



# PRODUCT BULLETIN

## Hydraulic over Air Relay Valves

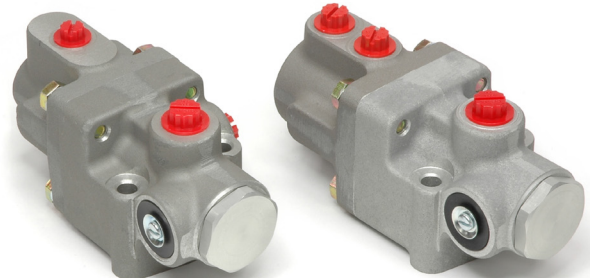
### DESCRIPTION

ZF Hydraulic over Air Relay Valves output air pressure in proportion to the hydraulic input pressure. Hydraulic input pressure, from a component such as a master cylinder or hydraulic control valve, sends a pilot signal to the relay valve to modulate air brake pressure.

An example application might be controlling an air braked trailer from a hydraulically braked towing vehicle that has an air power source. ZF Off-Highway Solutions Minnesota Inc. has three Hydraulic over Air Relay Valve designs:

- **Single** input provides one hydraulic pilot port to control modulated air braking pressure.
- **Dual** input provides two independent pilot ports to control modulated air braking pressure. The dual design function is the same as a single design when pilot pressure is applied to either the P1 or P2 port. When pilot pressure is applied to both P1 and P2 ports at the same time, controlled air braking pressure ratio increases proportionally. The P1 and P2 ports of the dual input relay valve can be of different pressure ratios. Steering assist applications may use a dual input design relay valve.
- **Tandem** input functions the same as the single design except it provides redundancy by having two independent pilot pressure ports. Hydraulic pilot pressure can be applied to the P1 and/or P2 port and the pressure ratio remains the same.

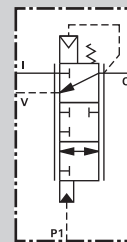
Contact ZF Off-Highway Solutions Minnesota Inc. for the different hydraulic pressure to air pressure ratios.



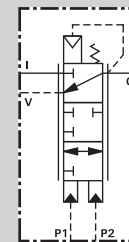
Single

Dual or Tandem

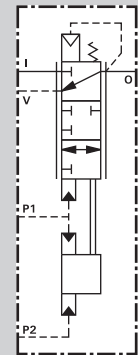
### Symbols



Single



Dual



Tandem

### SPECIFICATIONS

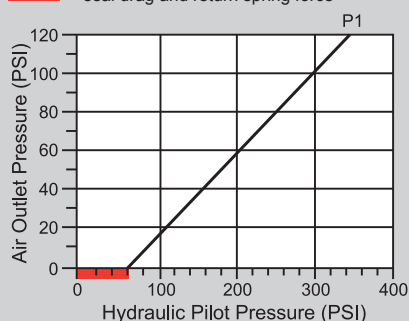
Maximum air pressure ..... 150 PSI  
 Maximum fluid pressure ..... 2000 PSI  
 Hydraulic to air pressure ratio ..... 3:1 to 21:1  
 Maximum operating temperature ..... 250 °F  
 Fluid type ..... mineral base hydraulic oil

Port sizes ..... 3/8-18NPSF (air ports only)  
 #4 SAE J1926/1 ORB (hyd. or air ports)  
 #6 SAE J1926/1 ORB (hyd. or air ports)  
 SAE J2244/1:M12 x 1.25 (hyd. or air ports)  
 SAE J2244/1:M14 x 1.50 (hyd. or air ports)

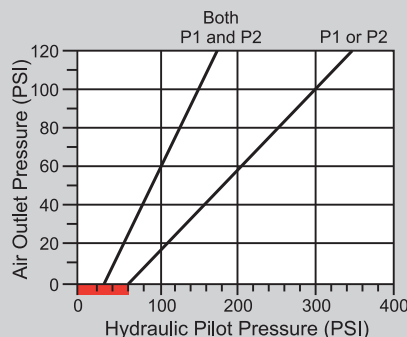
(contact ZF Off-Highway Solutions Inc. for other port size requirements)

