10” Cryogenic Butterfly Prevalve

V0E11000-01

SPACE

VACCO’s 10” Cryogenic Prevalve is a pneumatically actuated, normally open butterfly valve element. A dual offset configuration pulls off the butterfly valve element away from spring-energized seals prior to rotation to maximize seal life and improve leakage.

The butterfly prevalve supports a propellant system chill down and controls propellant flow—preventing inadvertent bypass to the Main Propulsion System. It also facilitates the propellant system drain in the event of a scrub. VACCO’s butterfly prevalve leverages Space Shuttle qualified design.

Features

- Dual motion mechanism
  - Maximizes seal life
  - Improves leakage
- Pneumatic actuator
  - Closes valve
  - Removable from valve housing
- Normally open valve holds neutral position without applying pneumatic actuation pressures
- Robust rack and pinion mechanism rotates butterfly valve element
- Removable electrical position indicator device signifies open or closed positions
- Two relief valves prevent excessive pressure on the downstream (outlet) side when valve is closed
- Butterfly support roller bearings capable of high loads

Operating Parameters

Main Valve
- Operating Pressures ..... 0 to 100 psig
- Proof Pressures ..... 175 psig max
- Burst Pressures ..... 275 psig max

Actuator
- Operating Pressure ..... 500 psig min
- Operating Pressure ..... 750 psig norm
- Operating Pressure ..... 880 psig max
- Proof Pressure ..... 1,715 psig max
- Burst Pressure ..... 3,425 psig max

Response Time
- Opening ..... 1.5 sec max when actuator vented to 14.7 psid
- Closing ..... 1.7 sec max when actuator pressurized to 750 psig

Internal Leakage
- Inlet-to-Outlet (LH_2) ..... 2,000 SCIM (from -423°F to +170°F) 5 to 50 psid
- Outlet-to-Inlet (LH_2) ..... 2,500 SCIM (from -150°F to +170°F) 0 to 5 psid
- Outlet-to-Inlet (LH_2) ..... 2,500 SCIM (from -423°F to +170°F) 0 to 15 psid

External Leakage
- Combined static and primary or secondary shaft ..... 5 SCIM (-423°F to +170°F) from 4 to 50 psid
- Static Seals Only ..... 0.01 SCCS (-423°F to +170°F) from 4 to 50 psid

Flow Rate ..... 10,761 gal/min, LH_2, at 15 psig min

Pressure Drop ..... 1.5 psid, max

Weight ..... 75 lb (est)

Performance characteristics are based on customer requirements. As such, they are not representative of component capabilities or limitations.

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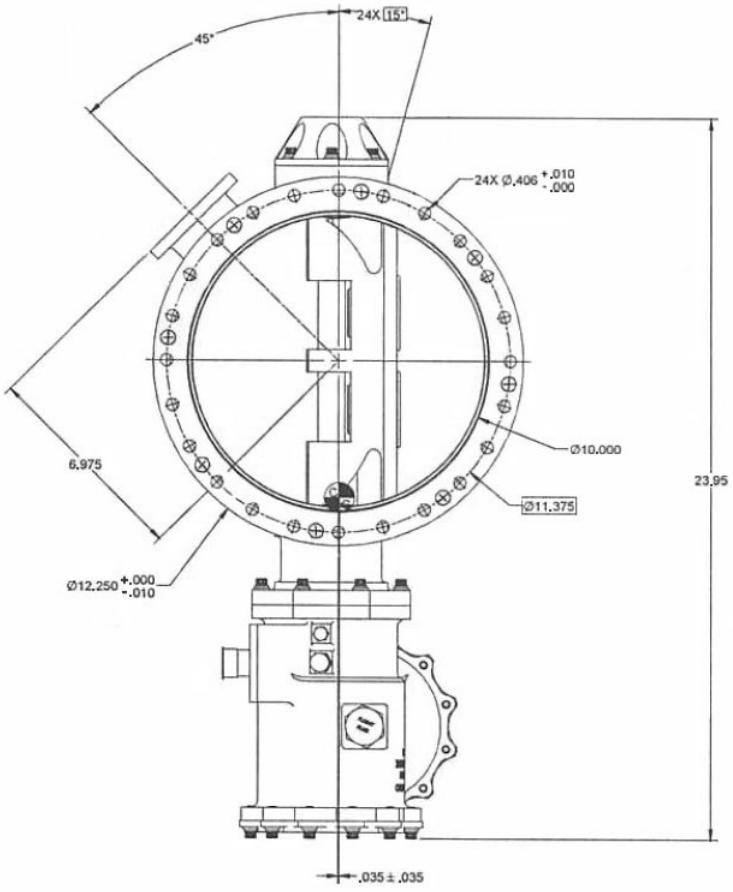

