
# Focus

## Operation and Service Manual

TESCOM
CORPORATION

The Engineered Solutions COMpany

HIGH PURITY CONTROLS DIVISION

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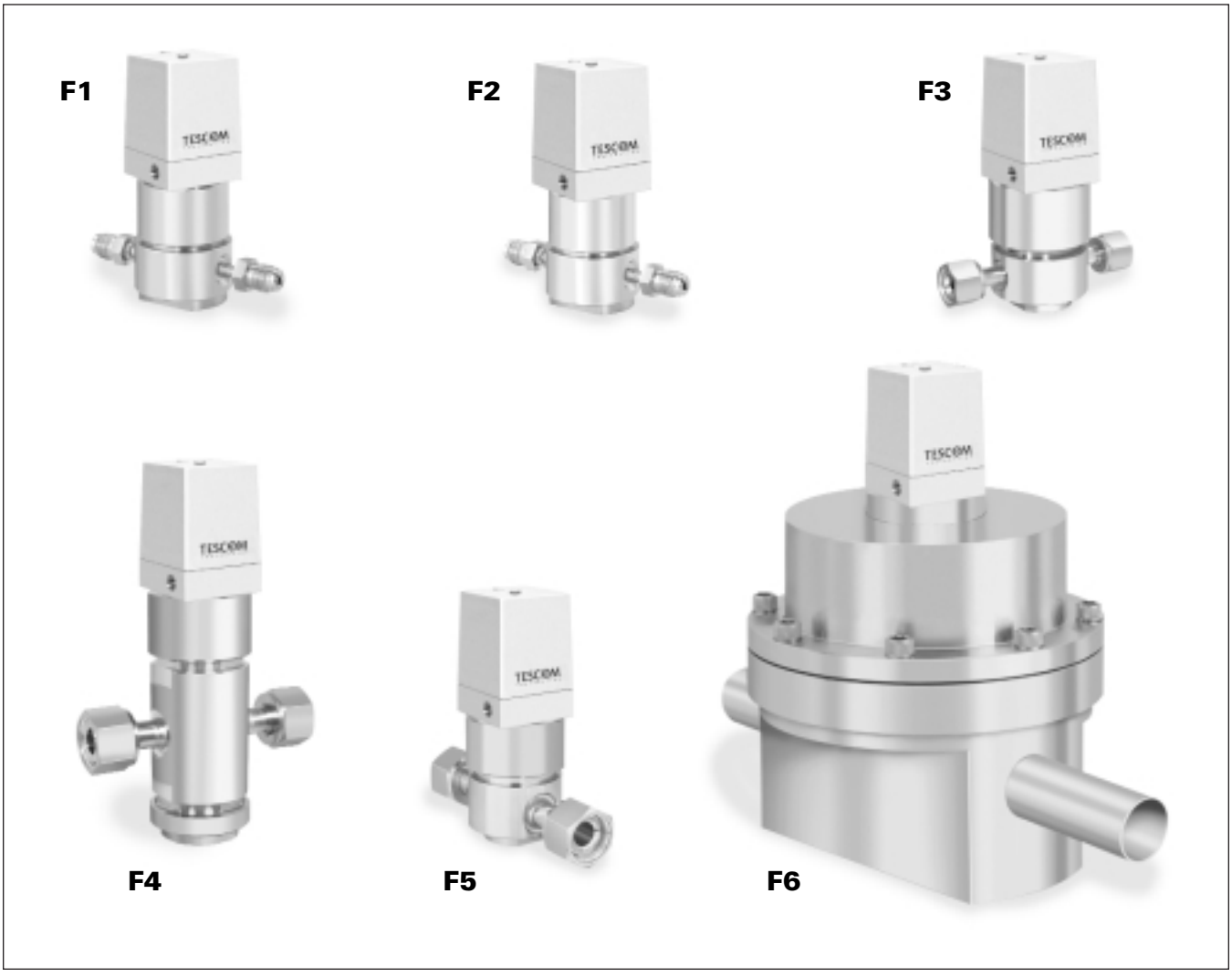
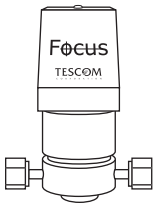
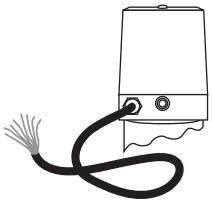
# 1 *Focus Models*



