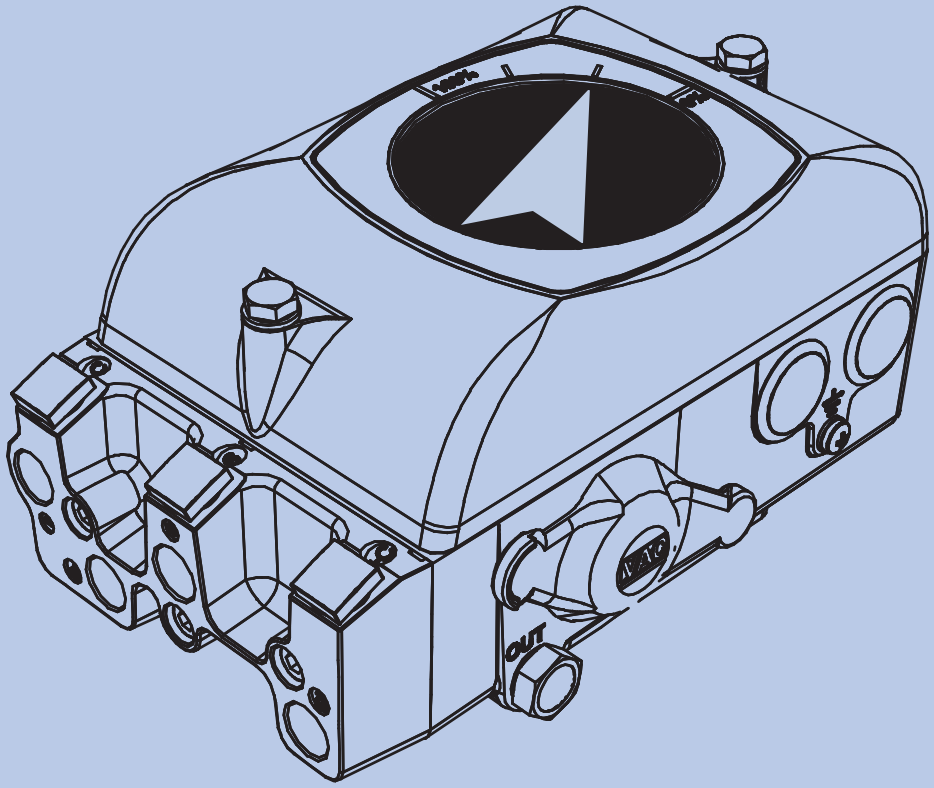
VAC, Valve Accessories & Controls.
www.vac.se

V200 POSITIONER

Datasheet



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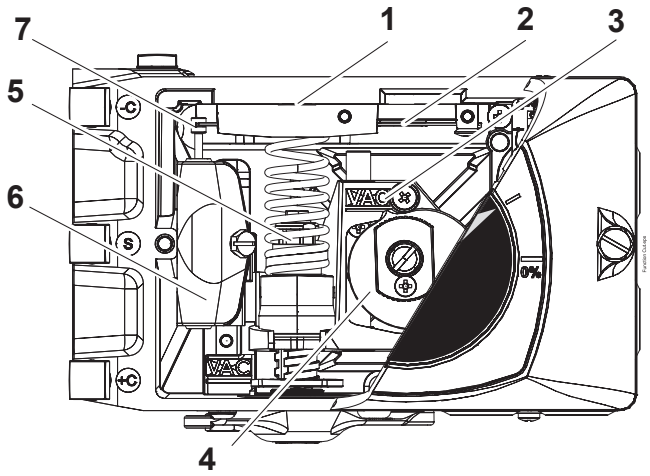
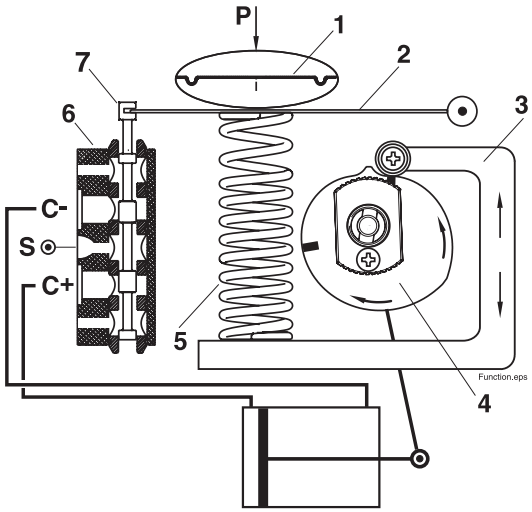
1 INTRODUCTION

