



Model 4000 Pressure Controller Application Guide

A Dyna-Flo 4000 pneumatic pressure controller and a Dyna-Flo control valve can be combined to be a stand-alone control system.

Controller Valve Combinations

The 4000 controller can be paired with a Dyna-Flo control valve for four different control applications based on fail open / fail closed valve and direct or reverse acting controllers.

4000 Selection Process

1. Determine the required valve fail position. This is what happens if the control valve loses its instrument air signal and is independent of the 4000.
2. From the required actuator shut off differential pressure, choose the actuator input / controller output. (Either 3 to 15 or 6 to 30 psig.) The controller output must match the actuator input. Remember that to achieve certain shut off pressures the 6 to 30 psig signal will be required.
3. Choose a bourdon tube range. Try to choose a range where the set point is in the middle if possible. If the bourdon tube is over-pressured the tube will zero shift throwing the 4000 out of calibration. The range must include the highest potential pressure the pipe will see. The standard bourdon tubes are SS316 - however in order for NACE compliance a K-Monel bourdon tube must be used. There are three NACE pressure ranges available.
4. Determine whether or not a direct or reverse acting controller is required based on what the system is expected to do.

Fail Open Control Valve / Direct Acting Controller

If a fail open control valve is paired with a direct acting controller we get the following process performance: On rising process pressure the controller output rises which closes the valve. If the process pressure is below the set point the controller would be wide open. (This would behave similar to a direct acting regulator only the valve / controller response is slower.)

Fail Open Control Valve / Reverse Acting Controller

In this case when the process pressure rises the controller output decreases which tends to open the valve. If the process pressure is below the set point the valve is closed. (An example of this application is a compressor recycle valve.)

Fail Closed Control Valve / Direct Acting Controller

This is the same as the fail open valve / reverse acting controller. An increase in process pressure means an increase in controller output which means the valve is opened. If the process pressure is below the set point the valve is closed. A typical application is backpressure control. (In this case the valve controller acts similar to that of a PSV.)

Fail Closed Control Valve / Reverse Acting Controller

A rise in process pressure means a decrease in controller output which means the valve is closed. If the process pressure is below the set point the valve is open. (This is typically used for pressure control.)

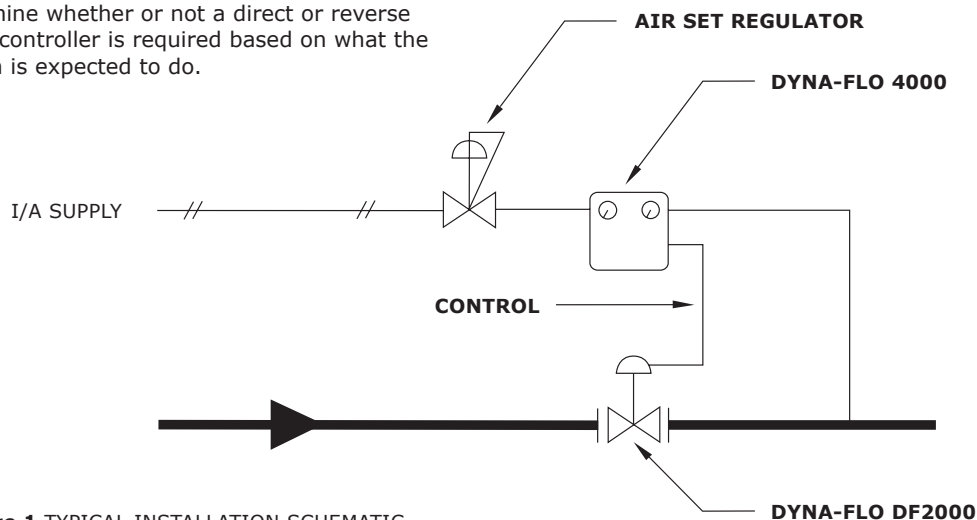


Figure 1 TYPICAL INSTALLATION SCHEMATIC



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Valve Orientation	Controller Action	Process Increases Valve Tries To	Process Below Set Point Valve Is	Air Signal Fails Valve
Fail Open	Direct	Close	Open	Opens
Fail Open	Reverse	Open	Closed	Opens
Fail Closed	Direct	Open	Closed	Closes
Fail Closed	Reverse	Close	Open	Closes

FAQ's

What is the control range of the bourdon tubes?

The control range is 6% to 100% of the range. This means a 1500 psig tube can control anywhere from 90 psig to 1500 psig.

What happens if the process pressure increases to more than the tube rating?

The bourdon tubes have a particular range in which they properly operate. If a tube is stretched past its operating point the controller will operate with more error. To avoid this zero shift a mechanical travel stop can be used.

What is the burst pressure for the various bourdon tubes?

TUBE RATING	BURST PRESSURE
0-30 psig	1175 psig
0-60 psig	1400 psig
0-100 psig	1750 psig
0-200 psig	2200 psig
0-300 psig	2550 psig
0-600 psig	2650 psig
0-1000 psig	2950 psig
0-1500 psig	10300 psig
0-3000 psig	13200 psig
0-5000 psig	17600 psig

I want to control at 40 psig but the line might pressure up to 600 ANSI. What should I use?

A 0 to 1500 psig tube can only control to 90 psig - and it is preferable to control in the middle of the range - not at the end points. A 60 psig tube is only rated to 1400 psig so use a 100 psig tube rated to 1750 psig. A mechanical travel stop should be installed to prevent the 4000 from seeing any zero shift.

How can the 4000 be mounted?

The 4000 controller can be either mounted on the control valve or remote mounted in a panel, on a wall or on a pipe stand. Typically an air set regulator is required.

Can I re-use an existing 4000 or existing control valve?

When matching a 4000 and control valve it is important to make sure that the output from the controller matches that of the control valve input. Most control valves are either 3 to 15 psig or 6 to 30 psig - the 4000 output can be either. The output range does impact the amount of shut-off available to the actuator. Dyna-Flo will assume a 6 to 30 output, as this is the more common.

Can I use wet natural gas as instrument gas?

No. We recommend dry natural gas. If wet gas is used there is the possibility the controller will stop working as the orifices could clog.

Is the action field reversible?

The controller action (direct or reverse) is easily field reversible - however the controller does need to be re-calibrated.

Can I field change from a 6-30 psig to 3-15 psig controller output?

Yes, the change is easy. However the controller must be re calibrated.

We are using another manufacturers pressure controller. Will I have to buy two sets of parts?

No. The 4000 parts are interchangeable with a FISHER* 4150/4160 controller.

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