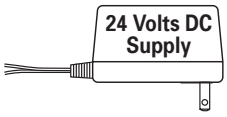
# 2 *Contents*




FOCUS UNIT

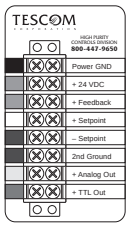


CABLE




24 VOLTS DC SUPPLY
(Optional)

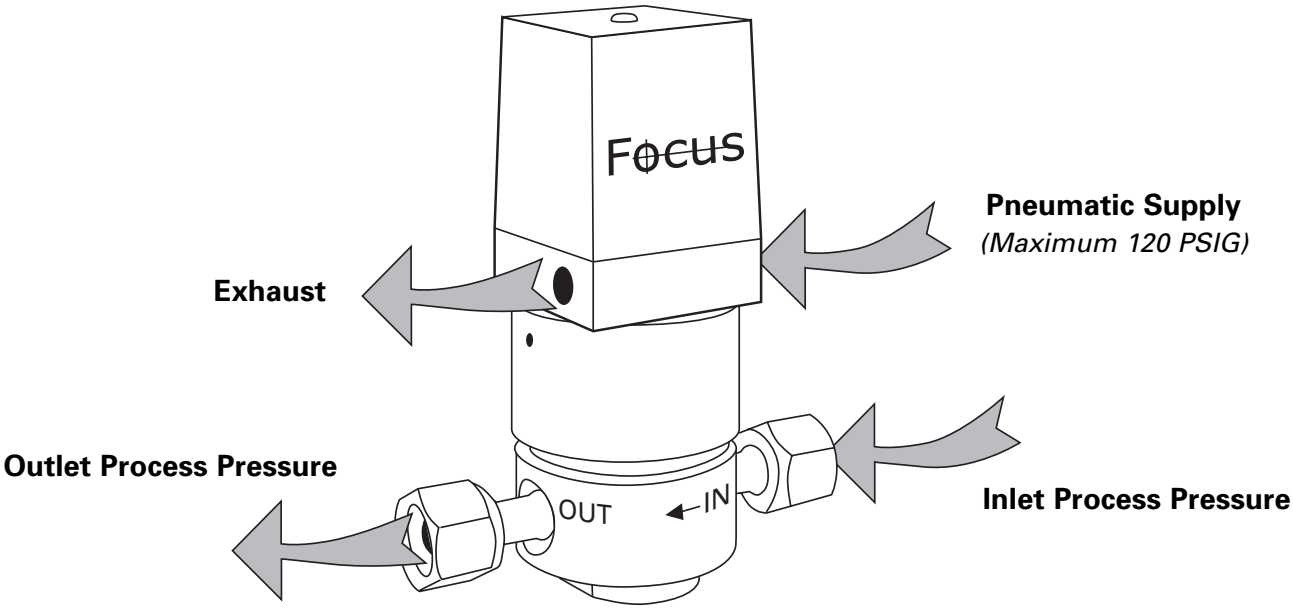

TRANSDUCER
(Optional)



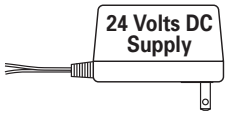

CONTACT/TERMINAL
BOARD GUIDE LABEL
(Optional)

FOCUS USER
MANUAL

# 3 *Operation and Installation Requirements*

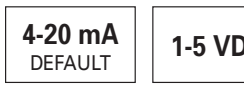



Tools and Supplies needed:

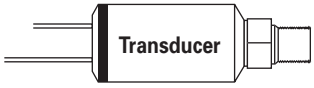



24 VOLTS DC
SUPPLY

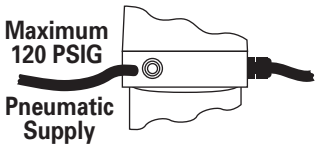
WRENCHES




SETPOINT SIGNAL
(POTENTIOMETER OR PLC)




TRANSDUCER




PNEUMATIC SUPPLY
TO FIT 1/8" NPT

# 4 *Configuration*

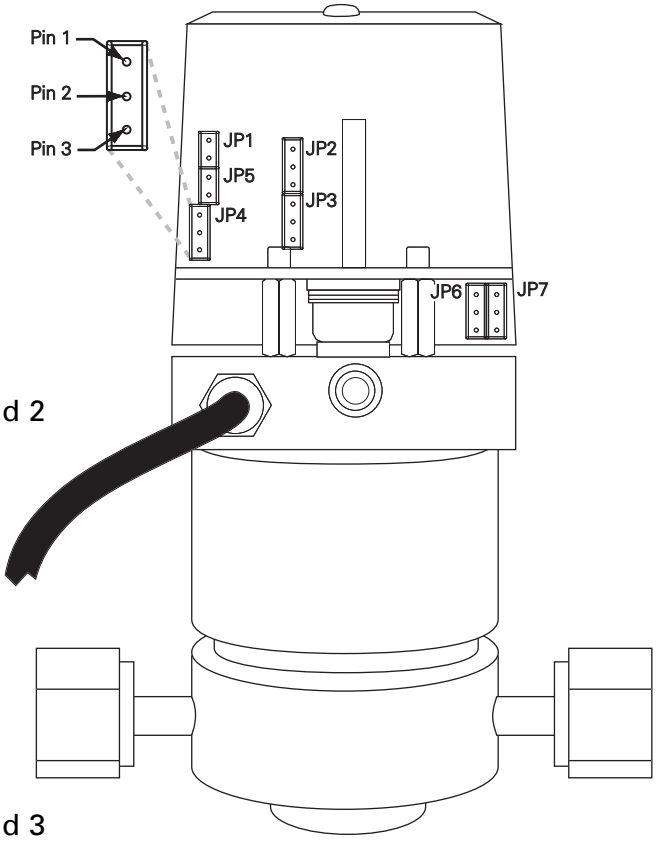
**Factory Default**

The standard Focus comes with the setpoint signal and feedback signal being set as 4-20 mA. If you require setting either the setpoint or feedback signal to a voltage signal please see below, otherwise go to **Installation Section 5**.

**Changing Setpoint and Feedback Signal Values**

This section is to tailor setpoint and feedback signals for your unit. ***As standard, the factory sets both the setpoint and feedback values as a 4-20 mA signal.***