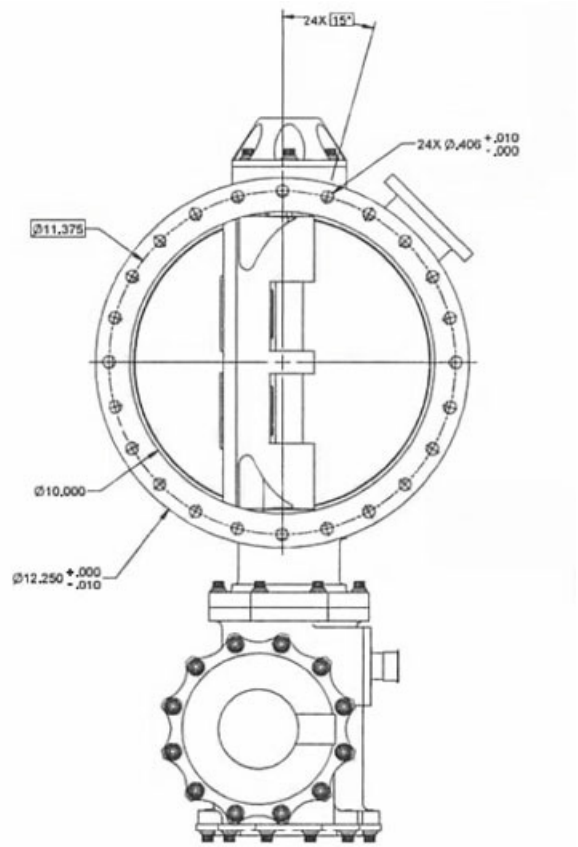

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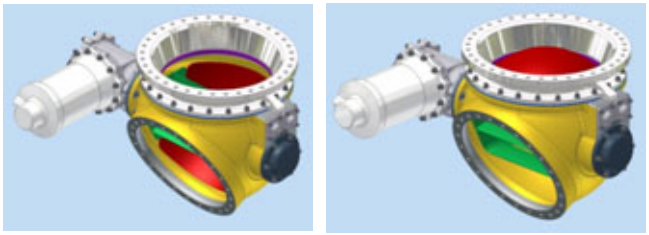
10” Cryogenic LH_2 Prevalve

X10102000-01

VACCO’s 10” Cryogenic LH_2 Prevalve is a pneumatically actuated, normally open visor element. A dual offset configuration pulls off the visor valve element away from spring-energized seals prior to rotation to maximize seal life and improve leakage.

The prevalve visor supports a propellant system chill down and controls propellant flow—preventing inadvertent bypass to the Main Propulsion System. It also facilitates the propellant system drain in the event of a scrub. VACCO’s visor leverages Space Shuttle qualified design.