1.1 Principle of Operation

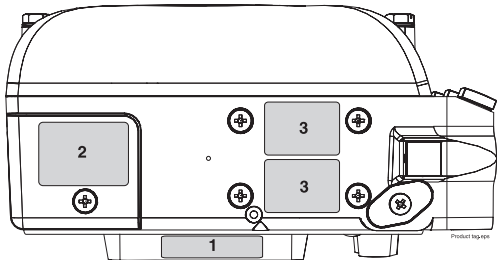
The V200 incorporates the force balance principal of operation. The desired value, in the form of pressure, affects the membrane(1) with the force that is created and transferred to the balance arm(2). The opposing force, which represents the actual control value, is provided by the feedback spring(5) and creating force in the opposite direction on the balance arm(2). The feedback spring, resting on the feedback arm(3), is positioned by the shape and response of the cam. The cam(4) is connected to the cylinder's (actuator) piston rod via the drive.
The pilot valve(6) is connected to the balance arm and follows the balance arm's movement. The system is stable when the gold plated spool(7) is in the neutral position and the forces that affect the balance arm is in equilibrium.
As soon as a signal change occurs or a change in the position of the valve/actuator package occurs, the "force balance" is also changed and the spool responds. Air immediately begins to flow into the part of the actuator (C+ or C-) which allows the feedback mechanism to return the spool to the neutral position.
The system is self-stabilizing and searches for a steady state position.





1.2 Product identification

The V200 identification tags, Serial number tag(1), product model tag(2) and feedback option tags(3), are placed as shown.
The product model tag contains information on control signal, maximum working pressure and temperature ranges. Other information can be shown depending on the model.



1.3 Air quality recommendations

Poor air quality is one of the main causes of premature functional problems with pneumatic and electro pneumatic equipment. The pilot valve and IP-converter are precision instruments, and are therefore the most sensitive parts of the positioner.

a) Water in the supply air is a natural occurrence. This happens when air is compressed. The compression heats the air and the natural degree of water in the air can remain as moisture. When the air cools in pipes etc.
the moisture condenses and becomes liquid water. Large quantities can build and sometimes flood small water separators. This excess water will eventually reach the control valve and positioner. This can cause corrosion damage to the IP converter, causing the unit to malfunction.

We strongly recommend the use of water separators with adequate capacity. Coalesing filters from a reputable manufacturer is an inexpensive way to help prevent unit malfunctions or failures, and add life to the product. These filters remove particles and moisture from air lines.

b) Oil in the supply air usually is from the main compressor. Oil can clog the small nozzles and disturb the flapper in the IP-converter. It can also cause the gold plated spool to “drag” within the pilot valve. The result is poor control or in the worst case, failure.

c) Particles in the air usually occur because of corrosion. Dirt and particles can block the small nozzles of the IP-converter.
They can also cause the pilot valve to malfunction. The unit may completely fail.

To ensure normal operational safety with VAC positioner products, we recommend that a water separator and a <80 micrometer filter are mounted as close to the product as possible. If large amounts of oil are present an oil separator should be installed as well.

To further increase operational safety, we recommend that the working air is clean, dry and free of moisture, water, oil, particles and other contaminants, in accordance with the standard ANSI/ISA– 7.0.01– 1996

1.4 Safety Instructions

CAUTION: Beware of moving parts when positioner is operated!

CAUTION: Beware of parts with live voltage!
A voltage, which is normally not dangerous, is supplied to the positioner.
Avoid touching live parts and bare wires as well as short circuiting live parts and the housing.

CAUTION: Do not dismantle a pressurized positioner!
Dismantling a pressurized positioner will result in uncontrolled pressure release. Always isolate the relevant part of the pipeline. Release the pressure from the positioner and the piping. Failure to do this may result in damage or personal injury.

CAUTION: Do not exceed the positioner performance limitations!
Exceeding the limitations marked on the positioner may cause damage to the positioner, actuator and valve. Damage or personal injury may result.

2. INSTALLATION

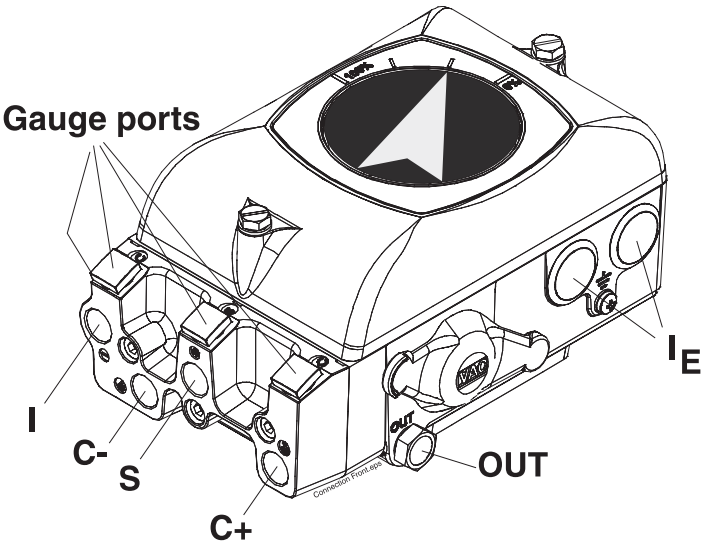
2.1 Connections

S – Supply air
V200P: max. 10 bar / 1 MPa / 145 psi
V200E: 1,5 - 10 bar / 0,15 - 1 MPA / 23 - 145 psi