> ***CAUTION:*** CONFIRM POWER SUPPLY IS OFF BEFORE MOVING JUMPERS




**CONFIGURE SETPOINT SIGNAL**

**Mode - JP1**
- ❏ Current Setpoint: Install Jumper
- ❏ Voltage Setpoint: Remove Jumper

**Range - JP2**
- ❏ 4-20 mA/1-5 Volts: Install Jumper on pins 1 and 2
- ❏ 0-10 Volts: Install Jumper on pins 2 and 3

**CONFIGURE FEEDBACK SIGNAL**

**Mode - JP5**
- ❏ Current Feedback: Install Jumper
- ❏ Voltage Feedback: Remove Jumper

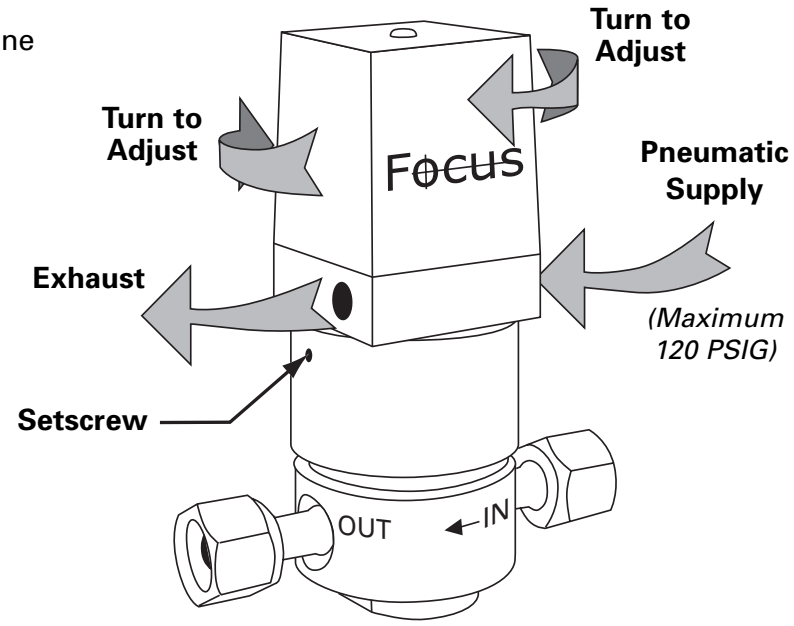
**Range - JP4**
- ❏ 0-10 Volts: Install Jumper on pins 1 and 2
- ❏ 4-20 mA/1-5 Volts: Install Jumper on pins 2 and 3

> ***Note:*** If utilizing Analog Output Signal, please see Appendices, page 9.

# 5 *Installation*

### Mechanical Installation

Install the Focus unit into the process line before electrically wiring the Focus, transducer and power supply. This procedure should be carried out in conjunction with your own safety process for the handling of compressed gases.




1. Connect Focus into process line ensuring proper orientation (inlet and outlet connections identified on unit).
2. If required, loosen setscrew in order to rotate controller to ease installation. Tighten setscrew.
3. Connect pneumatic supply line to Focus via 1/8" NPT inlet port as identified.
4. No connection to exhaust port of controller necessary. Do not plug.

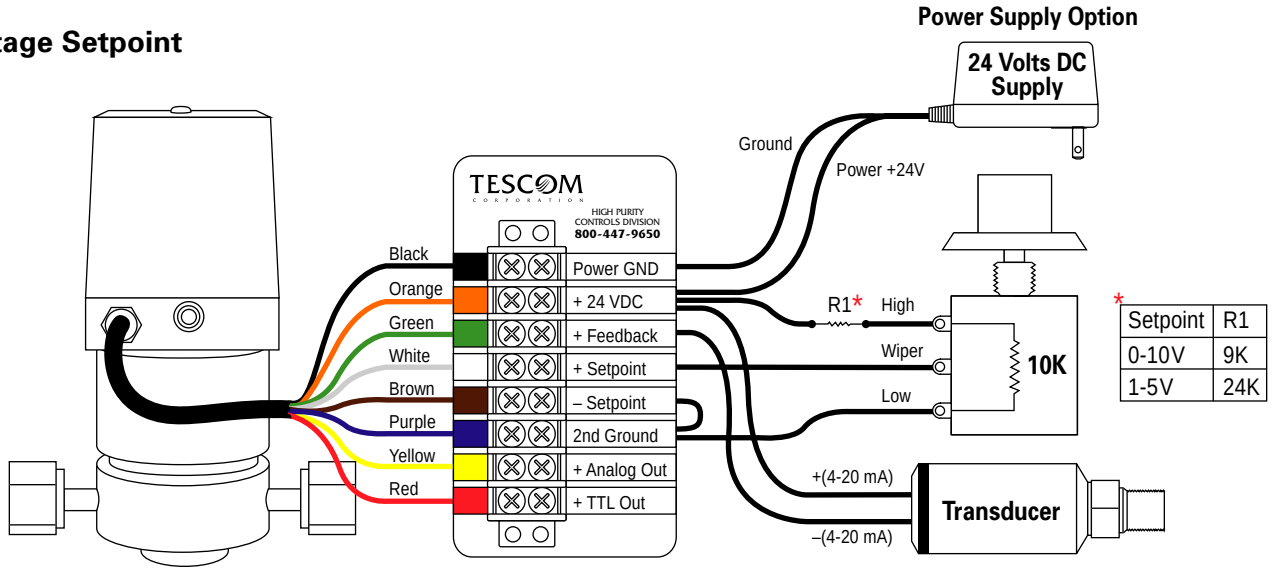
***CAUTION:***
- Use CDA or nitrogen for the controllers pneumatic supply.
- Both the pneumatic and process lines are to remain off until Focus is mechanically and electrically installed.

