Engineered Reliability and Precise Control

Hydraulic/Pneumatic R-DDV® Servovalves

WOODWARD

Superior Performance

R-DDV® Servovalve
Principles of Operation

The Woodward HRT R-DDV® (Rotary Direct Drive Valve) Servovalve is a proven, unique and rugged servovalve design. The limited angle, rotary torque motor drives a valve spool directly through an “eccentric” built into the motor shaft. Rotary operation of the motor results in linear spool motion which modulates fluid flow through the control ports of the valve.

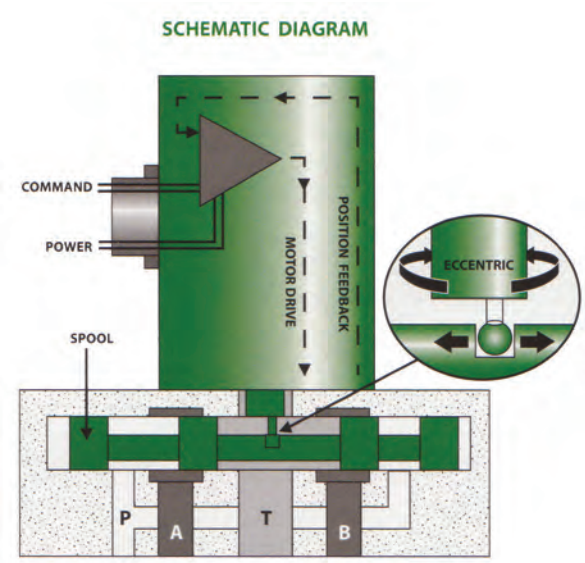
The R-DDV® Servovalve utilizes an integrated electronic controller that is packaged into the torque motor housing. The controller compares spool position, which is monitored by an electronic device within the motor, with the input command signal. The resulting difference generates a current signal that drives the motor to the commanded position. The signal is electronically enhanced to ensure optimum valve performance and linearity.

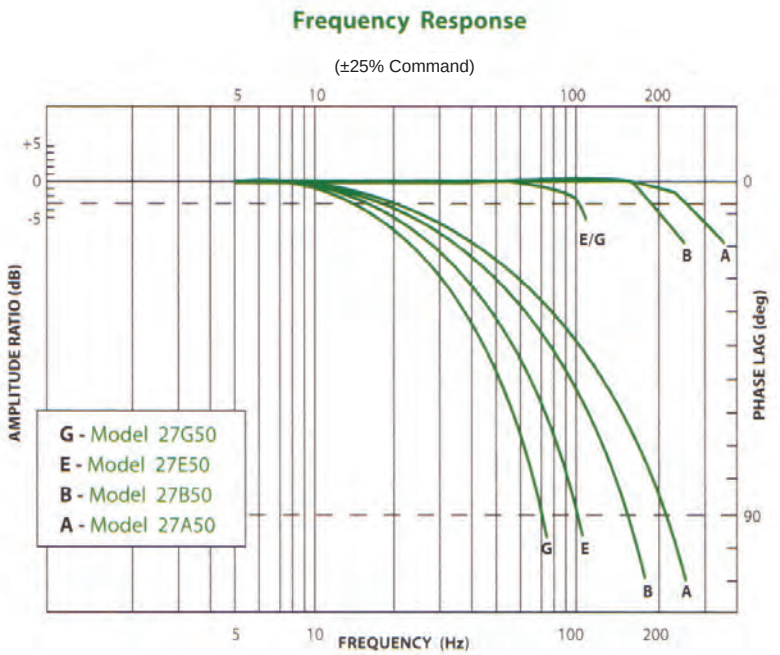
Performance
- Fast valve response independent of pressure (electric drive)
- Low internal leakage
- Operating pressures from vacuum to 5000 psi

Reliability
- Exceptional reliability (no nozzles, jets or filters to plug)
- Stainless steel body
- Vibration rated 40 g’s
- Shock rated 60 g’s
- Low parts count

Flexibility
- Compact size
- Hydraulic or pneumatic operation
  - 0.10 – 60 gpm hydraulic flow
  - 0.22 – 136 scfm pneumatic flow
- Easily interchangeable
- Variety of input commands (mA and Volts)
- ATEX certified for hazardous environments for model 27G

Ease of Use
- Four pin electrical connector or pigtails
- Electronic control cards available
- Standard Fluid Power Interfaces





and Exceptional Reliability

MODEL EC250GP

General Purpose PID Control Card

(Shown with Card Holder CH250 enabling convenient mounting of the EC250GP control card. Electrical connections are made via screw terminals)

This cost-effective PID card for closed loop servo systems provides great adjustability and a wide array of options to easily adapt to your application.

