Varian Scroll Pumps

- SH100 Scroll Pump - 100 L/Min
- TriScroll 300 - 300 l/min
- Triscroll 600 - 600 L/Min

SH100

Single Scroll
Released in Winter, 2001

- **SH100 - 100 L/Min**
  - 6.7 x 10^{-2} mbar Ult
  - 18.6kg

Varian TriScroll

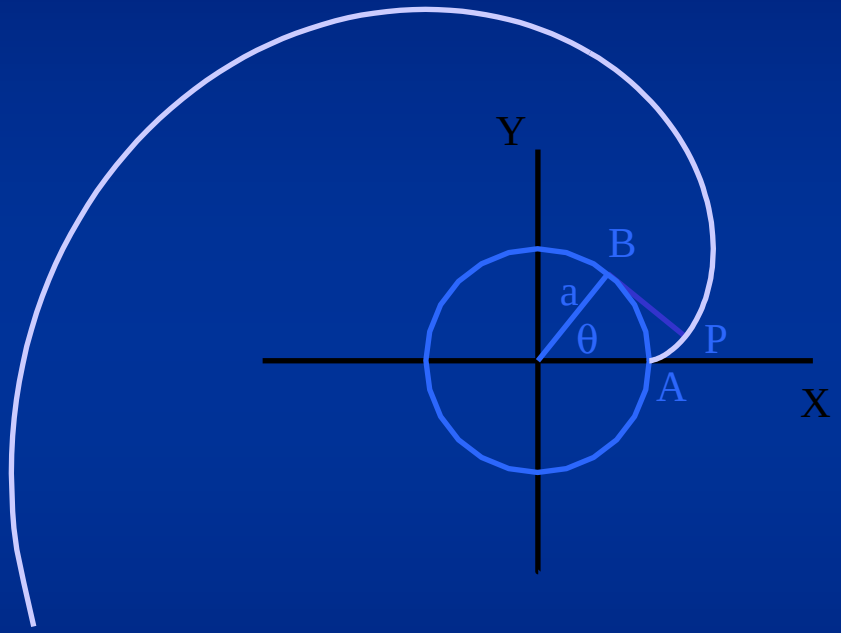
Dual Scroll, Two Stage

- **Triscroll 300 - 300L/Min**
  - 9.3 x 10^{-3} mbar Ult.
  - 26.4 kg
- **Triscroll 600 - 600 L/Min**
  - 9.3 x 10^{-3} mbar Ult.
  - 31 kg

Vacuum Scroll Pump Development

- Late 1960s: Vulliez > Normetex: First scroll vacuum pump; hermetic, bellows sealed, $$$
- Mid 1970s: Young and McCullough at ADL: Mainly for refrigeration applications
- ~1990: Iwata Air Compressor Corporation: Released 30 m^3/hour scroll vacuum pump
- Late 1990s: Varian, Busch, Edwards release scroll vacuum pumps