### Electrical Installation

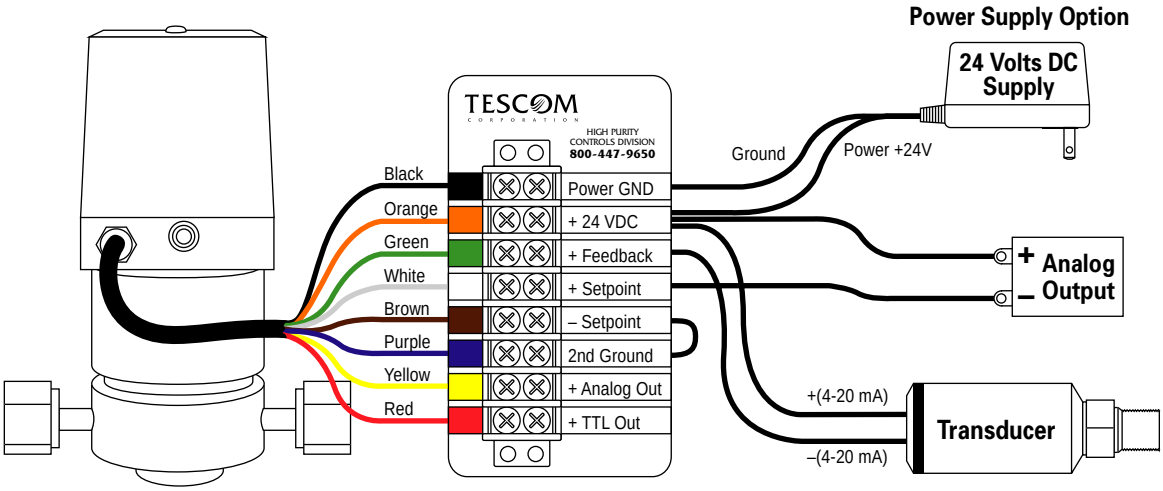
This procedure should be carried out in conjunction with your own safety process for the handling of compressed gases.

1. Connect wires as shown to the optional contact board ***(see diagrams on following page)***.
2. Ensure Setpoint has zero signal.
3. Turn on 24V power supply to Focus.
4. Turn on process gas and ensure that the outlet pressure remains at zero.
5. Slowly increase pneumatic supply to the Focus ensuring the outlet pressure remains at zero due to your setpoint signal being at zero.
6. Slowly increase setpoint signal until desired outlet pressure is reached.