- Provides all position control loop functions for one servovalve with electronic feedback device.
- Designed for use with all Woodward HRT R-DDV® Servovalves or other compatible servovalves.
- Second feedback loop for pressure control or special applications. Allows Acceleration, Force, Velocity, or Pressure feed back as primary loop or summed with position.

Front Panel Controls

- Proportional, Integral, and Derivative (PID) gains on position loop
- Actuator Position – Minimum Command (zero)
- Actuator Position – Maximum Command (span)
- Actuator Velocity Limit (maximum servovalve command)
- Proportional and Derivative gains on second loop
- "Wire Break" Indicator lamp
- Manual Input Jack for user-supplied 1K pot or Woodward HRT Manual Control Potentiometer Assembly

Analog (0 – 10 Volt or 4 – 20 mA) input

Analog (±5 Volt) valve drive output

Card size: 6.3" x 4.0" (3U form factor)

Connector: DIN 41612 F48

On-board 10 Volt reference supply

Analog (0 – 10 Volt or 4 – 20 mA) position feedback

On-board LVDT signal conditioning

Strain Gage signal conditioning on second loop for force or pressure transducer

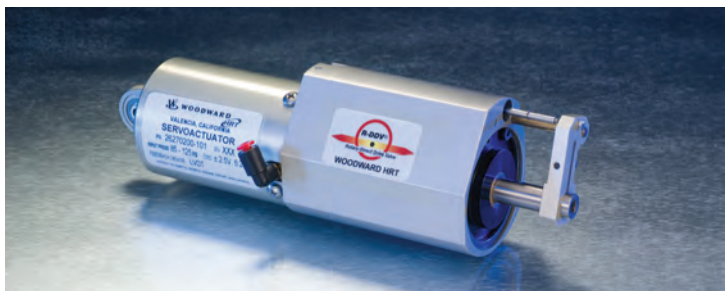
Options

Manual Control Potentiometer Assembly (TT200PT)

CH250 single card holder with screw terminals

MODEL EFB

Integrated Pneumatic Servoactuators



This complete, high performance, pneumatic actuator is for applications requiring superior analog operation.

- Model 27A50 R-DDV® Servovalve
- Low-Breakaway Friction
- Built-in Anti-rotation
- Low Installed Cost
- Easy Field Adjustment
- Simple Interface Requirements
- Unsurpassed Low Pressure Operation

Options

Feedback Potentiometer or LVDT

Command Input – Various Analog Voltage or Current

Standard Sizes Available

- Bore - 1, 2, and 2-1/2 Inch Diameter
- Stroke to 2 Inches

Model (5)	Mounting O-ring (5) (Port Size) [Bolt Size]	Rated Flow (±10%) Oil (gpm) @ 1000 psid	Rated Flow (±10%) Air (scfm) @ 100 psi	Internal Leakage (Max) Oil (gpm) @ 1000 psid	Internal Leakage (Max) Air (scfm) @ 100 psi	Max Continuous Steady State Operation Supply Pressure (psi)	Max Continuous Steady State Operation Power Supply Current (amps)(1)	Chip Shear (lbs)(1)	Electrical Interface (2)
27A50 (0.480 port circle) 2.03 x 1.30 x 3.4 high 0.8 lbs	.237 ID x .040 w (0.15 diameter) [0.138-32 x 1.0]	0.18 0.4 0.9 1.8 3.5	0.4 1 2 4 8	0.02 0.03 0.04 0.03 0.05	0.06 0.09 0.12 0.09 0.16	5000	0.1 0.15 0.25 0.45 1	19	**4 wires:** 2 power & 2 command
27B50 (D03) 3.75x 1.72 x 3.82 high 1.9 lbs	AS568 - 012 (0.31 diameter) [0.190-24 x 0.875]	0.6 1.2 2.5 5 8 11	1.5 3 6 11.5 18 25	0.03 0.03 0.05 0.08 0.11 0.15	0.09 0.09 0.16 0.25 0.36 0.5	5000 5000 5000 3000 (3) 2000 (3) 1000 (3)	0.2 0.4 0.9 1 1 0.9		(In-line Connectors Available)
27E50 (0.875 port circle) 4.05 x 3.15 x 5.3 high 5.1 lbs	AS568 - 013 (0.365 diameter) [0.312-18 x 1.5]	10 15 20	23 34 46	0.15 0.20 0.25	0.46 0.68 0.80	5000	0.6 0.2 0.2	50	**Connector:** CF3102E-14S-2P
27G50 (1.75 port circle) 6.2 x 3.0 x 7.0 high 10.7 lbs	AS568 - 018 (0.565 diameter) [0.312-18 x 1.5]	30 40 60	68 92 136	0.4 0.5 0.6	1.4 1.8 2.7	5000 5000 3000 (3)	0.7 0.9 0.9	83	**Mates with:** MS3106F-14S-2S