SPACE

Features

- Dual motion mechanism
  - Maximizes seal life
  - Improves leakage
- Pneumatic actuator
  - Closes valve
  - Removable from valve housing
- Normally open valve holds neutral position without applying pneumatic actuation pressures
- Robust rack and pinion mechanism rotates visor
- Removable electrical position indicator device signifies open or closed positions
- Two relief valves prevent excessive pressure on the downstream (outlet) side when valve is closed
- Angular contact bearings support high loads

Operating Parameters

Main Valve
- Operating Pressure ..... internal pressure of 1 x 10E-3 Torr to 120 psig
- Proof Pressure ..... 180 psig max
- Burst Pressure ..... 300 psig max

Actuator
- Control (Closing) Pressure ..... 500 psig min
- Normal Operating Pressure ..... 750 psig +/- 50 psig
- Control (Actuation) Pressure ..... 880 psig max
- Proof Pressure ..... 1,320 psig max
- Burst Pressure ..... 2,200 psig max

Pressure Drop ..... 1.0 psid max

Weight ..... 94 lb

Response Time
- Min Closing ..... 1.0 sec from open position while flowing LH_2 at max flow and zero flow conditions at a pressure of 45 to 100 psig
- Max Closing ..... 2.0 sec max with 0 to 100 psig of LH_2
- Max Closing ..... 1.5 sec max with 0 to 50 psig of LH_2

Response Time (cont’d)
- Max Opening ..... 2.5 sec max at -423°F
  - A) With press differential of 55 psid of LH_2 or GH_2 from the valve inlet to outlet
  - B) With press differential from the valve outlet to inlet at which the relief valve flows 0.5 lbm/sec min of LH_2

Internal Leakage
- Inlet-to-Outlet ..... 2000 SCIM (from -423°F to +170°F) 5 to 50 psid
- Outlet-to-Inlet ..... 2,500 SCIM (from -150°F to +170°F) 0 to 5 psid
- Outlet-to-Inlet ..... 2,500 SCIM (from -423°F to -150°F) 0 to 15 psid

External Leakage
- Combined static and primary or secondary shaft ..... 5 SCIM (-423°F to +170°F) from 4 to 50 psid
- Static seals individually ..... 0.04 SCIM (-423°F to +170°F) from 4 to 50 psid

Flow Rate ..... 10,761 gal/min, LH_2, at 50 psig min

Performance characteristics are based on customer requirements. As such, they are not representative of component capabilities or limitations.

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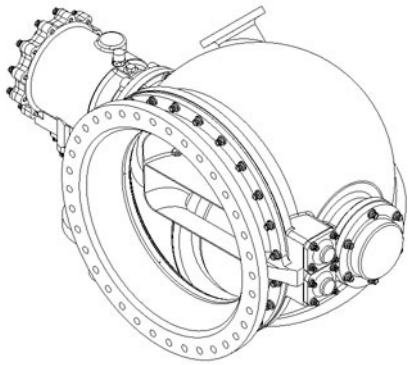

