



## TECHNICAL DATA

### POSITIONER SPECIFICATIONS

#### MODEL VP, VE, & VI

<b>Electrical Input Models VE &amp; VI</b>	4-20 milliamps 40 Vdc Maximum .025 Amp Maximum
<b>Resolution</b>	.10% of span Typical .25% of span Maximum
<b>Repeatability</b>	99.90% of span Typical 99.75% of span Maximum
<b>Hysteresis</b>	.25% of span Typical .50% of span Maximum
<b>Linearity</b>	+/-1.0% of span Maximum
<b>Gain</b>	250 PSIG/PSIG Single Acting 500 PSIG/PSIG Double Acting
<b>Model VP Std Input Ranges</b>	3-15 PSIG Full Range 3-9 & 9-15 Split Range
<b>Model VE Input Ranges</b>	4-20 & 4-12/12-20 MA Electronic Split Range
<b>Model VE Speed Control</b>	APPROX: 5, 20, & 40 Seconds Jumper Selected
<b>VE Voltage Required</b>	12.5 Vdc Min.(equivalent 600 ohm)
<b>VI Voltage Required</b>	4.0 Vdc Min. (170 ohm load)
<b>Stroke Range</b>	0-90 & 0-180 Degrees
<b>Supply Range</b>	30 to 150 PSIG
<b>Air Delivery</b>	10 SCFM @ 80PSIG STD 15 SCFM @ 80PSIG MAX-FLOW
<b>Air Consumption</b>	0.25 SCFM @ 80PSI 0.45 SCFM @ 80PSI MAX-FLOW
<b>Operating Temp.</b>	-40 to +150 F -40 to +65 C
<b>Temp. Effect</b>	.02%/deg F (.04%/deg C)
<b>Vibration Effect SAMA PMC 31.1-80</b>	Less than 2% error 0-120 HZ 2G Acceleration
<b>Pneumatic Connections</b>	1/8 NPT Gauge Ports 1/4 NPT Supply Air Port 1/4 NPT Outlet Ports
<b>Enclosure Classification</b>	Designed to NEMA 4X Watertight, Dusttight & Corrosion Resistant
<b>Enclosure Weight</b>	Approximately 2 LBS

### HAZARDOUS LOCATIONS APPROVALS

The integral I/P converter for the Model VI Positioner has the following Hazardous Location Approvals:

I/P Converter P.N. VK12, Type 22/06-65

Factory Mutual approved for:

Intrinsically Safe:

Class I, Division 1 Groups A,B,C,D

Non-Incendive / Division 2:

Class I, Division 2 Groups A,B,C,D

CSA approved for:

Intrinsically Safe:

Class I, Division 1 & 2, Groups A,B,C,D

For applications in Hazardous Locations reference control Documents No. 900842/900843, available by calling VRC at 513-677-8724 / fax 513-677-8731.

### OPTIONS

#### S1-Mechanical Switches

<b>Contact Form</b>	(2) SPDT Switches
<b>Ratings</b>	10 Amp 125/250 Vac 1/2 Amp 250 Vdc
<b>Operating Temp.</b>	-40 to +185 F
<b>Approvals</b>	UL Recognized/CSA Certified

#### S2-Proximity Switches

<b>Contact Form</b>	(2) SPST Switches
<b>Contact Rating</b>	1 Amp, 120 Vac/200 Vdc 50 Watts Maximum
<b>Operating Temp.</b>	-14 to +150 F
<b>Approvals</b>	UL Recognized

#### T1- 4-20 MA Transmitter

<b>Electrical Input</b>	12 Vdc to 40 Vdc Maximum
<b>Linearity</b>	+/- 1% Maximum
<b>Sensor Hysteresis</b>	0.1 Degree or less
<b>Operating Temp.</b>	-40 to +150 F

### MATERIALS OF CONSTRUCTION

<b>Enclosure</b>	PPA Composite, 300 Series Stainless Steel Rings, Cover & Mtg. Bolts
<b>Indicator Lens</b>	GE LEXAN
<b>Internals</b>	PPA, PPS, & PEEK 300 Series Stainless Steel Nickel Plated Brass
<b>Spool Valve</b>	300 Series Stainless Steel
<b>Signal Diaphragm &amp; O-rings</b>	Buna-N
<b>I/P Module (VK02)</b>	PPS Composite 300 Series Stainless Steel Teflon Coated Carbon Steel Nickel Plated Brass & Steel High Density Polyethylene, & Delrin



## POSITIONER INSTALLATION PROCEDURE

### INTRODUCTION

The Positioner controls the position of a rotary or linear pneumatic actuator and its final control element by modulating the flow of supply air to the actuator in response to a control signal. There are (3) base models available:

- Model VP – pneumatic positioner
- Model VE – electro–pneumatic positioner
- Model VI – electro–pneumatic (for general purpose and Hazardous Locations)

### MOUNTING PROCEDURE

The Positioner can be installed on Single or Double Acting rotary or linear actuators. The procedure is typical and assumes that the optional Universal Mounting Kit is used to mount the positioner to a rotary actuator.