All Models	
Rated Pressure	Static: 5000 psi all ports / Impulse: 5000 psi P A B ports, 1000 psi T port
Null Bias	< ± 1.0% of Rated Command
Threshold (Max)	< 0.5% of Rated Command
Hysteresis (Max)	< 1.0% of Rated Command
Operating Temperature Range	-40° to +185° F (4)
Recommended Fluid Cleanliness	ISO 4406 code 16/13
Power Supply Required	24 VDC, 2.0 amps
Command Input Signal	±VDC or ±mA, a variety of options available - see **www.r-ddv.com**

(1) Power supply current for high frequency operation and chip shear: up to 2 amps maximum
(2) See **www.r-ddv.com** for wiring polarity
(3) Listed supply pressure is for continuous steady state operation at 100% command. Operation up to 5000 psi is possible for less than 100% command and/or less than continuous operation. Consult Woodward HRT
(4) Higher temperature operation available. Consult Woodward HRT
(5) Dimensions in inches

WOODWARD

25200 W. Rye Canyon Road, Santa Clarita, CA 91355 (888) 659-4229

R-DDV® Part Numbering System

(basic part number) (options)

Example Part Number: 27B50F - 6F01 G -999

Basic Configurations

Model	Port Circle	Bolt Pattern
27A50F	0.48"	.938" X 1.032"
27B50F	------ D03 -------	
27E50F	0.875"	1.750" X 2.562"
27G50F	1.75"	2.375" X 3.625"

O-Ring Material

Code	Description
-	Nitrile (std config)
V*	Viton

* at additional cost

Electrical Commands

Code	Command	Impedance (ohms)
01	± 5 V	50K
02	± 10 V	50K
03	± 5 mA	1000
04	± 50 mA	100
05	0 to +10 V	50K
06	± 40 mA	125
07	± 2 V / ± 5 mA	403
08	± 3 V / ± 7.5 mA	403
09	± 5 V / ± 12.5 mA	403
10	+4 to +20 mA	620
11	± 10 mA	500
12	± 8 mA	620
13	± 12 mA	412
14	± 20 mA	250
15	± 10 V / ± 20 mA	500
16	± 2.5 V	50k
17	± 100 mA	25
18	± 2.5 V / ± 6.2 mA	403

Flow Rate

Model	Code	gpm*	scfm**	Cv ***	Max Pressure	Std Lap****
27A	**0M**	0.18	0.45	0.008	5000 psi	5% UL
	1E	0.4	1.0	0.018	5000 psi	5% UL
	2F	0.9	2.0	0.036	5000 psi	2% OL
	3D	1.8	4.0	0.071	5000 psi	10% OL
	4K	3.5	8.0	0.14	5000 psi	10% OL
27B	**2B**	0.6	1.5	0.027	5000 psi	
	3C	1.2	3.0	0.054	5000 psi	-995
	4D	2.5	6.0	0.11	5000 psi	or
	5E	5.0	11.5	0.21	3000 psi	-999
	6F	8.0	18	0.32	2000 psi	
	7G	11.0	25	0.45	1000 psi	
27E	**3B**	10.0	23	0.41	5000 psi	-995
	4A	15.0	34	0.61	5000 psi	or
	5C	20.0	46	0.82	5000 psi	-999
27G	**3F**	30.0	68	1.22	5000 psi	-995
	5F	40.0	92	1.64	5000 psi	or
	9F	60.0	136	2.44	3000 psi	-999

* 4-way flow, oil, 1000 psid ** 4-way flow, air, 100 psig *** Per orifice
**** See table: 'Options: Spool Lap' for -995 and -999 description. All the standard overlapped options are electrically compensated to Zero-lap.

Options: Leadwire / Connector (leave blank for standard)

Code	Option
Models 27A and 27B	
Blank	10" 4-wire shielded leadwire cable (standard configuration)
A*	10" 4-wire cable w/ 2-pin Continental (24V) & Elco (Cmd) connectors
B*	10" shielded cable w/ 6-pin MS3101F-14S-6P, Bosch 4-lead pin-out
C*	20 foot, 4-wire shielded leadwire cable
F*	3 foot, 4-wire shielded leadwire cable
G*	10" shielded leadwire cable w/ 4-pin MS3101F-14S-2P connector
H*	10" leadwire cable w/ 4-pin Van Brakel connector VBE4-BRN
Models 27E and 27G	
Blank	4-pin MS connector CF3102E-14S-2P (standard configuration)
B	6-pin MS connector CF3102E-14S-6P, Bosch 4-lead pin-out
J*	6-pin MS connector CF3102E-14S-6P, with position output