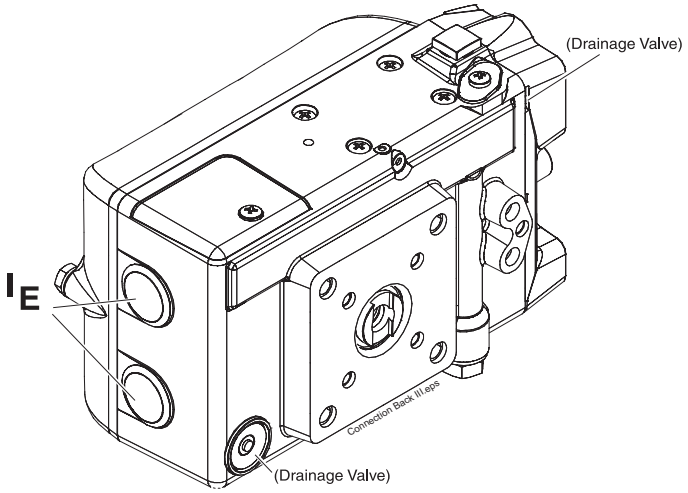
I – Input, pressure signal
V200P: 0,2 1 bar / 20 -100 kPa / 3-15 psi
V200E: Plugged

I_E – Input, current signal
V200E: 4-20 mA (Ri max 250 ohm)
V200P: Plugged

C+ - Actuator connection + stroke
C- - Actuator connection - stroke



OUT - All air from the actuator, IP and positioner is vented through this port.
Standard equipped with a bug screen/silencer



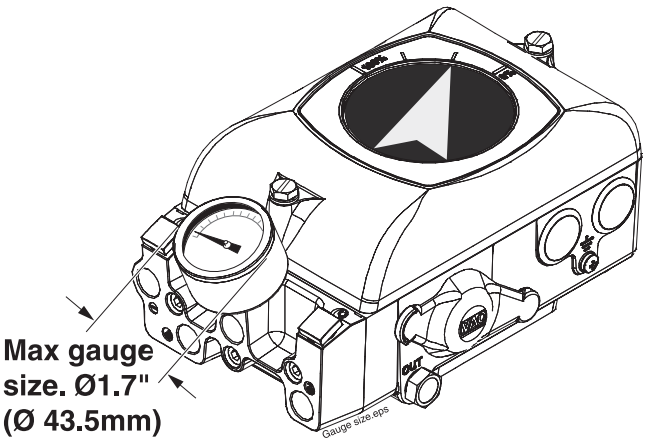
Air connections for male 1/4” NPT or G 1/4”.

Gauge connections for male 1/8” NPT or G 1/8”.

Cable entry for male 1/2” NPT or M20 cable fittings.

G threads are indicated by an engraved G on the air connection side of the positioner.

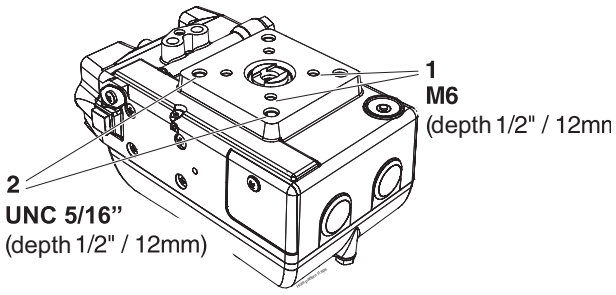
Gauge ports I, C+, C- and S are factory plugged. Remove plugs and replace with gauges.



The IP connection must be plugged in V200E.
The IE entrys should be plugged in V200P

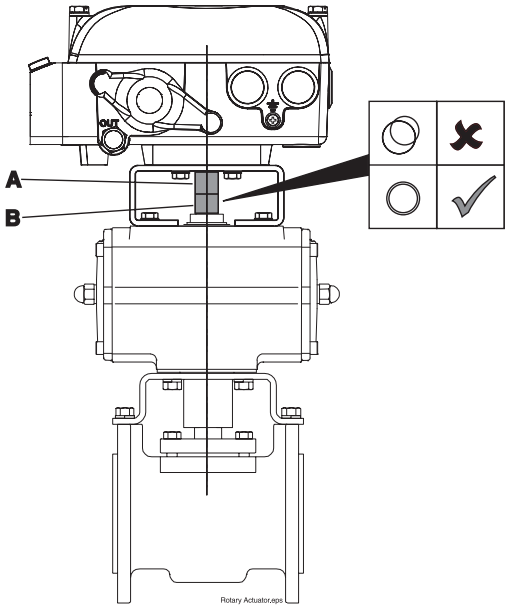
2.2 General mounting instructions.

The V200 has the ISO F05 hole pattern(1) and 2¼" x 2¼" hole pattern(2).



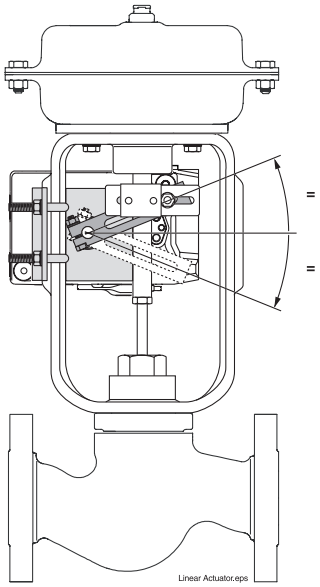
2.2.1 Rotary actuator

The VAC V200 has a very stable and properly sized drive shaft bearing. However, the positioner drive(A) should be aligned properly to the rotary actuator spindle(B).
A relatively small error combined with a rigid coupling can create very powerful radial forces, which can overload and cause premature wear.