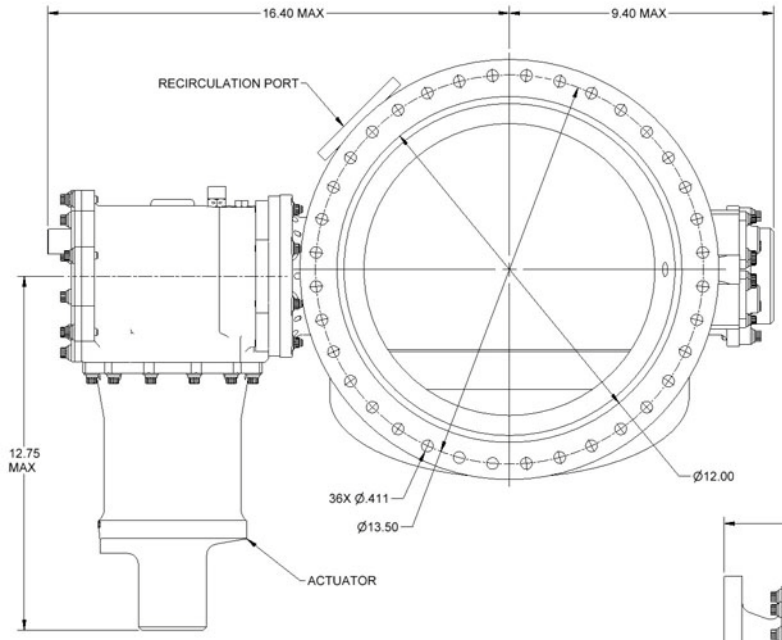

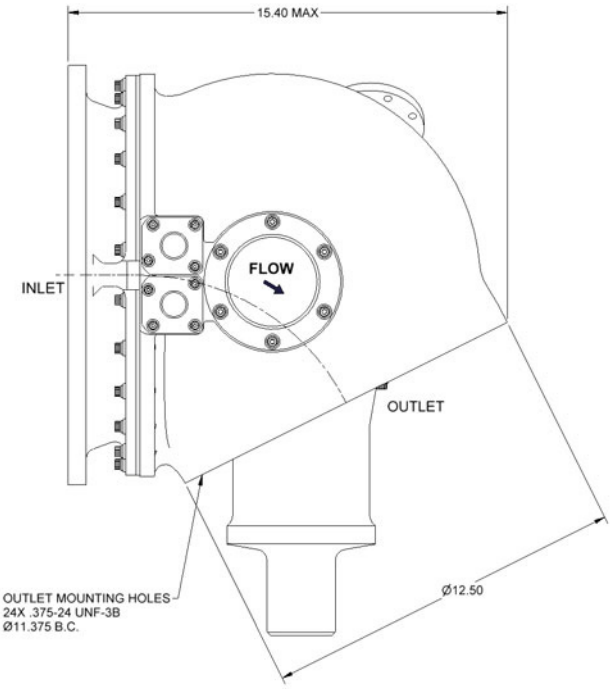

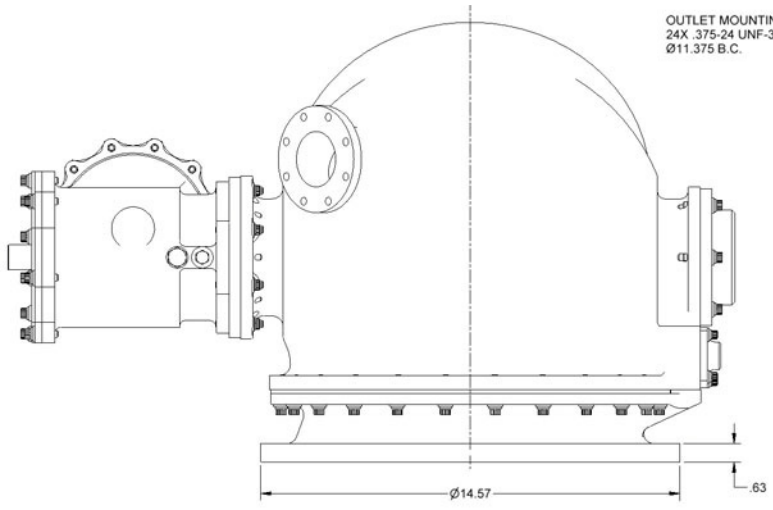

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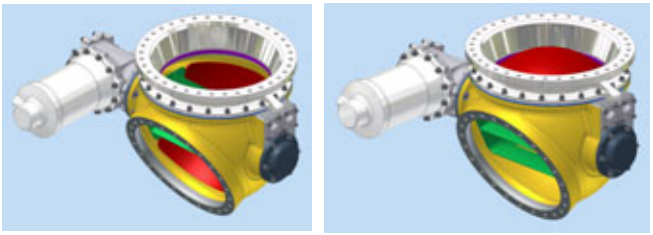
10” Cryogenic LO_2 Prevalve

X10101000-01

VACCO’s 10” Cryogenic LO_2 Prevalve is a pneumatically actuated, normally open visor element. A dual offset configuration pulls off the visor valve element away from spring-energized seals prior to rotation to maximize seal life and improve leakage.

The prevalve visor supports a propellant system chill down and controls propellant flow—preventing inadvertent bypass to the Main Propulsion System. It also facilitates the propellant system drain in the event of a scrub. VACCO’s visor leverages Space Shuttle qualified design.



