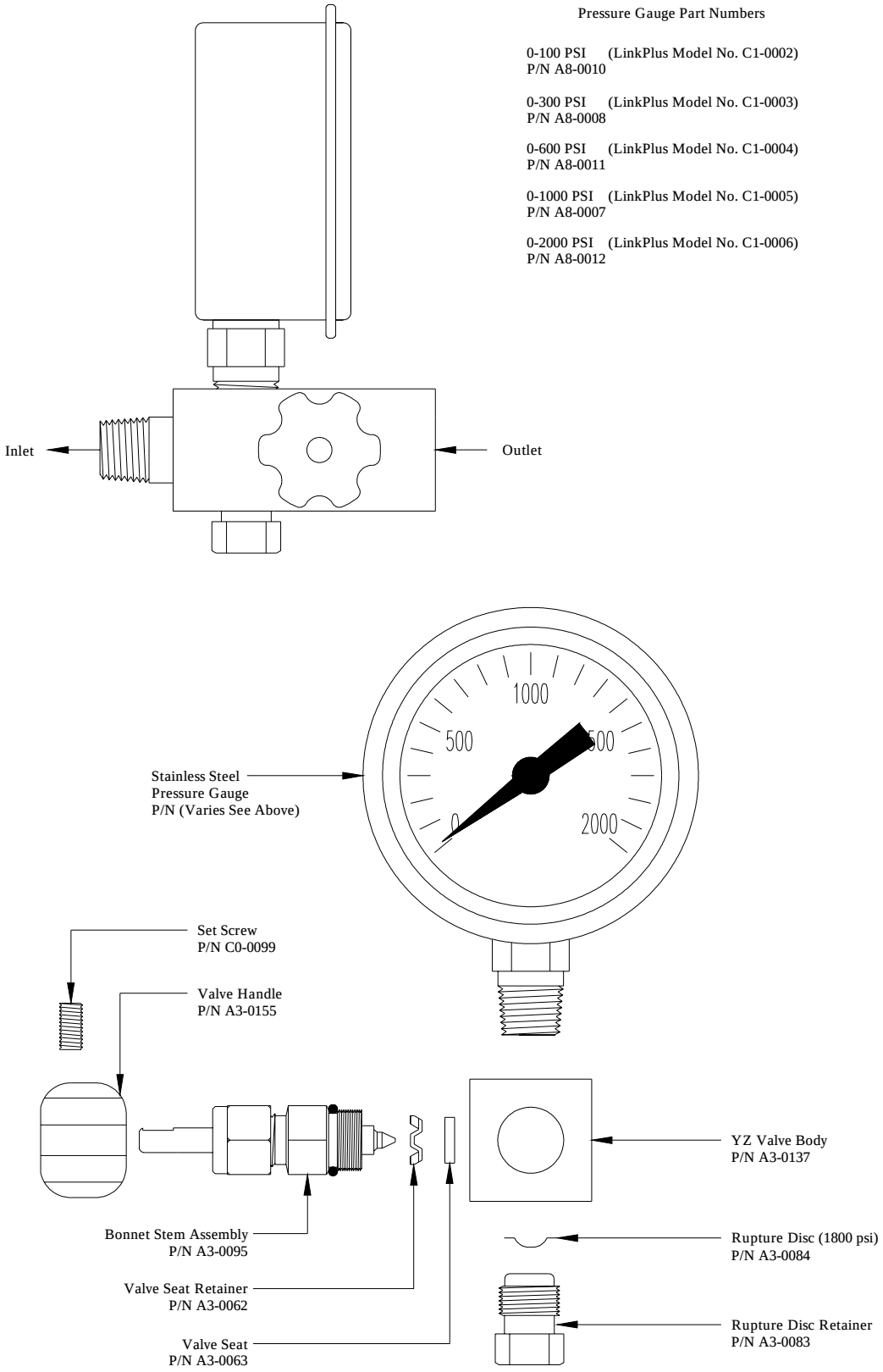
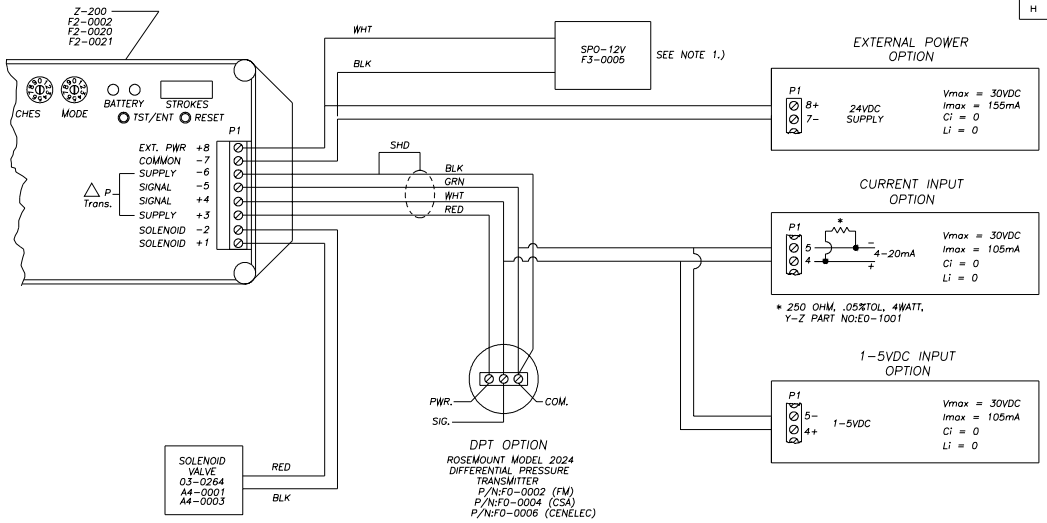