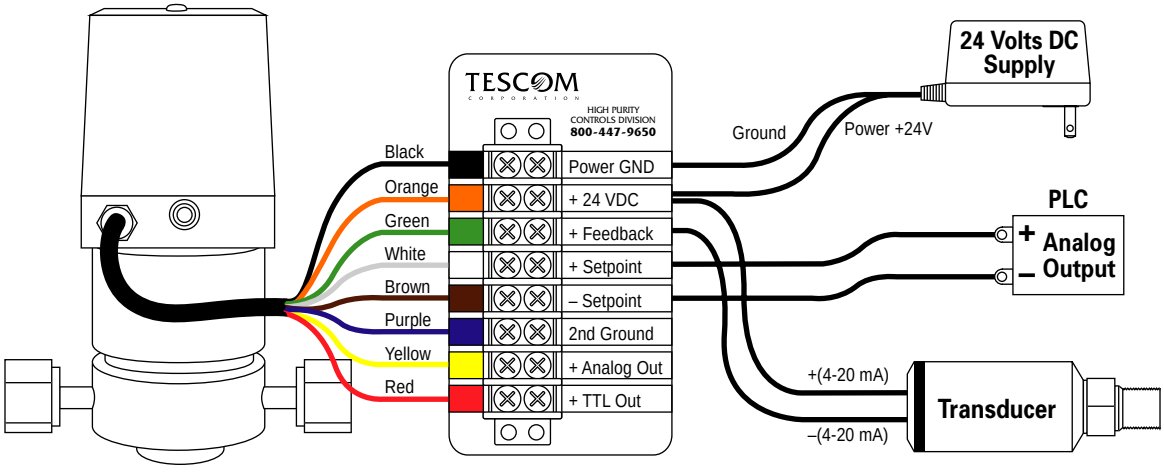
## Voltage Setpoint




## Current Setpoint - Passive Source




## Current Setpoint - Active Source



# *Appendices*

***The Focus comes pre-tuned from the factory. Refer to this section only if the current tuning parameters appear unsuitable for the application.***

## *Tuning The Focus*

There are 5 adjustments located on the control card. The initial factory pot settings are listed in the table ***(right)***.

**Note:** The counter-clockwise endpoint from which to start turning the pots is found by rotating the pot counter-clockwise 25 turns.

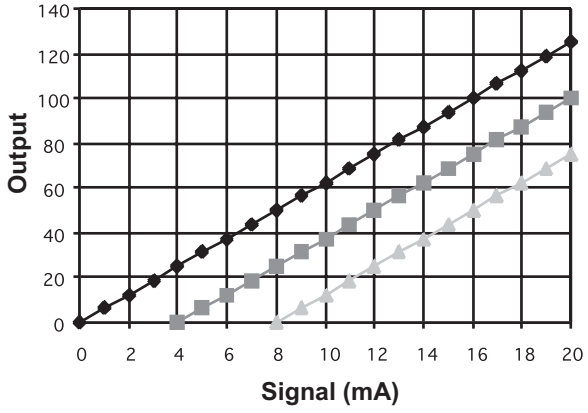
| FUNCTION | CLOCKWISE TURNS |
|---|---|
| Gain | 6 |
| Stability (Integral) | 17 |
| Deadband | 20 |
| Zero | 17 |
| Span | 22 |

- The easiest method for calibrating and tuning the system is to use a volt meter to monitor the setpoint and feedback voltages.
- Turn all the pots back to the factory settings.
- Apply a setpoint signal of at least 12.5% (6 mAmps, 1.5 VDC if 1 - 5 VDC, or 1.25 VDC if 0 - 10 VDC).
- Rotate the deadband pot until exhaust gas can barely be felt escaping from the exhaust port ***(see diagram on page 10)***. Rotating the deadband pot clockwise will decrease the deadband to the point that the inlet and exhaust solenoid valves will operate continuously. This will result in a very accurate tracking response, but obviously consumes gas. If the deadband is increased by rotating the pot counter-clockwise, pilot gas will be conserved, but the system will not respond to a change in setpoint or feedback until the error signal is larger than the imposed deadband voltage. This can result in drifting of the feedback signal or no response to a small change in setpoint signal.
- Apply a setpoint signal of about 2.5% (4.4 mAmps, 1.1 VDC if 1 - 5 VDC, or 0.25 VDC if 0 - 10 VDC). Measure the feedback signal and adjust the zero pot until the feedback signal matches the setpoint signal. Rotating the zero pot clockwise will increase the feedback signal and a counter-clockwise rotation will decrease the feedback signal. Sufficient time should be given for the system to respond between each adjustment of the pots, especially if there is a large control volume. Rotate the pots slowly and observe the system reaction.