SPACE

Features

- Dual motion mechanism
  - Maximizes seal life
  - Improves leakage
- Pneumatic actuator
  - Closes valve
  - Removable from valve housing
- Normally open valve holds neutral position without applying pneumatic actuation pressures
- Robust rack and pinion mechanism rotates visor
- Removable electrical position indicator device signifies open or closed positions
- Two relief valves prevent excessive pressure on the downstream (outlet) side when valve is closed
- Angular contact bearings support high loads

Operating Parameters

Main Valve
- Operating Pressure ..... internal pressure of 1 x 10E-3 Torr to 120 psig
- Proof Pressure ..... 180 psig max
- Burst Pressure ..... 300 psig max

Actuator
- Control (Closing) Pressure ..... 500 psig min
- Normal Operating Pressure ..... 750 psig +/- 50 psig
- Control (Actuation) Pressure ..... 880 psig max
- Proof Pressure ..... 1,320 psig max
- Burst Pressure ..... 2,200 psig max

Pressure Drop ..... 1.7 psid max

Weight ..... 94 lb

Response Time
- Min Closing ..... 0.8 sec from open position while flowing LO_2 at max flow and zero flow conditions at a pressure of 45 to 100 psig
- Max Closing ..... 1.5 sec max with 0 to 100 psig of LO_2

Response Time (cont’d)
- Max Opening ..... 1.5 sec max at -320°F
  - A) With press differential of 85 psid of LO_2 or GO_2 from the valve inlet to outlet
  - B) With press differential from the valve outlet to inlet at which the relief valve flows 2.0 lbm/sec min of LO_2

Internal Leakage
- Inlet-to-Outlet ..... 1000 SCIM (from -320°F to +170°F) 5 to 120 psid
- Outlet-to-Inlet ..... 2,500 SCIM (from -150°F to +170°F) 0 to 5 psid
- Outlet-to-Inlet ..... 2,500 SCIM (from -320°F to -150°F) 0 to 15 psid

External Leakage
- Combined static and primary or secondary shaft ..... 10 SCIM (-320°F to +170°F) from 4 to 120 psid
- Static seals individually ..... 0.04 SCIM (-320°F to +170°F) from 4 to 120 psid

Flow Rate ..... 3,631 gal/min, LO_2, at 50 psig min

Performance characteristics are based on customer requirements. As such, they are not representative of component capabilities or limitations.

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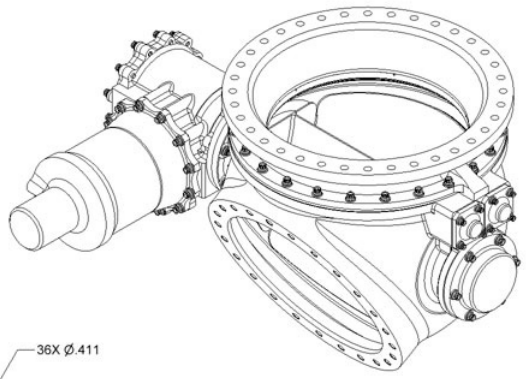