Diagram #7: Z-200 Installation Notes/Wiring Control Documentation

System Installation Notes and Recommendations

The manufacturer's system installtion instructions and the National Electric Code, Canadian Electrical Code where applicable, must be followed when installing this equipment. Tampering or replacement with non-factory components may adversely effect the safe use of the system.
Only the specified batteries should be used with this apparatus.
For guidance on installation see ANSI/ISA 12.6 Installation of Intrinsically Safe Instrument Systems in Class Hazardous Locations.

REVISIONS		
REV	DATE	DESCRIPTION
C	4/23/92	
D	5/15/92	
E	10/7/93	
F	6/29/94	
G	2/06/95	
H	2/3/04	ECO-0259 [REH]



CLASS I , DIVISION 1, GROUP C,D T3C HAZARDOUS AREA EExia IIB ZONE 0 T4

$V_{MAX} \geq V_{OC}$
$I_{MAX} \geq I_{SC}$
$C_A \geq C_I + C_{CABLE}$
$L_A \geq L_I + L_{CABLE}$

CONTROL EQUIPMENT SHALL NOT USE OR GENERATE MORE THAN 250VAC

Exia INTRINSICALLY SAFE / SECURITE INTRINSEQUE

Z-200 WIRING DIAGRAM

NOTES:

1) NOT FOR USE IN EExia IIB TA ZONE 0 AREA.

** NO CHANGES ARE TO BE MADE TO THIS DRAWING WITHOUT PRIOR FACTORY MUTUAL APPROVAL.

YZ SYSTEMS
3101 POLLOK DR. CONROE, TEXAS 77303

DRAWING NO: 103-0431
SCALE: NTS
DESCRIPTION: Z-200 WIRING CONTROL DOCUMENT
SHEET 1 OF 1
B SIZE

DRAWN: Q.C. DATE: 11/20/91
CHECKED: DATE:
APPROVED: DATE:

Diagram #8: DuraSite Portable Sample Vessel Instructions

Purpose: The DuraSite Portable Sample Vessel permits the user to remove a liquid or gas hydrocarbon sample from a pipeline or a sampling device. This is accomplished without changing the pressure of the product or exposing it to a contaminant fluid. If properly used and maintained the DuraSite will provide many years of safe, accurate and clean sampling.