**Zero Adjustment**

- Apply a setpoint signal of about 95% (19.2 mAmps, 4.8 VDC if 1 - 5 VDC, or 9.5 VDC if 0 - 10 VDC). Measure the feedback signal and adjust the span pot until the feedback signal matches the setpoint signal. Again, sufficient time should be given for the system to respond between each adjustment of the pots. Since the zero and span adjustments interact with one another, it is necessary to readjust the zero after adjusting the span. Recheck the zero and adjust it if the feedback signal does not match the setpoint signal of 2.5%. Continue to recheck zero and span until the feedback signal and setpoint signal match at both the low and high setpoint values.

**Zero Pot Rotation Effect**

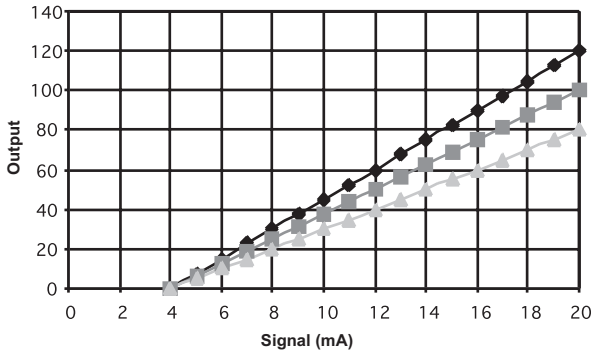


## *Tuning The Focus* *continued*

### Span Adjustment

Typically, Gain and Stability adjustments are not needed. However, the following general guidelines can be followed to fine tune your system:

**Span Pot Rotation Effect**

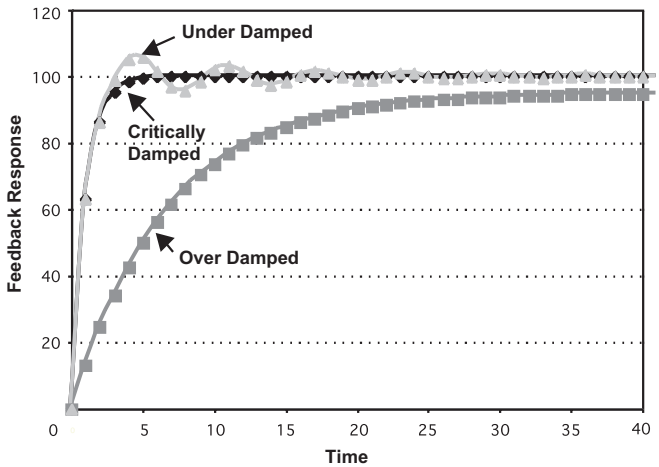



- Rotating the gain pot clockwise increases the system gain and decreases the system response time. Too little gain will result in slow response and inaccurate signal tracking. Too much gain will result in system instability, fast vibration, or in the feedback signal overshooting the setpoint signal when a large step change in setpoint is initiated.
- Rotating the stability pot clockwise will decrease the reset time and quicken the addition of gain into the system. This can again result in setpoint overshoot. Rotating the pot counter-clockwise will increase the reset time and dampen the control response to a step change in setpoint.
- The stability adjustment does not interact with any of the other adjustments, however, if the gain or deadband pots are turned at this point, the zero and span will need to be readjusted per the procedure outlined above.

### System Response

If the system is experiencing a slow oscillation, decrease the gain by rotating the pot counter-clockwise until the oscillation stops. If the oscillation is rapid, increase the reset action by rotating the stability pot clockwise until the oscillation stops. These settings will be the maximum gain and minimum reset time that can be used with the system as it is configured. If the feedback signal severely overshoots the setpoint signal when a change in setpoint is made, turn the stability pot counter-clockwise alternately with the gain pot (also counter-clockwise), until the overshoot is eliminated.