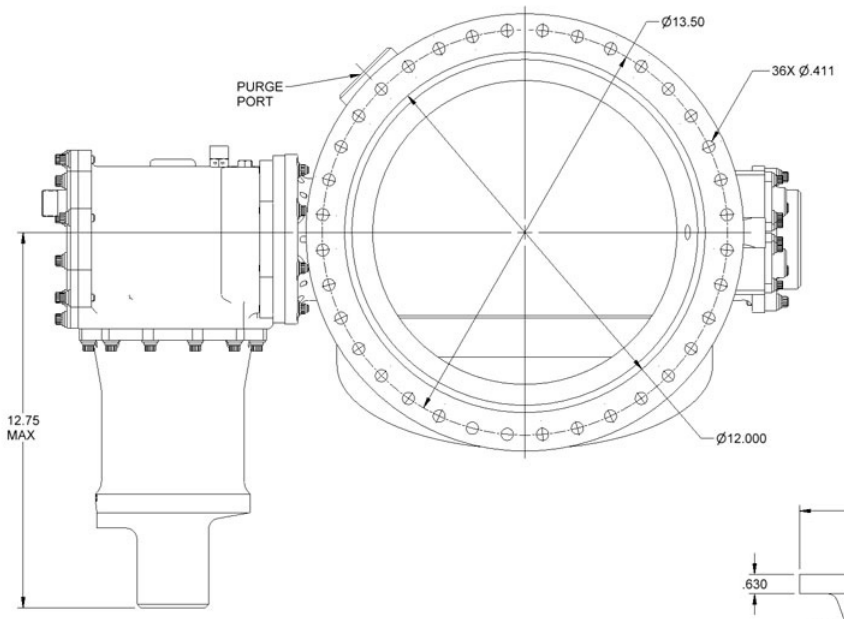

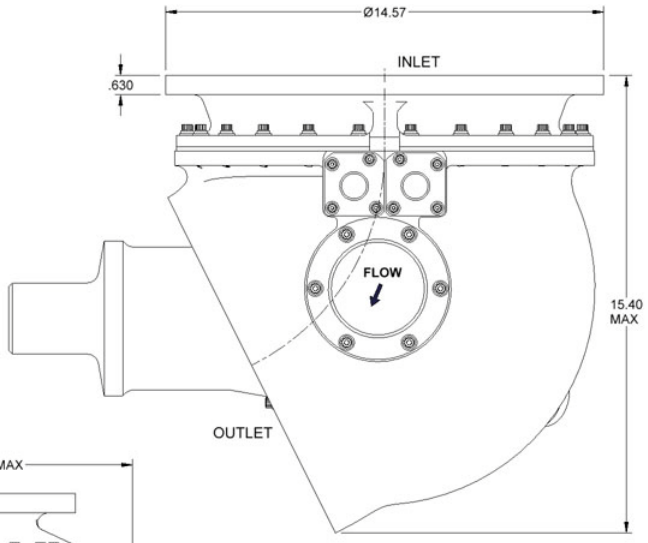

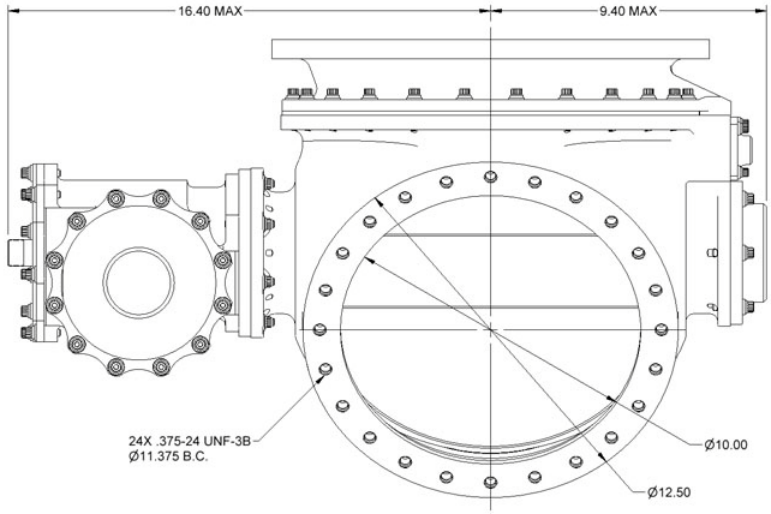

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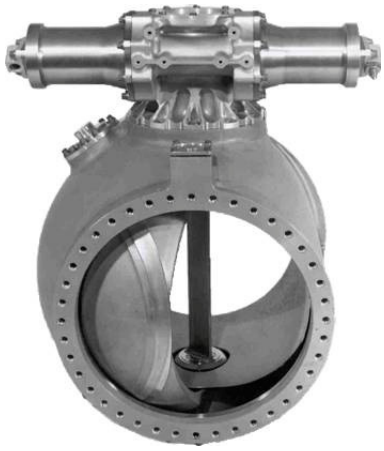
12” Cryogenic Prevalve

73325000

VACCO’s 12” Cryogenic Prevalve is a pneumatically actuated and segmented visor element. This valve element rotates completely out of the flow stream when open, eliminating the possibility of cavitation and provides for an extremely low pressure drop at the full flow condition.