Use: The DuraSite is a very safe device to use. As with any equipment dealing with flammable products, it is mandatory that a good, thorough operator training procedure be established prior to use.

Typical use of the cylinder would be as follows:

Step 1: (In The Lab) Connect a regulated inert gas supply to the pre-charge valve. The product valve should be open. By carefully controlling the pre-charge valve and the regulator, the cylinder can be slowly charged with pre-charge gas (NOTE: This should be done slowly to prevent slamming the piston down to the opposite end). The pressure on the pre-charge pressure gauge should be brought to a reading of 10-50 psi above the expected pressure of the product in the field . Close the pre-charge valve and disconnect the gas supply. Check the pre-charge valve, relief device, and the pre-charge pressure gauge for leaks. Any leaks should be stopped before continuing. The vessel should be placed in a padded carrying case and made ready for field use.
Proceed to *EITHER* Step 2, or Step 3 as required for your application.

STEP 2: FOR COLLECTION OF SAMPLE VIA SPOT SAMPLE OR FROM COMPOSITE ACCUMULATOR VESSEL.

2a: Connect the product end of the pre-charged sample vessel to the product supply.
(Sampler product removal valve, or Pipeline sample probe)
NOTE: the pre-charge pressure gauge reading should be greater than the product supply pressure reading. If not, repeat Step 1 above.

2b: Once the vessel is connected to the product supply, it is necessary to vent a small amount of product prior to filling the vessel. This assures fresh product and removes any air or gas when dealing with liquids. This can be done by loosening the product purge valve a very small amount until the product is purged. After thorough purging, the product purge valve should be tightened.

2c: The product pressure gauge reading should be 10-50 psi below the pre-charge pressure gauge reading. By carefully opening the pre-charge valve, the pressure becomes equalized, then begins to drop below the product pressure. The pre-charge valve should be carefully controlled so as to not vent the pre-charge gas too fast.

2d: When the cylinder becomes a maximum of 80% full (see volume indicator), all valves should be closed. The product connection is slowly broken in order to vent any trapped product. After vessel removal, all connections should be checked for leaks and the pre-charge and product valve ports capped to prevent leakage.

2e: Pack the DuraSite in appropriate carrying case to meet D.O.T. guideline, with D.O.T. paperwork and transport to lab for analysis.

STEP 3: FOR DIRECT CONNECTION TO SAMPLER.

3a: Connect the sampler discharge port to the product inlet port to the DuraSite using 1/8" stainless steel tubing.

3b: (Gas sampling) Connect the pre-charge port to the DuraSite to the pipeline for pre-charge pressure (Proceed to step 3d), or configured like the liquid sample application below. (Step 3c)

3c: (Light sampling) Pre-charge the DuraSite as indicated in Step 1, then install a pressure relief valve to the pre-charge port and open the pre-charge valve on the DuraSite. (The pressure relief valve should have a relief pressure setting of approximately 100 psi above line pressure.)

3d: Open the product inlet valve of the DuraSite and the purge valve on the sampler. Next open the purge valve on the product end of the DuraSite and allow product to purge all lines and connections out.

3e: Close purge valves and begin sample cycle.

3f: At the end of sample cycle, close product inlet valve on the DuraSite and remove the DuraSite. Pack the DuraSite in appropriate carrying case to meet D.O.T. guideline, with D.O.T. paperwork and transport to lab for analysis.

Step 4: (In The Lab) Prior to analysis, the product should be mixed. This is accomplished simply and efficiently by inverting the cylinder end-over-end, causing the mixing ball to fall through the product. Approximately 10-12 trips of the mixing ball through the product assures a homogenous solution.