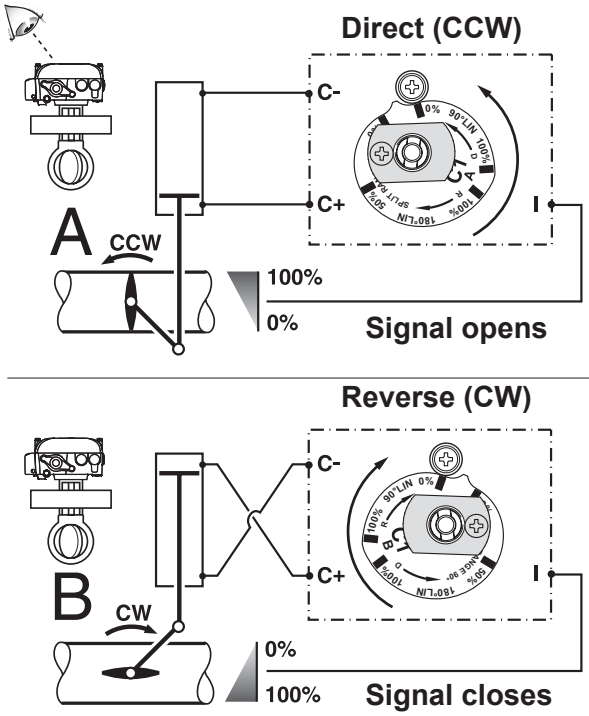
2.2.2 Linear actuator

When mounting to linear actuators, the positioner should be attached in such a way that its drive is in the center (mid stroke) of the actuator's stroke. Proper installation and alignment will minimize linearity error.