The prevalve visor supports a propellant system chill down and controls propellant flow. It keeps the Main Propulsion System safe by preventing inadvertent bypass of propellant. The prevalve visor also facilitates the propellant system drain in the event of a scrub. VACCO’s robust visor design has a 25-year service record and is Space Shuttle qualified.



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Features

- Available in LO_2 (Type I) or LH_2 (Type II) configurations
- Dual motion mechanism
  - Maximizes seal life
  - Improves leakage
- Pneumatic actuator
  - Closes valve
  - Removable from valve housing
  - Holds neutral position without applying pneumatic actuation pressures
- Robust rack and pinion mechanism rotates visor
- Electrical position indicator device signifies open or closed positions (removable)
- Two relief valves prevent excessive pressure on the downstream (outlet) side when valve is closed
- Visor support roller bearings capable of high loads

Operating Parameters

Main Valve Pressures
- Operating ..... 275 psig
- Proof ..... 357 psig
- Burst ..... 413 psig

Actuator Pressures
- Operating ..... 400 to 740 psig
- Proof ..... 1,275 psig
- Burst ..... 1,700 psig

Response Time
- Opening ..... 1.5 sec max
- Closing ..... 0.75 sec max

Leakage at Operating Pressure, Ambient
- GHe ..... 300 SCIM
- GH_2 ..... 2,000 SCIM

Flow Rate
- LO_2 ..... 6,100 gal/min
- LH_2 ..... 16,500 gal/min

Pressure Drop
- LO_2 ..... 0.5 psid (at 45 psig inlet)
- LH_2 ..... 0.25 psid (at 15 psig inlet)

Weight ..... 100 lb

Performance characteristics are based on customer requirements. As such, they are not representative of component capabilities or limitations.

