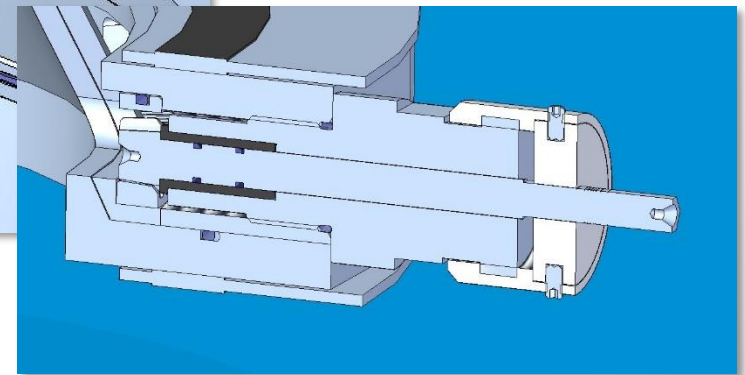
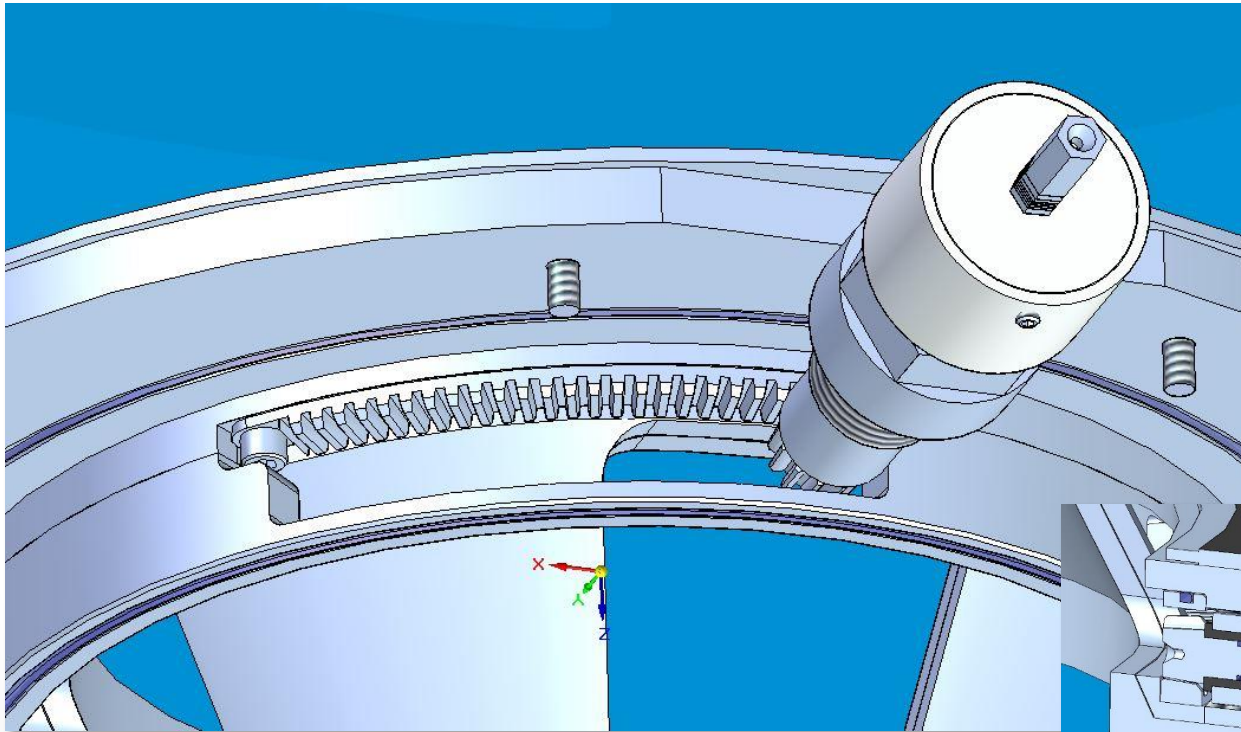


Dynamic Variable Orifice (DVO)

for Adjustable Pulsation Dampening and System Blow-Down Rate Control



DVO – How Does it Work?



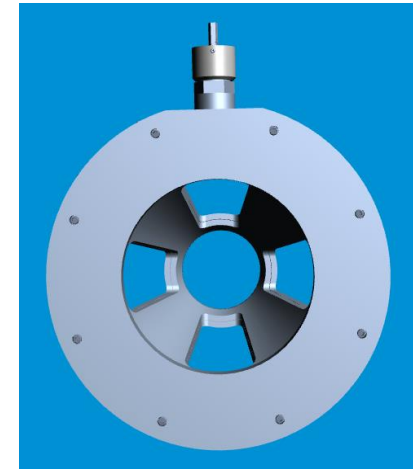
DVO – How Does it Work?