1. Move the actuator to its start position
2. Secure the Universal Bracket to the actuator
3. Mount the Adapter to the actuator shaft

**WARNING: The Adapter must be bolted to the actuator shaft to assure a reliable connection between the Positioner and actuator.**

**CAUTION: The Adapter (coupler) also may need to be machined to the proper length so that the Positioner bottoms out on the Bracket before the Adapter bottoms out inside the Positioner female shaft.**

4. Align the female shaft of the Positioner with the Adapter and slide the Positioner down the actuator shaft until the Positioner is flush with the Bracket

**CAUTION: An interference fit between the Adapter and Positioner shaft greater than 0.001 inch significantly increases the Positioner shaft torque and can damage the Positioner.**

5. Cycle the Positioner and then place it in a mid–travel position. Use the Positioner mounting bolts to secure the unit to the Bracket.

### PNEUMATIC CONNECTIONS

All air ports require user supplied NPT fittings. Unused ports require NPT pipe plugs. Scale free piping should be blown out before installation to prevent dirt and debris from entering the Positioner. Use accepted practice when installing the piping. Install shutoff valves, drains, and seals as required. The piping should slope upward toward the unit to reduce condensation from entering the Positioner. Use flexible connections for supply air and signal air connections.

Use pipe sealant on all air fittings. TEFLON sealant is recommended. Do not use tape.

**CAUTION: Maximum torque for the 1/4 and 1/8 NPT ports is 12 and 6 ft. lbs. respectively.**

The following piping connection procedure assumes the Positioner is properly mounted to the actuator and the actuator is in its start position.

1. Connect outlet ports P1 and P2 to the actuator using 1/4 inch NPT fittings. P1 and P2 are related to gauge ports G1 and G2 respectively.

**P2** is always connected to the actuator port used to move the actuator away from its start position.

**P1** is connected to the remaining actuator port for Double Acting actuators and Single Acting actuators with air assist. Otherwise **P1** is plugged.

2. Connect supply air to the Positioner SUPPLY port using a 1/4 NPT fitting.

3. Model VE & VI Positioners require the SIGNAL port to be plugged and are shipped from the factory with the plug installed. On Model VP Positioners connect the signal pressure to the SIGNAL port using a 1/8 NPT fitting.

**NOTE: See I/P section for wiring instructions**

### SUPPLY AIR REQUIREMENTS

Supply air is required to be clean, dry, and oil free instrument quality air as defined in the ISA–S7.3 specification. Regulated air is not required but a supply air filter should be installed.

**WARNING: Maximum pressure to be applied to the Positioner is 150 PSIG.**

### FEEDBACK CAM

With the Positioner mounted and the actuator at its start position the CAM FOLLOWER and bearing should be at the 0 degree point on the FEEDBACK CAM. Direct or Reverse Acting is accomplished by selecting the D or R side of the FEEDBACK CAM.

### POSITIONER VENT

The Positioner exhausts air through a one way duckbill valve that is integral to the Positioner housing. In applications such as natural gas where the supply gas medium is to be recovered, the vent can be blocked using a cap plug, (VRC part number V00026).

### **WARNING!**

**IF THE CAP PLUG IS INSTALLED IN THE POSITIONER BREATHER VENT THE POSITIONER MUST BE EXHAUSTED THROUGH THE 1/2 NPT CONDUITS. FAILURE TO DO SO CAN RESULT IN BODILY INJURY DUE TO A BUILD UP OF INTERNAL PRESSURE, AND SUBSEQUENT RUPTURE OF THE POSITIONER HOUSING AND COVER!**

### SPECIAL INSTRUCTIONS FOR MODEL VI POSITIONER

The Model VI Positioner is designed for both General Purpose and Hazardous Locations as defined by the National Electrical Code (NEC). The Model VI has an integral I/P converter P.N. VK12 (type 22/06–65) that is FM & CSA approved as Intrinsically Safe and Non–Incendive for use in Hazardous Locations.

For applications in Hazardous Locations reference control Documents No. 900842/900843, available by calling VRC at 513–677–8724 / fax 513–677–8731.



## CALIBRATION PROCEDURE PNEUMATIC SECTION

**NOTE:** The VRC Positioner is calibrated at the factory for 0–90 degree rotation. Small adjustments may be needed due to mounting or differences in actuator rotation.