Involute Formula



- **Involute Definition:**

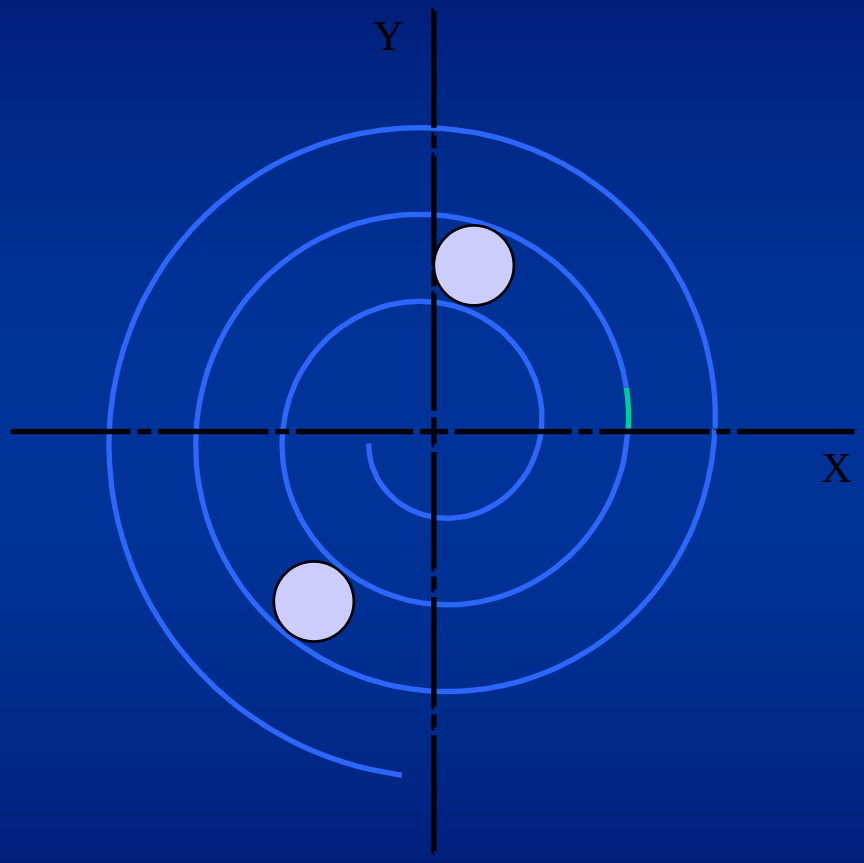
Length BP = Length BA = a* θ

- **Yields:**

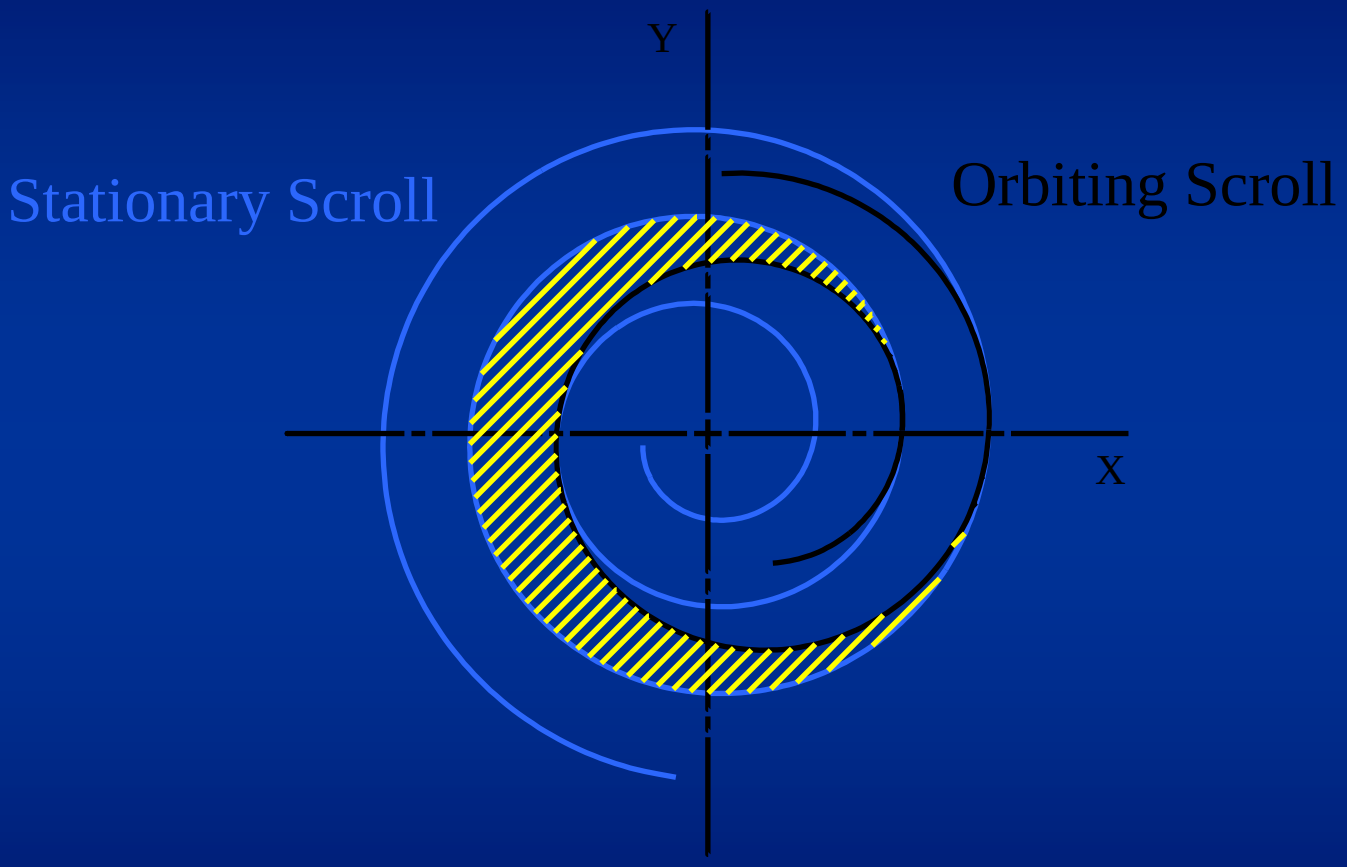
X = a*(cos θ + θ*sin θ)