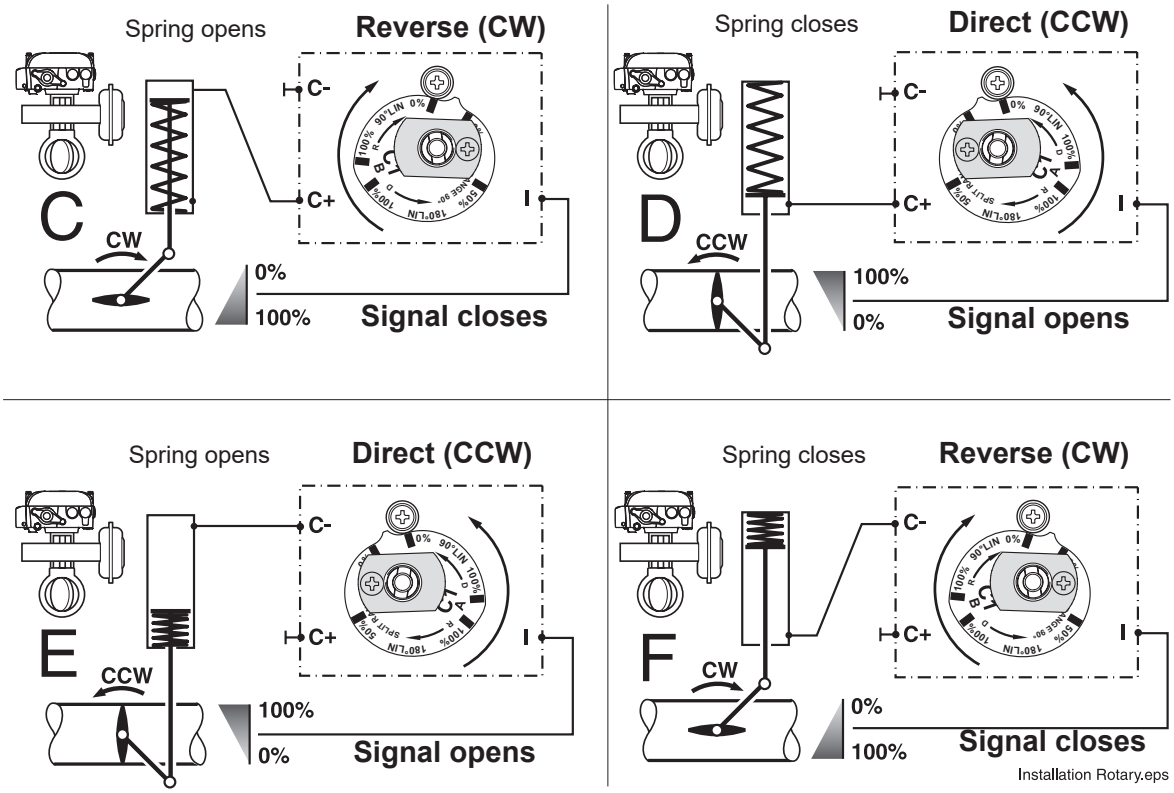


2.3 Installation instructions for rotary actuators

2.3.1 Double acting



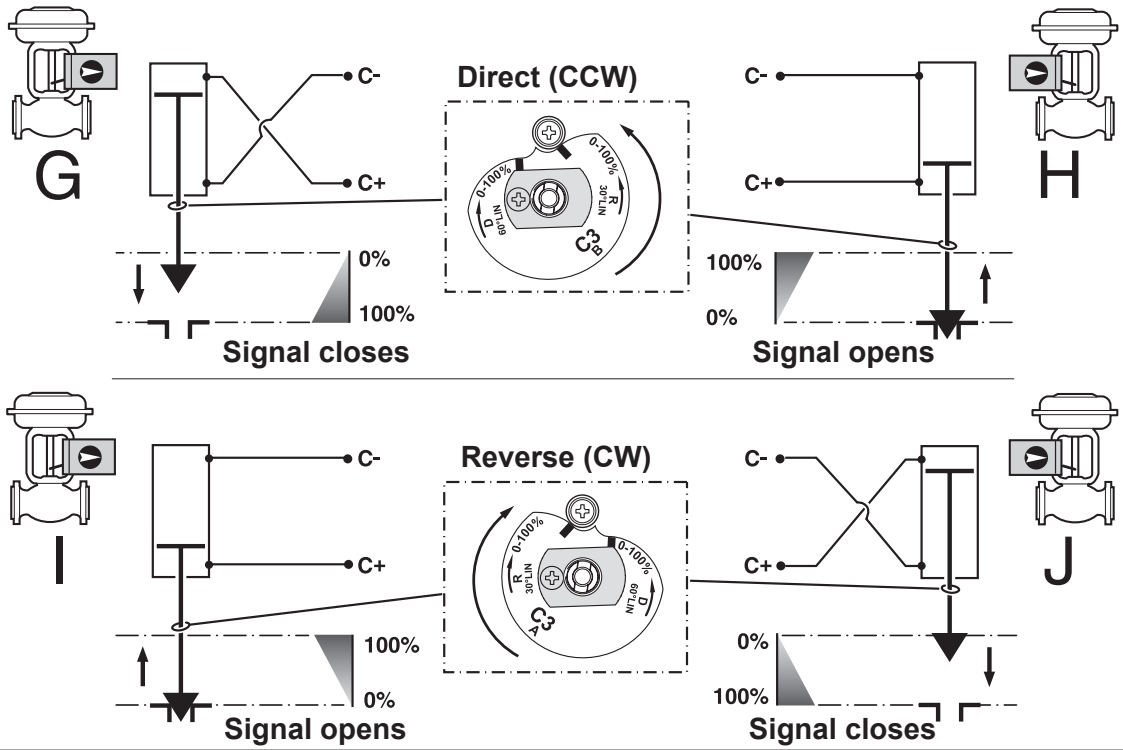
2.3.2 Single acting



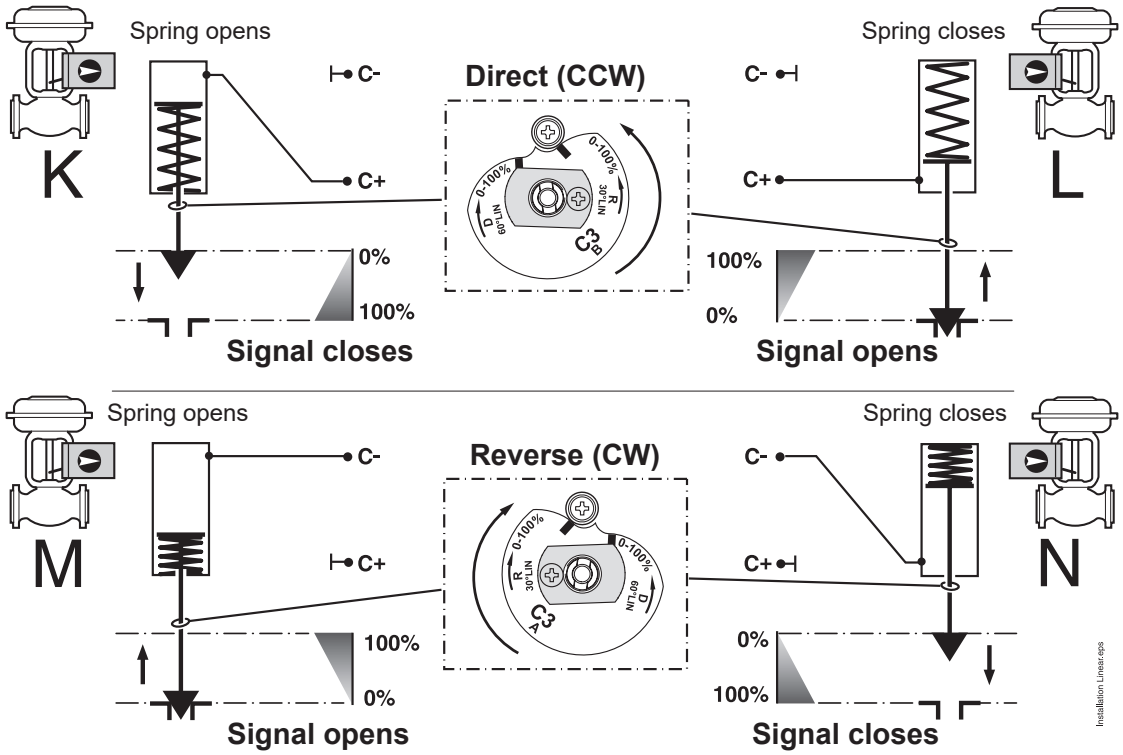
Installation Rotary.eps

2.4 Installation instructions for linear actuators

2.4.1 Double acting



2.4.2 Single acting



2.5 Cam

The V200 is standard shipped with the C1-cam, factory set for 90° ±1°, direct (CCW) turning.

2.5.1 Adjustments

Remove the front cover and indicator.
(see page 15)

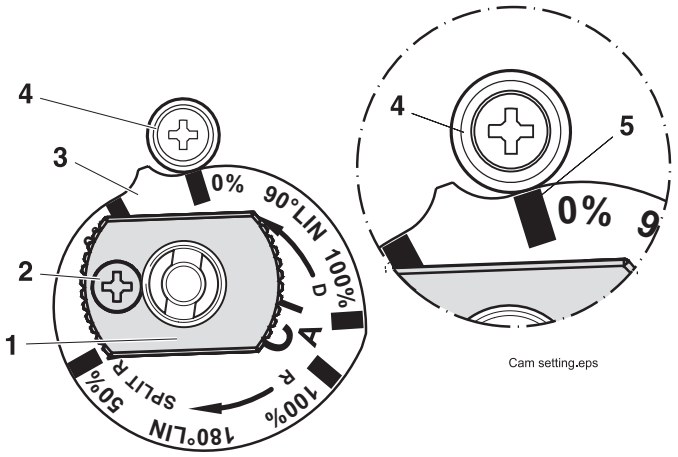
1. Loosen the locking screw(2) and the cam nut(1).

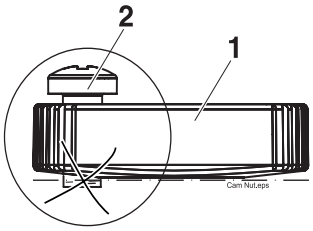
2. Stroke the valve/actuator to the stop/end position at 0% input.

3. Turn the cam(3) so that the index mark(5) for the selected curve aligns with the ball bearing(4). A small gap between the roller and the cam tip is desirable.