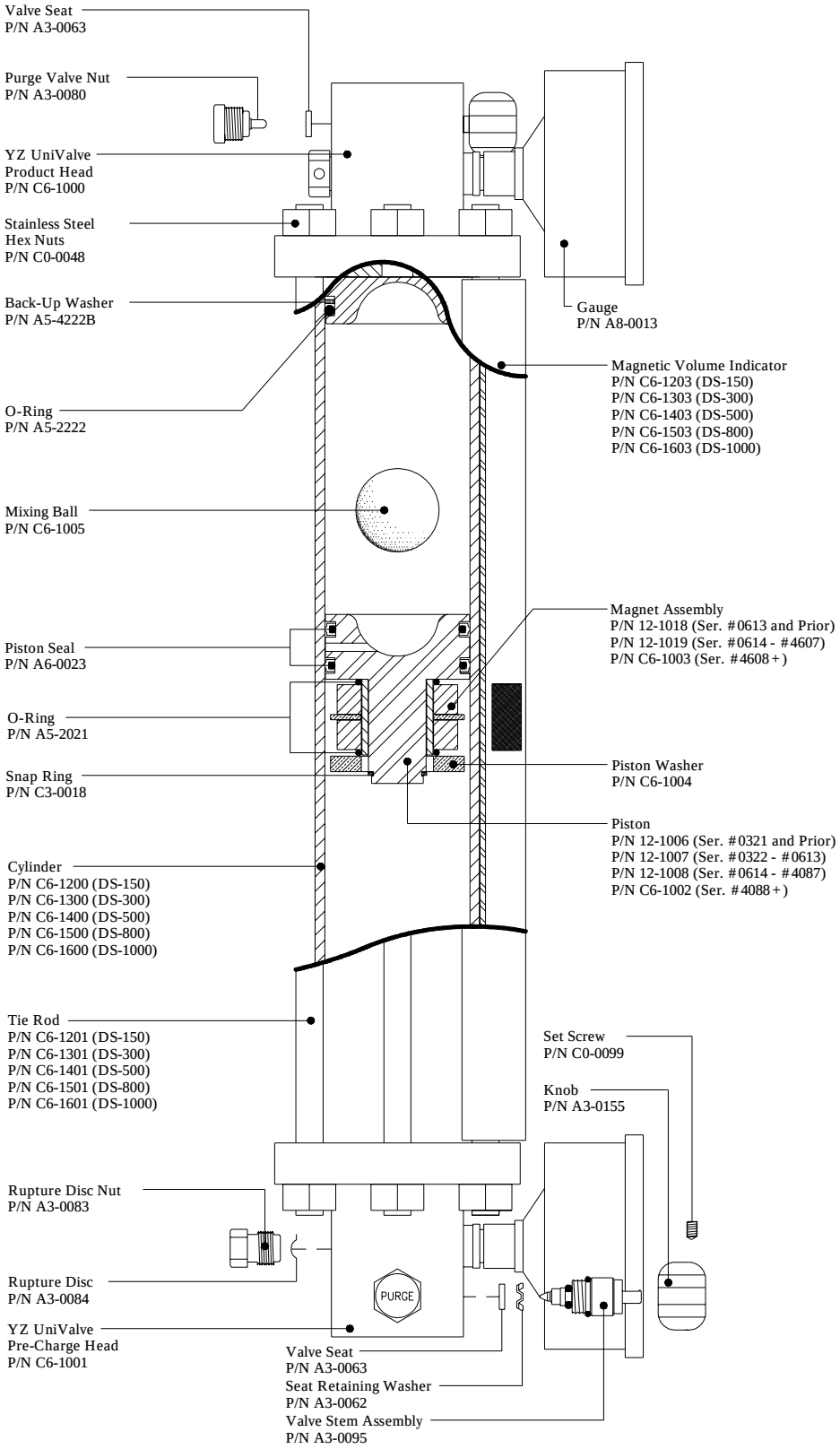
Step 5: The regulated pre-charge gas should be reconnected to the pre-charge side of the cylinder. The pre-charge gas supply should remain open during analysis.

Step 6: Purging a small amount of product from the vessel removes unmixed product from the tee, relief device, gauge, etc. The unit can now be connected to a chromatograph and the product analyzed.

Step 7: After analyzing, the remainder of the product should be dumped and the vessel properly cleaned. Normal cleaning can be accomplished by rinsing the product end with a petroleum solvent and flushing with acetone. If a more thorough cleaning is required, the vessel should be disassembled.