10" Conical DVO side view @ min beta setting.



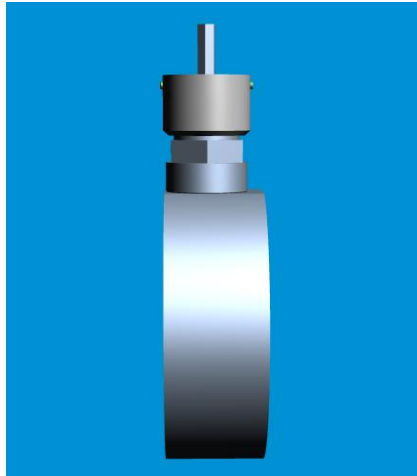
10" Conical DVO end view @ minimum beta setting.



10" Conical DVO end view @ maximum beta setting.

- Range of beta ratios
- Round center passage determines minimum beta ratio
- Position of windowed passages adjusts beta ratio
- Flat, conical or hybrid configurations possible

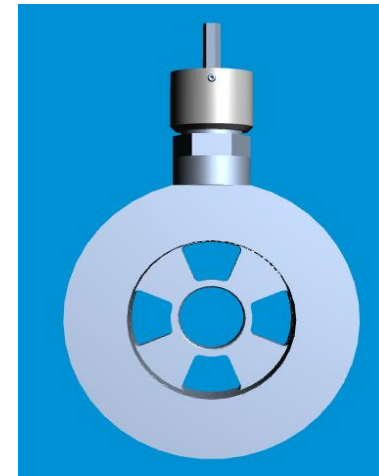
DVO – How Does it Work?



4" Flat DVO side view @ minimum beta setting.



4" Flat DVO end view @ minimum beta setting.



4" Flat DVO end view @ maximum beta setting.

- Range of beta ratios
- Round center passage determines minimum beta ratio
- Position of windowed passages adjusts beta ratio
- Flat, conical or hybrid configurations possible

DVO – Why?



- Fixed pulsation control orifices may cause significant performance penalties.
- Changing orifice beta ratio as operating conditions change can optimize trade-offs of pulsation control vs. ΔP , power & efficiency.
- Swapping out standard orifice plates is very costly.

DVO – Applications



- Can be used anywhere you have a standard orifice plate to perform similar pulsation control
- Seasonal Condition Changes
- Ideal for packager/ fleet packages where a standard package will be used over many different operating conditions and scenarios
- Custom applications – liquid lines/pumps/screw compressors

DVO – Applications



- **Optimization of Load Steps for flow, pulsation control**
 - Via Automation of DVO, optimum Beta Ratio per Load Step
 - Use of pulsation study to determine orifice configuration in different operating conditions
- **Controlled blowdown rate / operations**
 - Greatly reduces damage to elastomeric seals
 - Possibly eliminate need for blowdown line silencer and 2-step blowdown
 - Better adherence to DOT 192 regulations

DVO – General Specifications



- Designed to fit between standard flanges
- 1500 psig MAWP standard
- 600 and 900# ANSI flanges standard – custom applications possible.
- 4" thru 24" dia. or larger
- Can adjust beta ratio while compressor pressurized & operating
- 0.4 to 0.7 beta ratio for flat version
- 0.4 to 0.9 beta ratio for conical version
- Manual or automatic control options

DVO – Automated Specifications



- **Automation via Stepper Motor and Driver**
- **Hazardous Duty Class 1, Div 1 Stepper Motor**
- **200 Steps per Rev, 1.8° Step Angle**
- **EtherNet/IP and Modbus-TCP interfaces**
- **Receives signal from customer supplied PLC and sends pulse output to stepper motor. No PLC indexer required. No additional software required.**
- **10:1 gear reduction gearbox to increase torque and improve position resolution.**

Dynamic Variable Orifice (DVO)



- **Advantages**
 - **Much broader operation range than with fixed orifices**
 - **Pressure drop & horsepower loss can be optimized (minimized) as operating conditions change**
 - **Increased capacity resulting in increased revenue**
 - **With automation of the DVO, provides linked load steps or other operating parameters**
 - **May allow less complicated pulsation bottles in some cases**

Dynamic Variable Orifice (DVO) – Questions?

Thank You for your attention!