Y = a*(sin θ - θ*cos θ)

Involute



Involute Pocket



TriScroll Gas Flow - 2 Stage Design

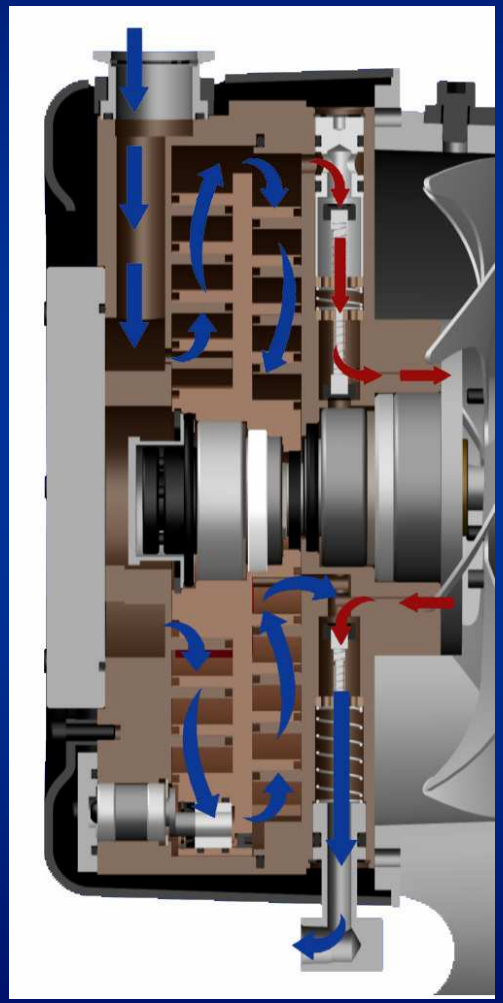
TriScroll First Stage

- 3 Involute Chambers
- Higher Speed at Inlet
- Full Stage operates at Vacuum

TriScroll Second Stage

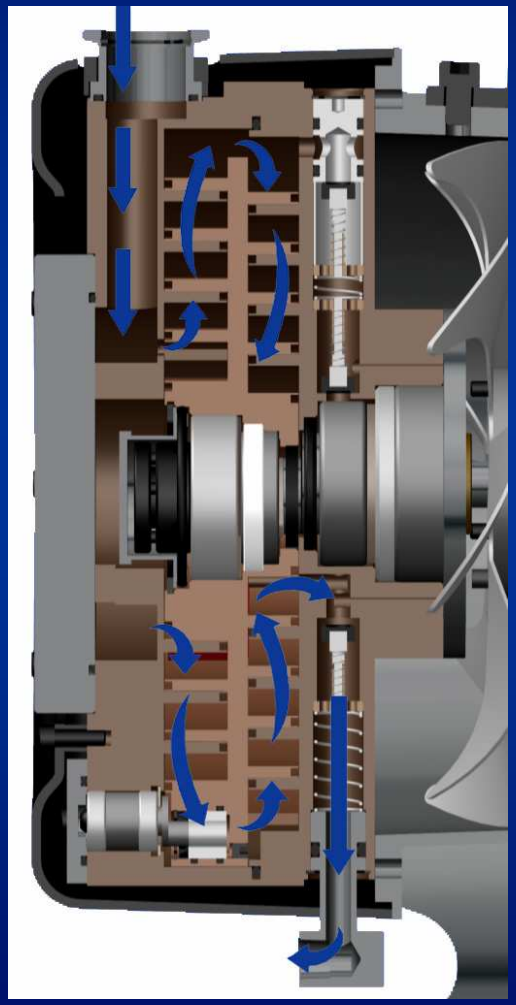
- 1 Chamber

TriScroll Gas Flow…



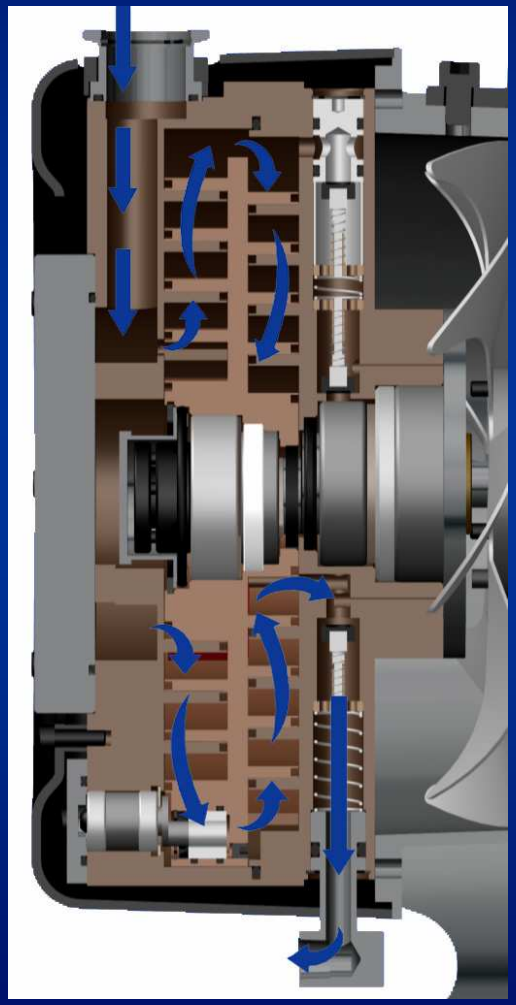
- **From atmosphere to ~ 550 mbar**