**Reaction To Step Change In Setpoint**



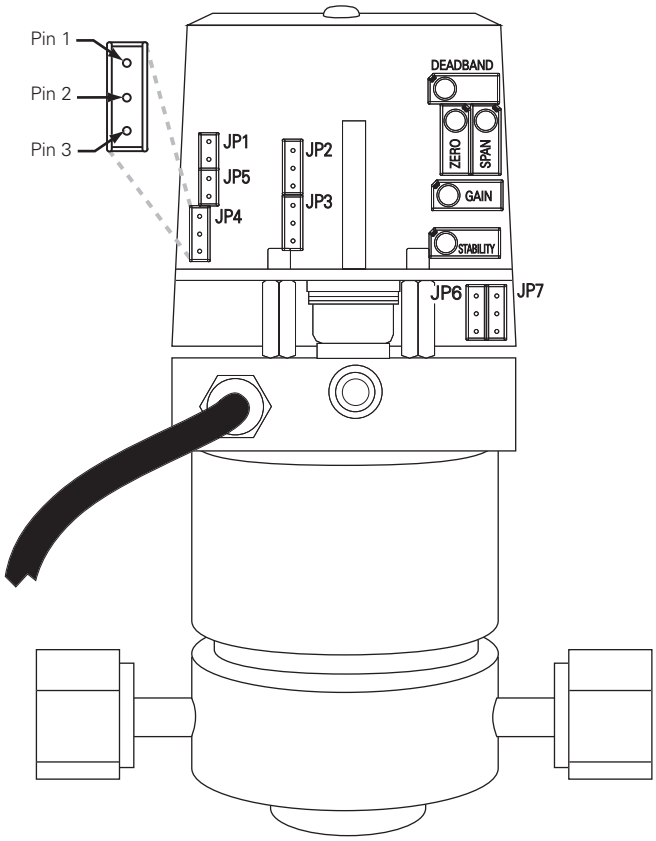
## *Configuring Analog Output Signal*

**Mode - JP6**

- ❏ Current Output Mode: Not available
- ❏ Voltage Output Mode: Install Jumper on pins 2 and 3

**Range - JP7**

- ❏ 1-5 Volts: Install Jumper on pins 1 and 2
- ❏ 0-10 Volts: Install Jumper on pins 2 and 3



## *Troubleshooting*

| FOCUS Symptom | Likely Cause | Remedy |
|---|---|---|
| Unable to maintain outlet pressure | FOCUS exhaust valve leaking | Return unit to factory for replacement of valve |
| | FOCUS supply pressure is not high enough | Check the incoming pressure to the FOCUS and ensure that it is between 10 to 20 PSIG above the maximum desired output pressure |
| Positive output pressure with zero setpoint | FOCUS Inlet solenoid valve leaking | Return unit to factory for replacement of valve |
| | FOCUS supply pressure exceeds the maximum | Lower supply pressure to less than 120 PSIG |
| Outlet pressure is equal to inlet pressure | FOCUS is not getting a feedback signal | Check transducer wiring and feedback jumper settings |
| | FOCUS is creeping due to contaminated seat | Return the FOCUS to factory for evaluation and repair |
| Outlet pressure does not follow setpoint changes | FOCUS jumpers not configured correctly | Reconfigure jumper settings according to page 4 |
| Outlet pressure becomes uncontrollable (unstable or unable to establish setpoint) | FOCUS GAIN, INTEGRAL, or DEADBAND are out of adjustment | Read the "TUNING THE FOCUS" section of this manual *(pages 8-9)* and readjust the gain and pots per that section |
| | The feedback signal reacts to a process change at a slower bandwidth than the FOCUS (25 milliseconds) | Replace the transducer with one that has a full range response time at least as fast as that of the FOCUS |
| | There are leaks in the downstream pressure line | Locate and eliminate all leaks |
| | The system design has components that can cause a delay in downstream transducer response while the upstream pressure is allowed to build up (pressure differential between measurement point and source) | Eliminate the flow restriction, or slow down the FOCUS response time by restricting the flow of supply pressure to the FOCUS |

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