WARNING: A portable sample vessel should never be filled to more than 80%. This allows a 20% pre-charge cushion to absorb thermal expansion of the product.
Shipping: Extreme care should be taken when preparing a vessel for shipment. Both valves should be capped to prevent possible leakage. The vessel should be placed in a snug-fitting, well-padded and durable case. All applicable DOT

Diagram #8: DuraSite Portable Sample Vessel



13. Rosemount Differential Pressure Transmitter (DPT):

13.1 Theory of Operation: the Rosemount Model 2024 Transmitter is a low power differential pressure measuring device capable of measuring differential pressures from 0 - 250 inches (635 cm) of water and delivering a proportional 1 - 5 volt output. The YZ Model Z-200 controller is designed to operate the Rosemount 2024 DPT. Both units are Factory Mutual (FM) approved for intrinsically safe Class I, Division 1, Groups C, D operation. This allows for the transmitter to be directly powered by the controller, without the use of barriers, when used in accordance with YZ Industries control document # 103-0431.

13.2 Installation

a. Locate the DPT in an area where vibration, shock, and temperature fluctuation effects are minimal.

b. Mount the DPT directly to the measurement taps or use the mounting bracket shipped with the transmitter (see diagram below). In either case, mount the DPT at an elevation above or equal to the pipeline measurement taps.

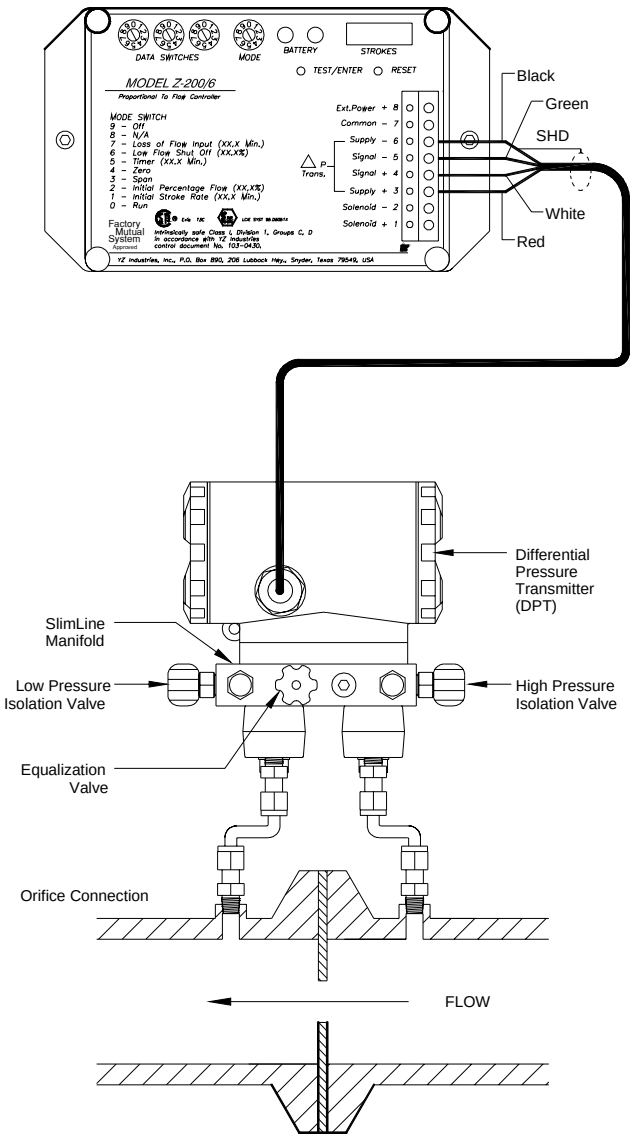
c. Connect the DPT to the Z-200 controller using the wiring kit included with the transmitter. This kit includes YZ's drawing #03-0467 which indicates how to connect the DPT and the Z-200.