### PRIOR TO CALIBRATING:

**NOTE:** REF. PAGE 6A FOR DRAWINGS

1. Tools required:
  - Regular screwdriver (for removing HSG cover)
  - For VE models: 4–20MA calibrator
  - For VP models: 3–15 psi signal source
2. This procedure assumes the positioner is correctly mounted to an actuator and supply pressure is on.
3. For VE models, verify the I/P module is calibrated by referring to page 7 of these instructions.
4. For CLOCKWISE and COUNTERCLOCKWISE orientation, the front of the positioner is where the supply air port is located. Ref. figure 3.
5. DIRECT and REVERSE ACTING. Determine which positioner response you require:
  - DIRECT ACTING—is when the actuator is required to rotate Counterclockwise with increasing control signal.
  - REVERSE ACTING—is when the actuator is required to rotate Clockwise with increasing control signal.

After determining your requirement, verify the positioner feedback cam is installed correctly for your application. A "D" is molded on one side of the cam and on the opposite side an "R" is molded.

- For DIRECT ACTING the "D" side should be facing up.
- For REVERSE ACTING the "R" side should be facing up.

### CALIBRATION PROCEDURE

#### ZERO ADJUSTMENT

**NOTE;** ZERO is defined as the START point of actuator rotation.

1. With 3 psi signal pressure applied, verify the actuator is at it's start point by manually deflecting the Balance Beam toward the front of the positioner housing while observing the Feedback Cam and Bearing Holder arrow (ref. figure 3A). The arrow should be pointing at the "0" on the Feedback Cam. If not, turn off supply air and reposition the Cam by removing the Wing Nut and unsplining the Cam. Reposition the Cam as required. Reinstall Wing Nut and turn supply air on.

2. Apply 3 psi signal pressure.

3. Rotate the ZERO Thumbwheel as required
  - Clockwise rotation moves the Zero point upscale on the Cam (toward 90 degrees)
  - Counterclockwise rotation moves the Zero point down scale on the Cam (toward 0 degrees)

**NOTE:** The Zero Thumbwheel is designed to give a feel for the amount of adjustment being made. Each click of the Thumbwheel is a .5 degree adjustment change.

**CAUTION:** Do not force the rotation of the Zero Thumbwheel, the Thumbwheel will rotate freely throughout it's adjustment range and forcing the rotation could damage the adjuster.

4. Zero is adjusted properly when increasing signal pressure from 3 psi to 3.5 psi causes the actuator to rotate away from it's start position (away from 0). Repeat step 3 if required.

#### SPAN ADJUSTMENT

**NOTE:** SPAN is defined as the full travel position of the actuator.

1. Apply 15 psi signal pressure to the positioner.
2. Determine if more or less actuator rotation is required.

**NOTE:** A quick check to verify if the actuator is against the actuator stops is to manually deflect the Balance Beam away from the front of the positioner. If the actuator continues to rotate when the Balance Beam is deflected, an increase in Span adjustment is required.

3. Rotate the SPAN Adjuster as required.
  - Clockwise rotation of the adjuster decreases SPAN.
  - Counterclockwise rotation of the adjuster increases SPAN.

**NOTE:** The Span Adjuster is designed to give a feel for the amount of adjustment being made. Each click of the adjuster is approximately 1 degree of change at the 90 degree setting.

4. SPAN is adjusted properly when decreasing signal pressure from 15 psi to 14.5 psi causes the actuator to move away from the actuator stops (away from 90 deg.). Repeat step 3 if required.
5. Recheck Zero adjustment.



# CALIBRATION PROCEDURE PNEUMATIC SECTION

NOTE; Figure 3A shows the correct relationship for the Cam and Bearing Holder for a DIRECT ACTING application when the actuator is at it's start point of rotation ( 3psi applied).