4. Tighten the cam nut by hand(1).
   Check that the locking screw(2) is still loose.
   (if not, loosen the locking screw slightly and tighten the nut again).

5. Tighten the locking screw(2).
   Do not tighten cam nut with screw(2) down.



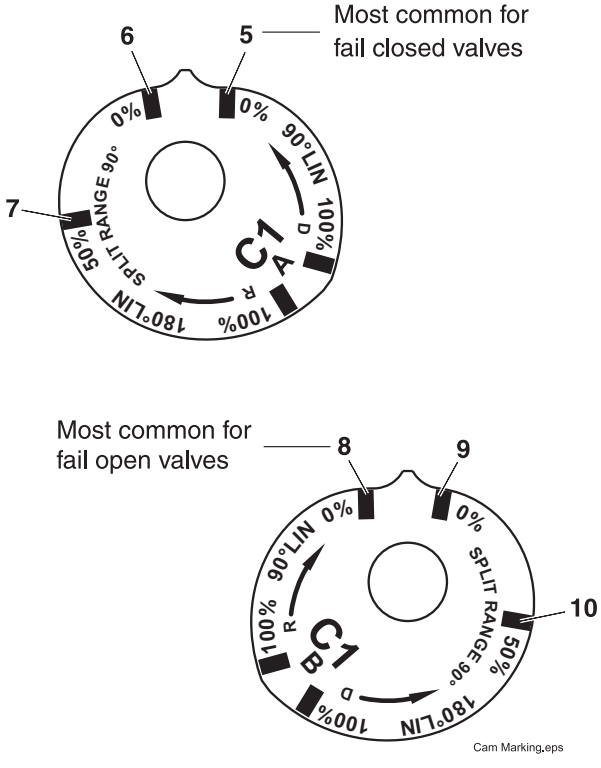


2.5.2 Cam specifications C1

Index mark / Starting point of rotation *

5.	90°	Linear 0-100%	CCW
6.	180°	Linear 0-100%	CW
6.	90°	Linear 0-50%	CW split range
7.	90°	Linear 50-100%	CW split range
8.	90°	Linear 0-100%	CW
9.	180°	Linear 0-100%	CCW
10.	90°	Linear 0-50%	CCW split range
11.	90°	Linear 50-100%	CCW split range

*Increasing signal rotation.
Most valves rotate CW to close / CCW to open



When field reversing action of positioner tubing must be reversed as well (see page 7 and 8)