  - Bypass valve open - by-passes 2nd stage
  - Allows the pump to operate as displacement pump at the higher pressures therefore allowing the pump to work more efficiently.

TriScroll Gas Flow…



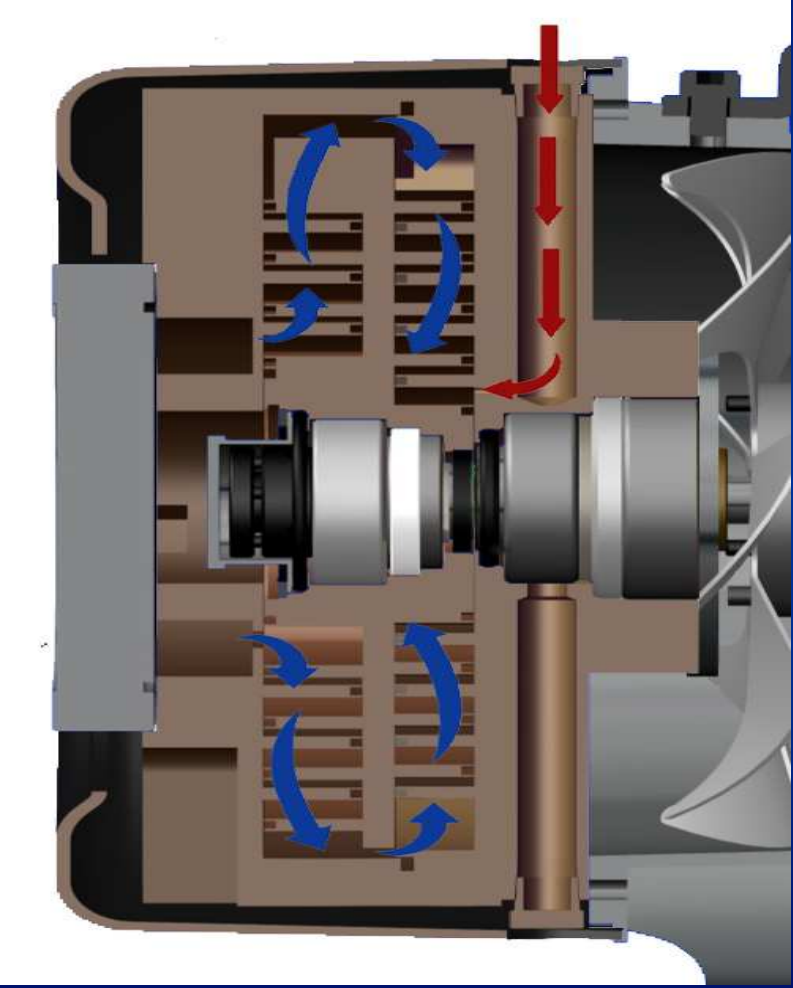
- **From ~ 550 mbar to ultimate**
  - Bypass valve is closed
  - All gas moves from TriScroll first stage; is compressed through the second stage, to the exhaust