### 3:1 ratio examples

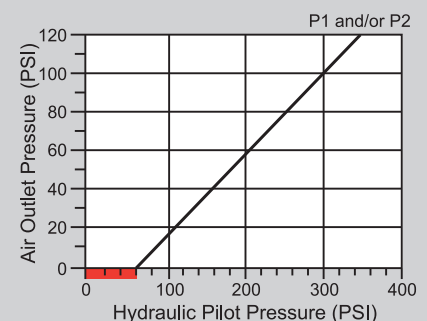
■ = seal drag and return spring force



Single Input

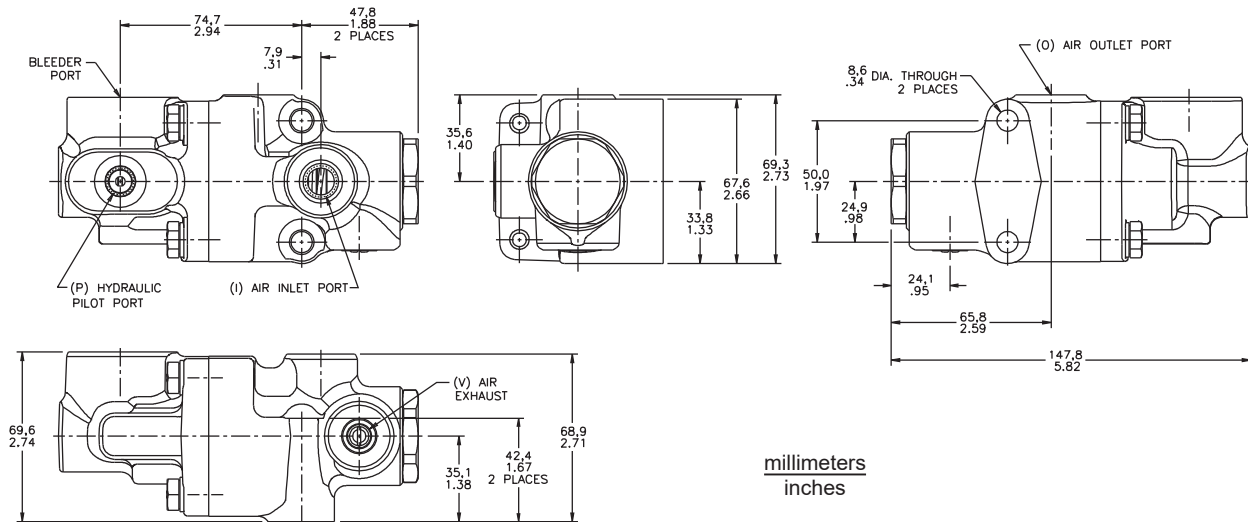


Dual Input

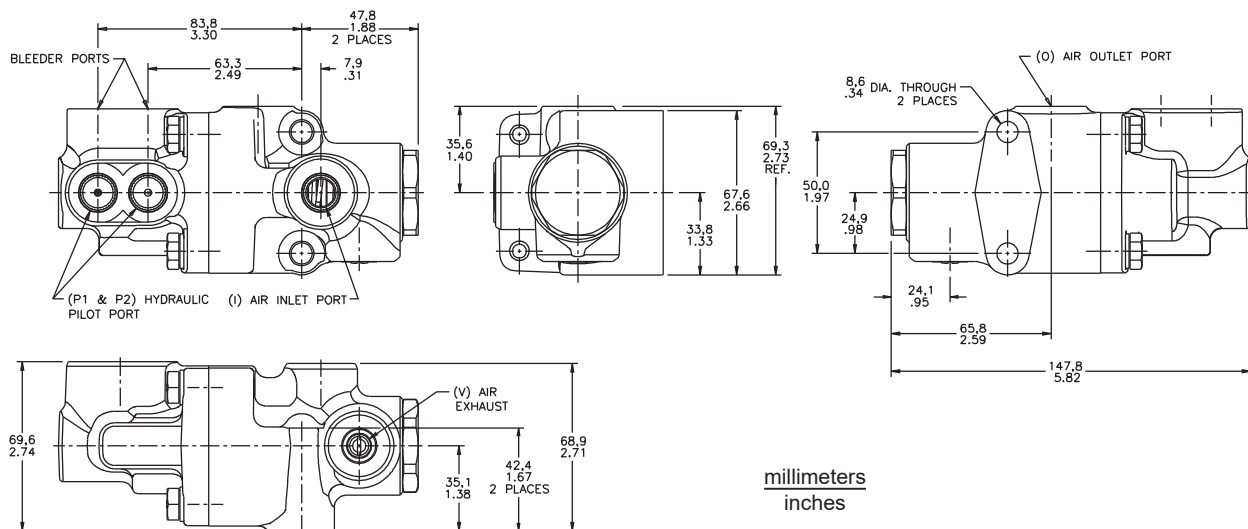


Tandem Input

## Single Input



## Dual or Tandem Input



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