* at additional cost for other than standard (Blank)

Options: Spool Lap

3-digit code used for model 27A, only when specifying non-standard lap condition
3-digit code required for model 27B, 27E, and 27G (-995 or -999 included in base price)

Code	Option
Blank	Std machined lap, electrically compensated to apparent Zero-lap (27A)
-999	Flow ground to Zero-lap (cost adder 27A)
-998*	Flow ground to 3% UL
-997*	Standard machined OL, no electrical compensation for lap
-996*	'Zero Flow' shut-off at zero command
-995	Flow Ground to 10% OL, electrically compensated to Zero-lap (cost adder 27A)
-8XX*	No Internal Fuse
-XXX*	Contact WHRT for other special considerations

*at additional cost for other than standard lap

Example Part Numbers:

27B50F-6F01C-999: *27B, Nitrile seals, 8.0 gpm, ±5V, 20 foot 4-wire shielded leadwire cable, Zero-Lap*

27A50F-3D02: *27A, Nitrile seals, 1.8 gpm, ±10V, std 10" 4-wire shielded leadwire cable, std 10% OL w/ electrical compensation to apparent Zero-Lap*

27G50FV9F10J-995: *27G, Viton seals, 60 gpm, 4-20 mA, 6-pin MS connector, 10% OL w/ electrical compensation to apparent Zero-Lap*

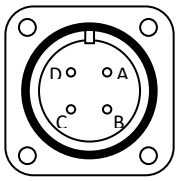
WOODWARD

R-DDV® Electrical Interface

Models 27E, 27G

4-Pin (Standard)

Pin A:	+24V Power
Pin B:	Cmd 1
Pin C:	Cmd 2
Pin D:	24V Return

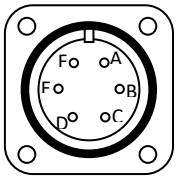


Valve – Mounted Connector:
CF3102C-14S-2P (shown)

Mating Connector:
MS3106E14S-2S (not shown)

Optional 6-Pin

	'J' Config.	**'B' Config.**
Pin A:	+24V Power	+24V Power
Pin B:	Cmd 1	24V Return
Pin C:	Cmd 2	Not Used
Pin D:	24V Return	Cmd 1
Pin E:	Feedback Out	Cmd 2
Pin F:	Feedback Out	Not Used



Valve – Mounted Connector:
CF3102E-14S-6P (shown)

Mating Connector:
MS3106E14S-6S (not shown)

Flow Polarity:
With Cmd 1 Positive, and greater than Null Cmd with respect to Cmd 2, Flow is out Port A.

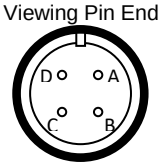
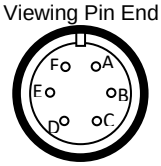
For "05" & "10" commands, with Zero Cmd flow is out Port B.

Position Feedback: ('J' Config.)
With Pin B +, and greater than Null Cmd with respect to Pin C, Feedback Pin E is + in respect to Pin F (flow P -> A)

Electrical Commands
(Cmd 1/Cmd 2, or Org/Grn)

Code	Command
01	± 5 V
02	± 10 V
03	± 5 mA
04	± 50 mA
05	0 to +10 V
06	± 40 mA
07	± 2 V / ± 5 mA
08	± 3 V / ± 7.5 mA
09	± 5 V / ± 12.5 mA
10	+4 to +20 mA
11	± 10 mA
12	± 8 mA
13	± 12 mA
14	± 20 mA
15	± 10 V / ± 20 mA
16	± 2.5 V
17	± 100 mA
18	± 2.5 V / ± 6.2 mA

Models 27A, 27B

Inputs	**Standard** Leadwires	**'G' Config** 4-pin Connector	**'B' Config** 6-pin Connector
+24V Power	Yellow	Pin A	Pin A
Cmd 1	Orange	Pin B	Pin D
Cmd 2	Green	Pin C	Pin E
24V Return	Black	Pin D	Pin B
		Viewing Pin End  ***MS3101F-14S-2P***	Viewing Pin End  ***MS3101F-14S-6P***
		MS3106E-14S-2S Mating Connector (not shown)	MS3106E-14S-6S Mating Connector (not shown)

Flow Polarity:
With Orange (Cmd 1) Positive, and greater than Null Cmd with respect to Green (Cmd 2),
Flow is out:

Models	27A	27B
	Port A	Port B

For "05" & "10" commands, with Zero Cmd
Flow is out:

Models	27A	27B
	Port A	Port B

Electrical Power Supply Requirements:

Voltage: 24 V ± 1 V, regulated supply
Current: Typical steady-state current, 60 - 75 mA
Maximum continuous current, 1.0 A
Maximum peak current, 2.2 A