TriScroll Gas Flow…



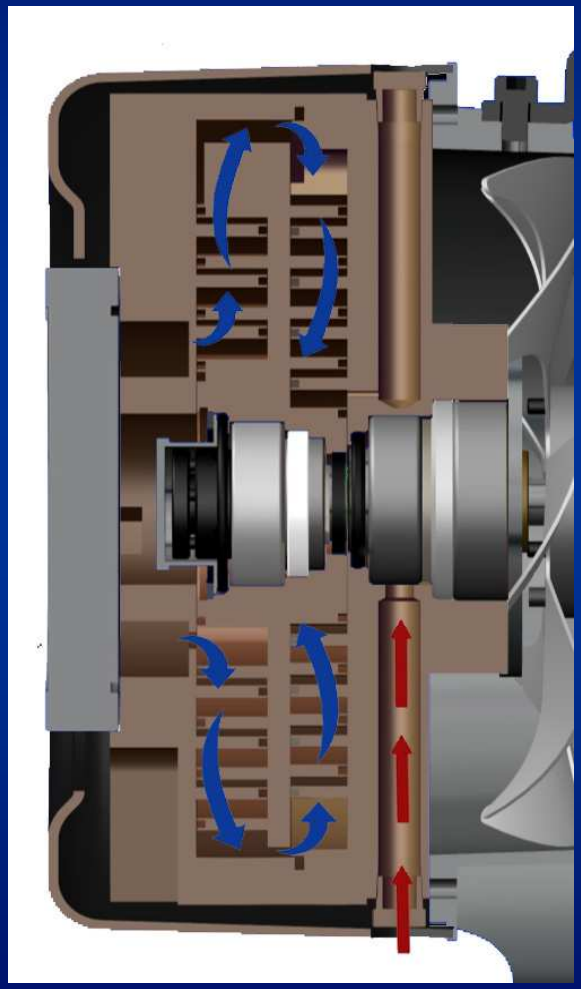
- **Benefits of two stage design:**
  - One shaft penetration to reduce moisture path to bearing
  - Low power consumption

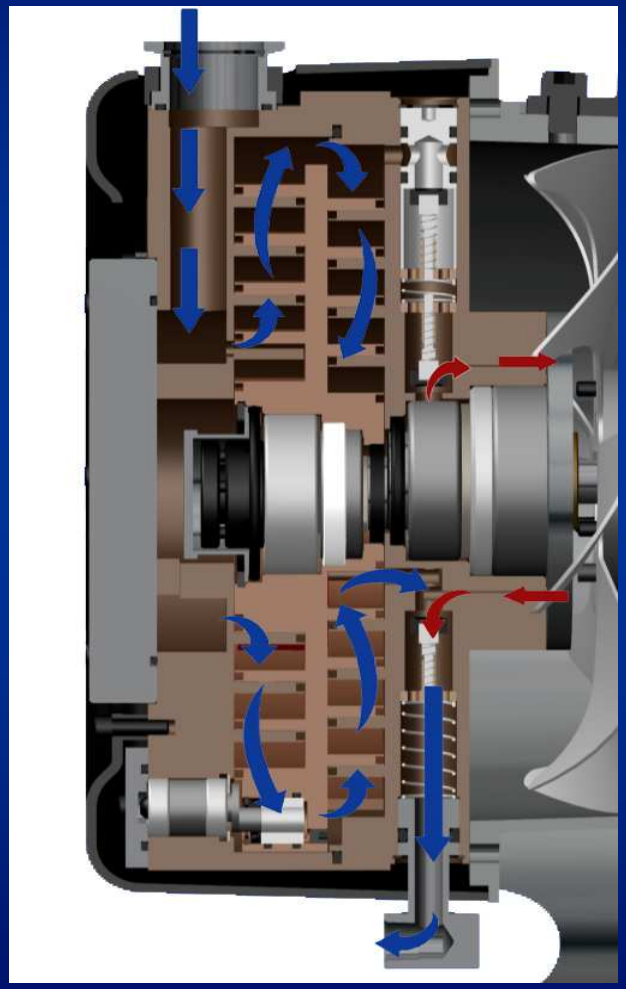
TriScroll Air Ballast Flow



- Automatic gas ballast - always operates unless plugged
- As the gas is expanded in the final stage of compression, air or dry Nitrogen is added to prevent condensation of gas, namely H_2O