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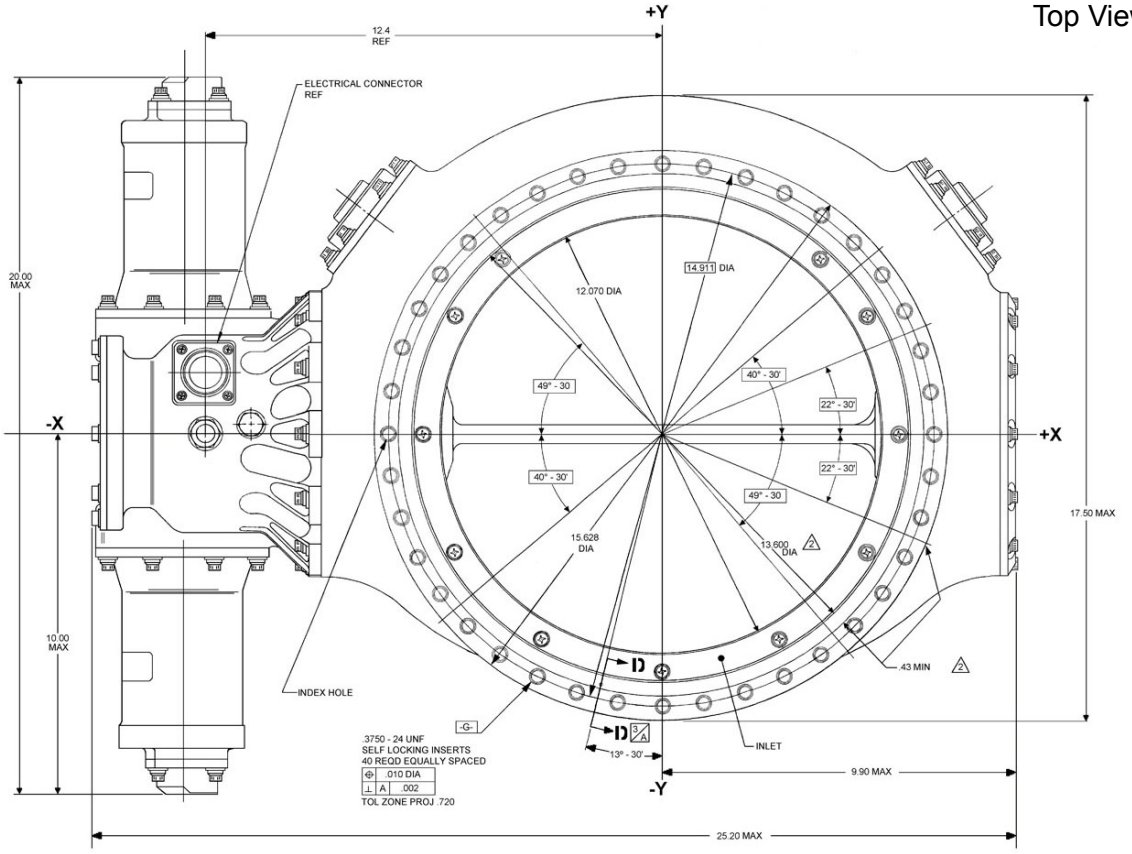
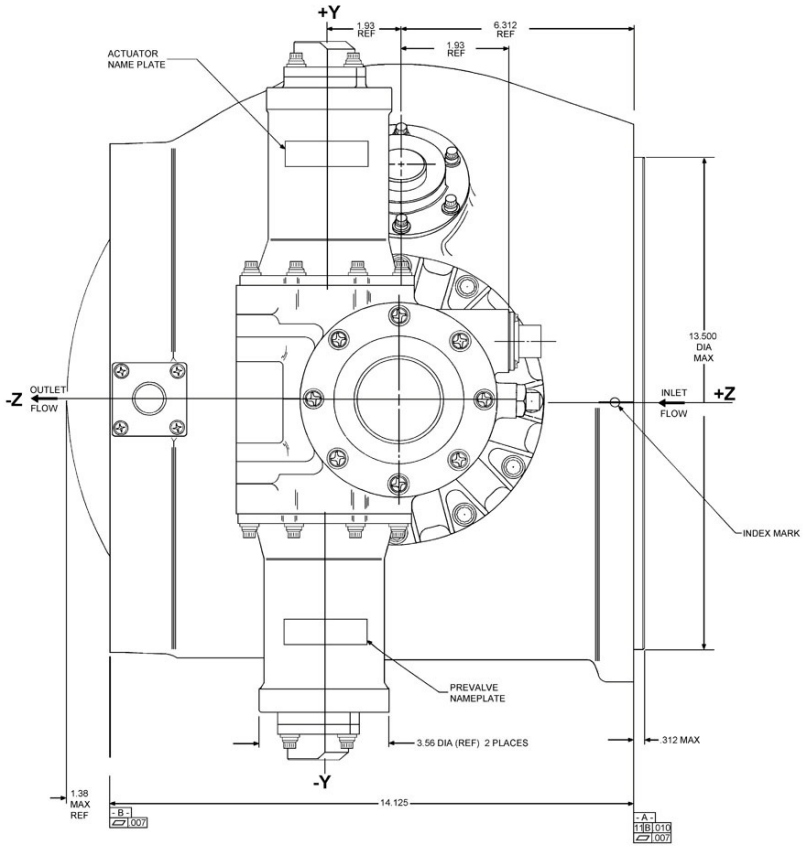
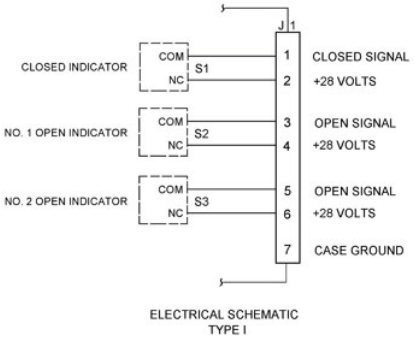
Top View



Side View



Electrical Schematic



ELECTRICAL SCHEMATIC
TYPE I

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