3. SPECIFICATIONS

3.1 Specifications V200

	Pneumatic **V200P**	Electropneumatic **V200E** (WS 122 I/P. DDV010)	Electropneumatic Intrinsically Safe **V200IS** (WS 122 I/P. DFV010)
Input Signal:	0,2-1 bar / 3-15 psi	4-20mA (Max.:Ri 250 Ohm)	4-20mA (Max.:Ri 250 Ohm)
Supply Pressure:	<10 bar / <1MPa / <145 psi	1,5-10bar / 0,15-1MPa / 21,8-145 psi	1,5-10bar / 0,15-1MPa / 21,8-145 psi
Linearity error:	<0.7% f.s	<1.0% f.s	<1.0% f.s
Hysteresis:	<0.4% f.s	<0.6% f.s	<0.6% f.s
Repeatability:	<0.3% f.s	<0.5% f.s	<0.5% f.s
Temperature range:	-40 bis +85 °C -40 bis +185 °F	-40 bis +85 °C -40 bis +185 °F	-40 bis +85 °C * -40 bis +185 °F* *Temp.range depending on certification
Values with standard pilot valve, **LB** installed.			
Pressure gain: @ 6bar / 600kPa / 87 psi	240:1	240:1	240:1
Bleed Rate: @ 6bar / 600kPa / 87 psi	Nm^3/h 0,34 (Nl/min) (5,6)	Nm^3/h 0,42 (Nl/min) (7,0)	Nm^3/h 0,42 (Nl/min) (7,0)
Air Delivery @ 6bar / 600kPa / 87 psi	Nm^3/h 48 (Nl/min) (800)	Nm^3/h 48 (Nl/min) (800)	Nm^3/h 48 (Nl/min) (800)
Air connections:	1/4" G (optional NPT threads)	1/4" G (optional NPT threads)	1/4" G (optional NPT threads)
Gauges:	1/8" G (optional NPT threads)	1/8" G (optional NPT threads)	1/8" G (optional NPT threads)
Cable entry:	M20x1,5 (optional 1/2¨ NPT)	M20x1,5 (optional 1/2¨ NPT)	M20x1,5 (optional 1/2¨ NPT)
Ingress & corrosion protection:	NEMA 4X and IP66	NEMA 4X and IP66	NEMA 4X and IP66
Standard coating:	Polyester	Polyester	Polyester
Weight:	1,45kg (3,2 lbs)	1,7kg (3,8 lbs)	1,7kg (3,8 lbs)
Weight with gauges:	1,54kg (3,4 lbs)	1,9kg (4,2 lbs)	1,9kg (4,2 lbs)

Valve types. (SG/LB valve is installed as standard)			**SG/LB**	**SHG (3)**	**SHGSHF (4)**
Pressure Gain:	@ 2bar / 0,2MPa / 29 psi	Poutput / Pinput	80	367	370
	@ 6bar / 0,6MPa / 87 psi	Poutput / Pinput	240	1100	1100
	@ 10bar / 1,0MPa / 145 psi	Poutput / Pinput	400	1833	1830
Pressure Gain: Acc. to ISA S75.13	Any	%Poutput / %Pinput	16	79	72
Air Delivery:	@ 2bar / 0,2MPa / 29 psi	Nm^3/h/(Nl/min)	16,2 / (270)	17,82 / (297)	28,2 / (470)
	@ 6bar / 0,6MPa / 87 psi	Nm^3/h/(Nl/min)	48 / (800)	53,4 / (890)	84 / (1400)
	@ 10bar / 1,0MPa / 145 psi	Nm^3/h/(Nl/min)	79,8 / (1330)	89,2 / (1486)	139,8 / (2330)
Bleed Rate:	@ 2bar / 0,2MPa / 29 psi	Nm^3/h/(Nl/min)	0,2 / (3,4)	0,47 / (7,9)	0,74 / (12,3)
	@ 6bar / 0,6MPa / 87 psi	Nm^3/h/(Nl/min)	0,34 / (5,6)	1,41 / (23,5)	2,21 / (36,8)
	@10bar / 1,0MPa / 145 psi	Nm^3/h/(Nl/min)	0,6 / (10,0)	2,35 / (39,1)	3,68 / (61,3)

Options: Feedback Spring for 0,4-2 bar / 40-200kPa / 6-30 psi input signal. Gauges. Stability kit, feedback modules.

3.2 Ordering Codes

Pneumatic	V200**P**
Electropneumatic	V200**E**
Explosion Proof	V200**EX**
Intrinsically Safe	V200**IS**
Fail Freeze	V200**FF**

Spindle D**1 Namur** (standard)
For additional spindle options, please contact VAC or visit our website at www.vac.se

Front Cover

90 degree rotation	**90**
60 degree rotation	**60**
45 degree rotation	**45**
30 degree rotation	**30**
Blank scale	**00**

Indicator Arrow	**A**
Standard Beacon/Raised (Black/Yellow)	**B**
Optional Beacon/Raised (Red/Green)	**BRG**

Cam (standard) 90° **C1** (standard)
For additional cam options, please contact VAC or visit our website at www.vac.se

Spool Valve Options (shipped with standard spool)

Standard (Low Bleed)	**SG/LB—Shipped as Standard**
Super High Gain	**SHG (3)**
Super High Gain Super High Flow	**SHGSHF (4)**