TriScroll Bearing Purge Flow

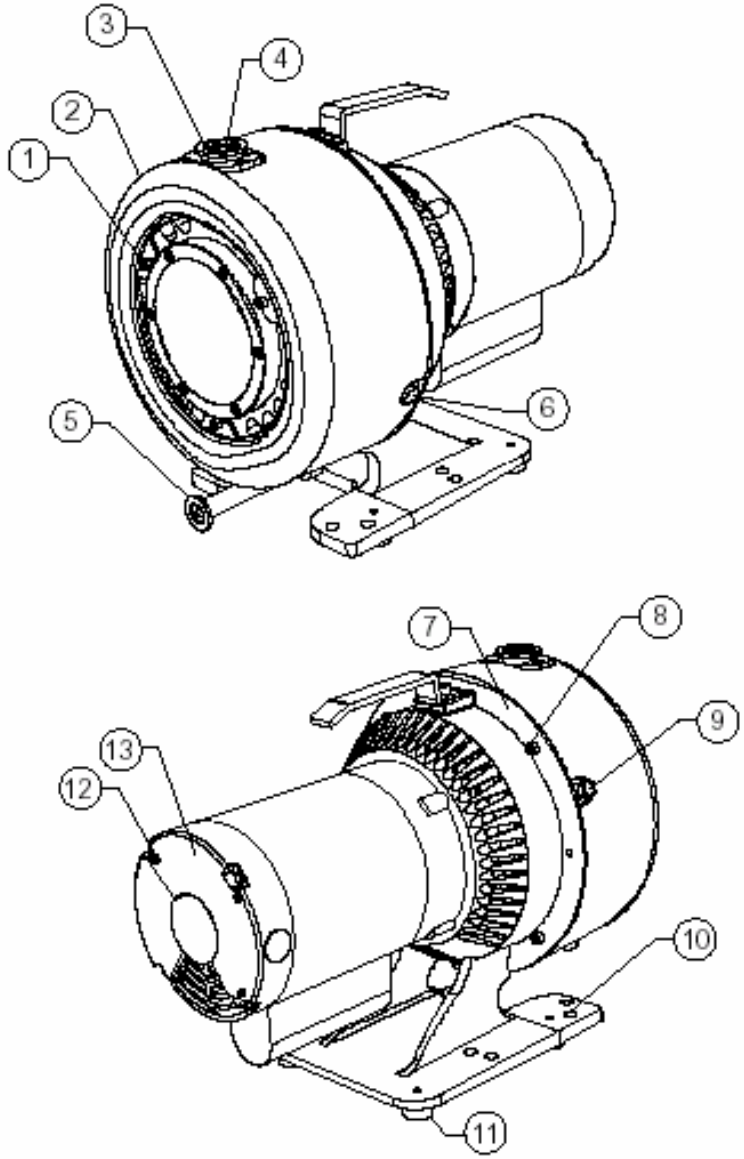




- Bearing purge available
- The Bearing Purge for applications which are particularly heavy with water or other condensable gases…for example Cryo Regeneration.
- Bearing purge and gas ballast exit through exhaust -no effect onbase pressure

Advantages: Scroll Vacuum Pumps

- Oil-Free
- Good Base Pressure
- Compact and Economical
- Few Valves Required
- Low Rotational Speed (~1740 RPM)
- Low Seal Sliding Speeds (~1 meter/sec)
- Can Be Perfectly Balanced



1. Cowling Screws; M5 (3)
2. Cowling
3. Inlet (NW25)
4. Inlet Screen
5. NW16 Exhaust Adapter
6. Bearing Purge Port (¼" National Pipe Thread)
7. Pump Frame
8. Frame Screws; M6 (4)
9. Gas Ballast Port (¼" National Pipe Thread)
10. Mounting Holes; 11 mm diameter thru (8)
11. Rubber Feet (4)
12. Motor Cover Screws (3)
13. Motor Electrical Cover

謝謝各位

元榕科技有限公司

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