FIG. 3A

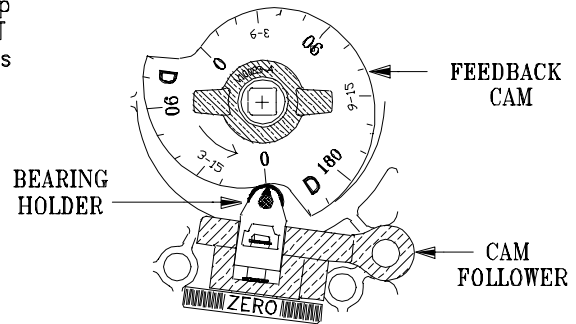
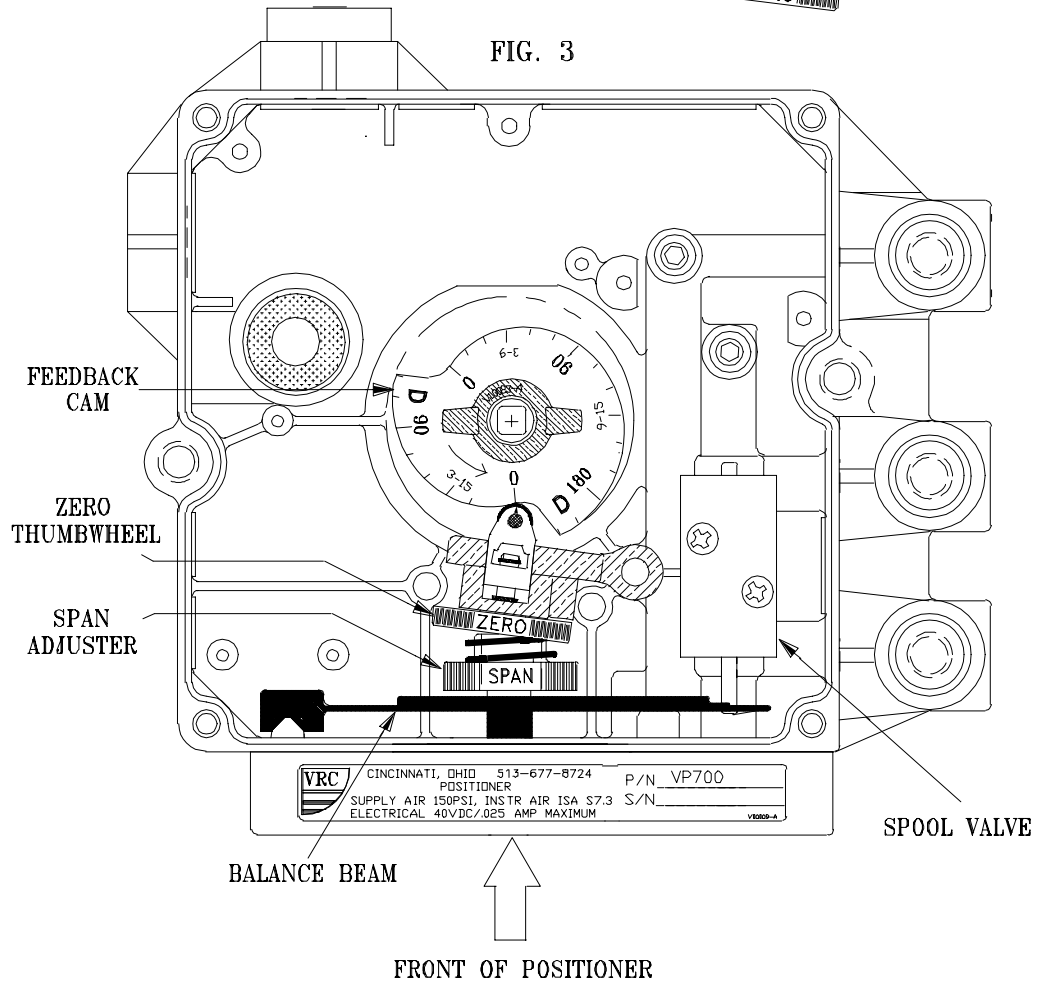


FIG. 3





## VK02 I/P MODULE CALIBRATION PROCEDURE

### CALIBRATION PROCEDURE (POSITIONER MODEL VE)

The VK02 I/P Module comes from the factory pretested and fully calibrated and should not need recalibration on new installations. If the unit appears to need calibration check all pipe fittings and connections for air leaks prior to performing the calibration procedure.

NOTE: To calibrate the I/P MODULE the following is required:

- 0-30 PSI pressure gauge in **SIGNAL PORT**
- 4-20 MA calibrator (min. 12volt output)
- Small regular screwdriver
- 3/16 Allen wrench

Reference figure 4.

### BIAS PRESSURE ADJUSTMENT

This adjustment ensures a proper mechanical relationship between the **CONTROL NOZZLE** and the teflon coated **DIAPHRAGM**.

1. With supply pressure applied and **NO** electrical signal applied, check the signal pressure gauge. The gauge should read 2.5 to 3.0 PSI.

2. If required, using the 3/16 Allen wrench, adjust the **BIAS PRESSURE SCREW** to obtain 2.5 to 3.0 PSI. Clockwise decreases pressure, counterclockwise increases pressure. Typically only small adjustments will be required.

NOTE: If the pressure does not adjust or there is no pressure showing on the **SIGNAL PRESSURE GAUGE** there may be an air leak, check to ensure the **SIGNAL PORT** has been plugged and all o-rings are installed, also check for any leakage at the gauge.

CONTINUING TO ADJUST THE BIAS PRESSURE SCREW UNDER THESE CONDITIONS CAN DAMAGE THE MODULE.

### ZERO/SPAN ADJUSTMENT

1. With supply pressure still on, apply 4 milliamps to the **I/P MODULE**, adjust the **ZERO POT** for 3 PSI.

2. Apply 20 milliamps, adjust the **SPAN POT** for 15 PSI.

3. ZERO and SPAN interact, repeat steps 1 and 2 and readjust as required.