NOTE: it is recommended that the cable length between the Z-200 and the DPT not exceed 25 feet (7.5 meters).

13.3 Calibration: calibration of the DPT requires the use of an accurate pressure source and a voltmeter.

a. Check the wiring between the 2024 DPT and the Z-200 controller to ensure it is connected correctly.

b. Connect the pressure source to the DPT high pressure port.



Maximum Pressure 2000 PSIA

13. Rosemount Differential Pressure Transmitter (DPT):

c. Connect the voltmeter positive lead to the DPT signal terminal and the voltmeter negative lead to the DPT common terminal.

d. Turn the mode switch on the Z-200 controller to position 4.

e. While applying the equivalent of 0" (0 cm) differential pressure to the transmitter, turn the DPT "Zero" adjustment screw until the transmitter output reads 1.00 volts.

f. Press the test/enter button on the Z-200 to set the controller's zero reference.

g. Turn the mode switch on the Z-200 controller to position 3.

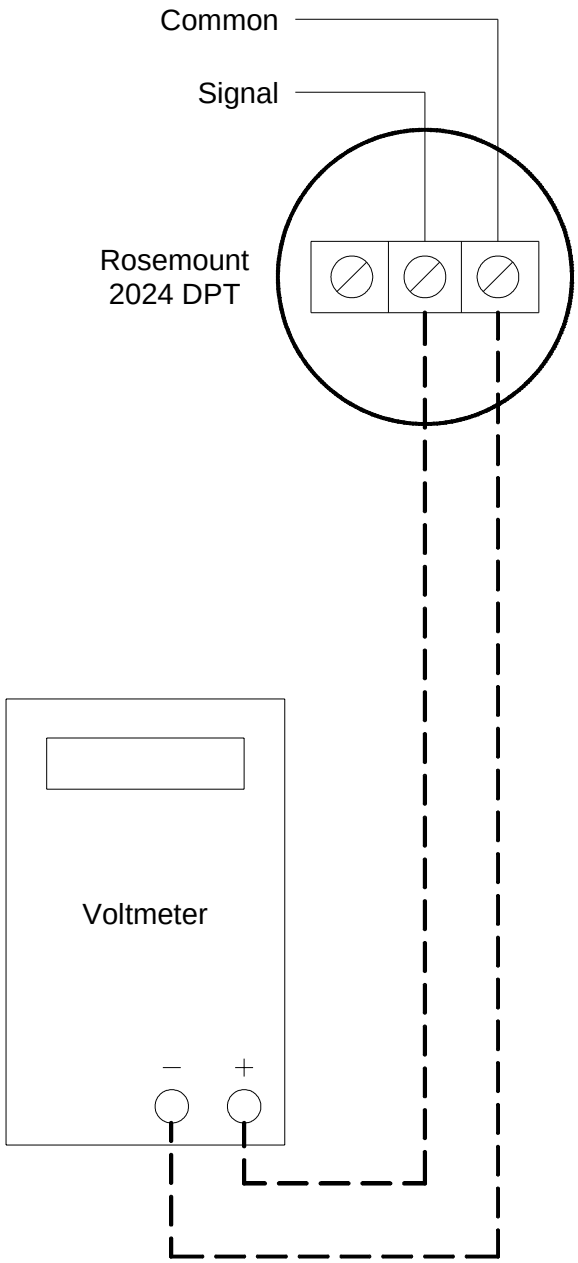
h. While applying the equivalent of maximum flow differential pressure to the transmitter, example 100" (254 cm) water differential, turn the span adjustment screw until the output reads 5.00 volts.

i. Press the test/enter button on the Z-200 to set the controller's span reference.

j. Repeat steps d. through j., readjusting the DPT zero and span as necessary.

k. Return the mode switch on the Z-200 controller to position 9. Refer to Section 8.2 to set the system input parameters before starting system operation.

NOTE: mode switch must be in position 3 or 4 to read transmitter output voltage.



Notes:

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Conroe, Texas 77303

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F: 936.788.5720

Em: Service@yzhq.com

Web: www.yzsystems.com