Options

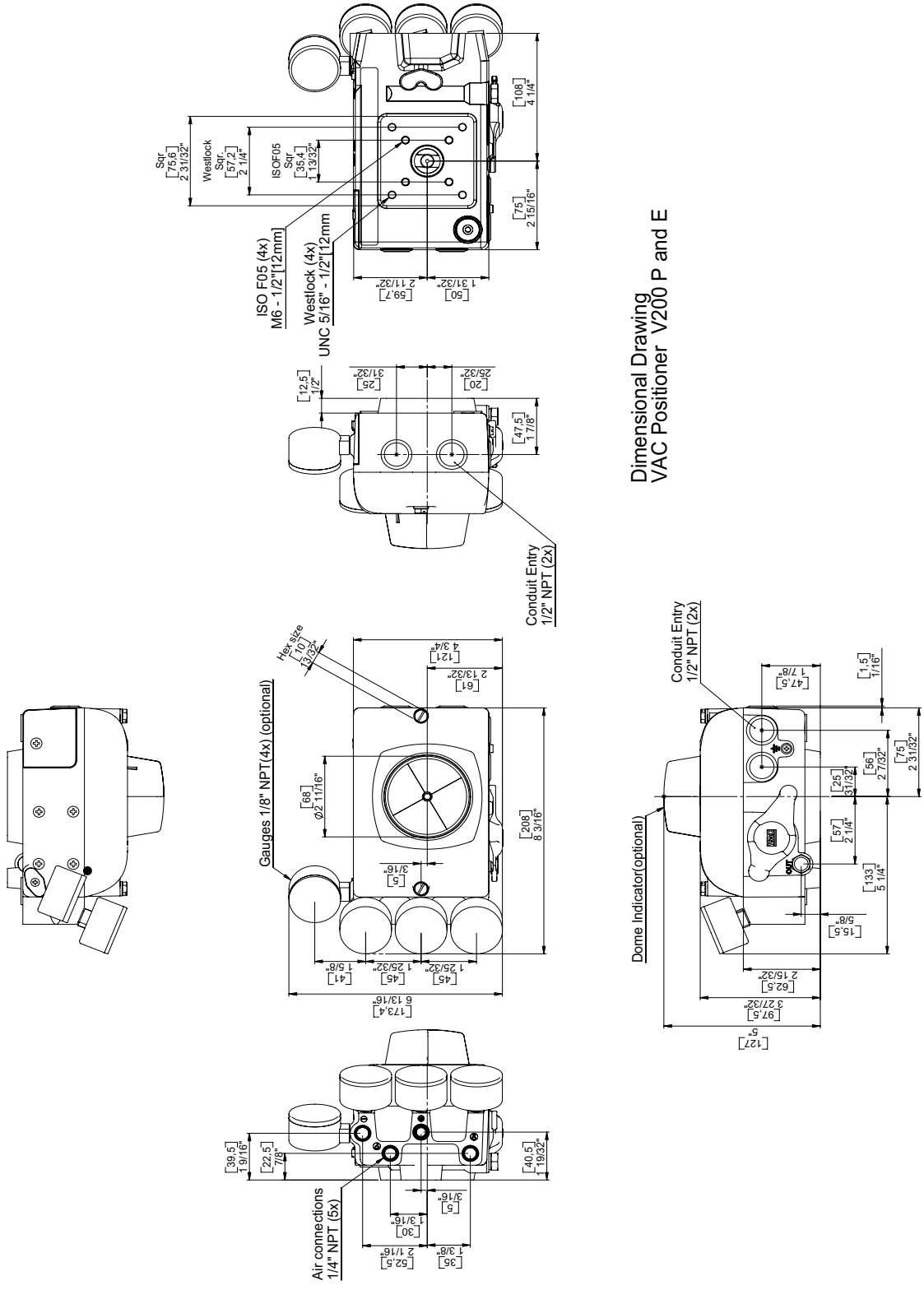
Extra High Temp (Pneumatic only) (-40 to +163 °C / -40 to +325 °F)	**EHT**
Low Temp (Pneumatic only) (-50 to +85°C / -58 to +185 °F)	**LT**
0/10 Volt I/P (V200E only)	**0/10V**
Gas Approved	**GA**
ATEX	**ATEX**
Tufram® Coating (V200 P and E)	**TUF**
Nickel Coating (V200 P and E)	**NIC**
40-200kPa / 6-30 psi Spring	**6-30**

Feedback Options	**FB**
2 SPDT Mechanical Switches	**M**
2 SPDT Reed Switches	**R**
2 SPDT Inductive Switches	**N**
4-20 mA Transmitter	**mA**
Mech Switches w/transmitter	**MmA**
Reed Switches w/transmitter	**RmA**
1 K potentiometer	**1K**
10 K potentiometer	**10K**

Example:
V200E-D1-90-B-C1
Electropneumatic with namur spindle, 90 degree cover, raised indicator, 90 degree cam
Example:
FB-MmA Mechanical switches with 4/20 mA transmitter.

4. DIMENSIONS

4.1 V200P/E std



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Connections that last.

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