

TMP

Turbo Molecular Pumps

🌀 Ball Bearing Type Turbo Molecular Pumps

TG-F_{SERIES} / TG_{SERIES} / TS_{SERIES}



OSAKA VACUUM, LTD.

Osaka Vacuum Ball Bearing Turbo Molecular Pumps

Turbo molecular pumps can be categorized by their rotor design and their bearings.

There are three types of rotor designs. The pure turbo-molecular rotor consists of discs with blades that rotate between corresponding stator blades, and the speed of the blades is the same magnitude as that of the gas molecules. The molecular drag type rotor consists of high-speed cylinders or discs that drag gas molecules along channels between the rotor and the stator. The compound turbo-molecular type features both turbo-molecular and molecular drag design stages on a single shaft. Osaka Vacuum developed the world's first one. The bearing types are ball bearing, active magnetic bearing, and hybrid (permanent magnet + ball bearing).

Osaka Vacuum lineups compound turbo-molecular vacuum pumps with ball bearings or active magnetic bearings, and molecular drag pumps with ball bearings.

An Osaka Vacuum ball bearing type turbomolecular pump uses two ball bearings to keep the high-speed rotor in position. The bearings use grease or oil for lubrication.

This catalog includes the following:

TG-F series grease lubricated ball bearing type compound turbo-molecular vacuum pumps

TG series oil lubricated ball bearing type compound turbo-molecular vacuum pumps

TS series oil lubricated ball bearing type molecular drag vacuum pumps

TG-F series



Compound rotor design, Compact, Durable, Any orientation, shock-tolerant, can be installed on a portable system or moving part.

TG series



Compound rotor design, Corrosion-resistant type available.

TS series



Molecular drag (Holweck type) rotor design, High throughput and high compression ratio at high pressure.

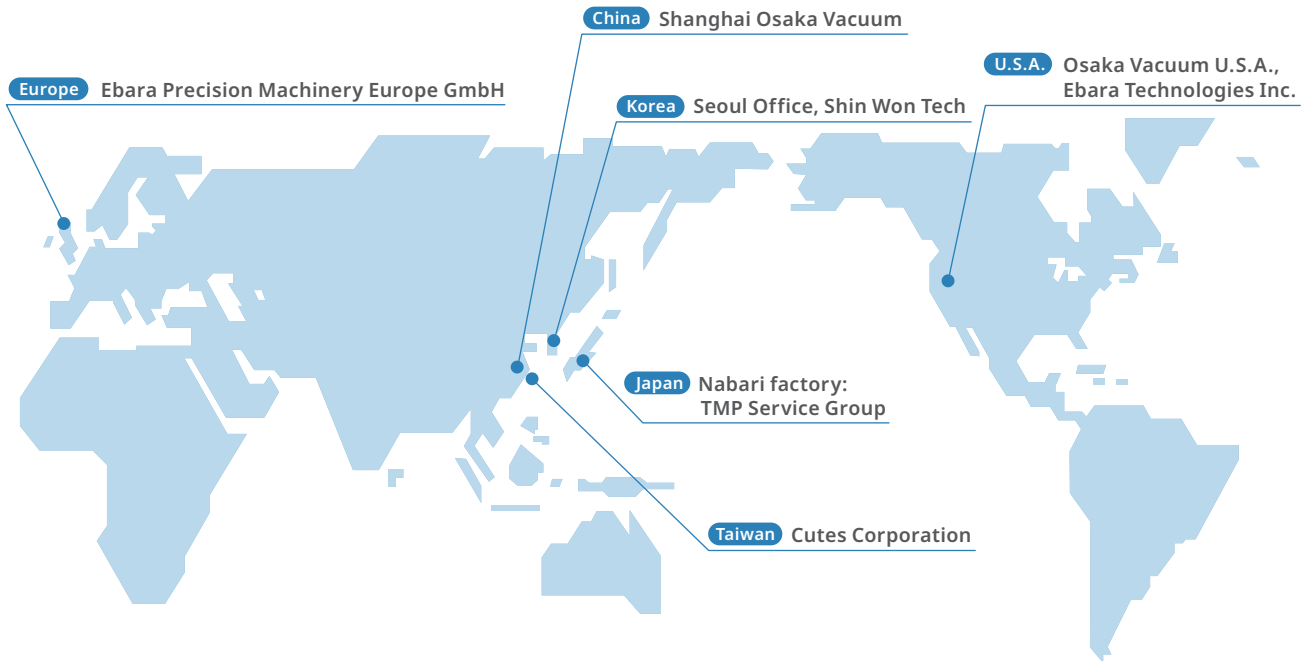
Ball Bearing Turbo Molecular Pump Lineups

*1 The TG series and TS series have corrosion-resistant models for applications involving corrosive gases.

*2 For the part marked □, refer to the Model Number Chart on page 12.

| | | TG-F SERIES P. 3 ~ P. 11 | | TG SERIES P. 13 ~ P. 17 | | TS SERIES P. 18 ~ P. 20 | |
|-------------|------|---------------------------------|---|----------------------------|--------------------------|------------------------------|--------------------------|
| Rotor | | Compound rotor | | Compound rotor | | All drag state rotor | |
| Bearing | | Grease-lubricated ball bearings | | | | Oil-lubricated ball bearings | |
| Controller | | On-board type | Rack-mounted type | Rack-mounted type | | | |
| Application | | Standard | | Standard | Corrosion resistant type | Standard | Corrosion resistant type |
| Inlet port | 65A | TG60F□□B TG70F□□B | TG50F□□B TG60F□□B-20 TG70F□□B-20 | | | | |
| | 100A | TG240F□□B | TG220F□□B TG350F□□B TG240F□□B-20 | | TG203□□ | TS50□□ | |
| | 150A | | TG450F□□B TG800F□□B TG800F□AB-60 | | TG553□□ TG1003□□ | TS440□□ | TS443□□ |
| | 200A | | TG1100F□□B TG1100F□AB-60 TG1400F□□B | | TG1303□□ | | |
| | 250A | | TG2400F□□B TG2400F□□B-40 | TG2810□□ | TG1803□□ TG2803□□ | | |
| | 300A | | | TG3210□□ | TG3213□□ | | |
| | 350A | | | TG3410□□ | TG3413□□ | | |
| | 450A | | | TG5000□□ | TG5003□□ | | |
| | 500A | | | TG5500□□ | TG5503□□ | | |

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TG-F SERIES

Industrial fields

| | | | | | | | |
|------------------|---------|------------------------|--------|----------|-----------------------|---------------------------|-----------------|
| Optical Industry | Display | Laboratory instruments | Energy | Material | Automotive / Aviation | Medical / Pharmaceuticals | Aerospace / R&D |
|------------------|---------|------------------------|--------|----------|-----------------------|---------------------------|-----------------|

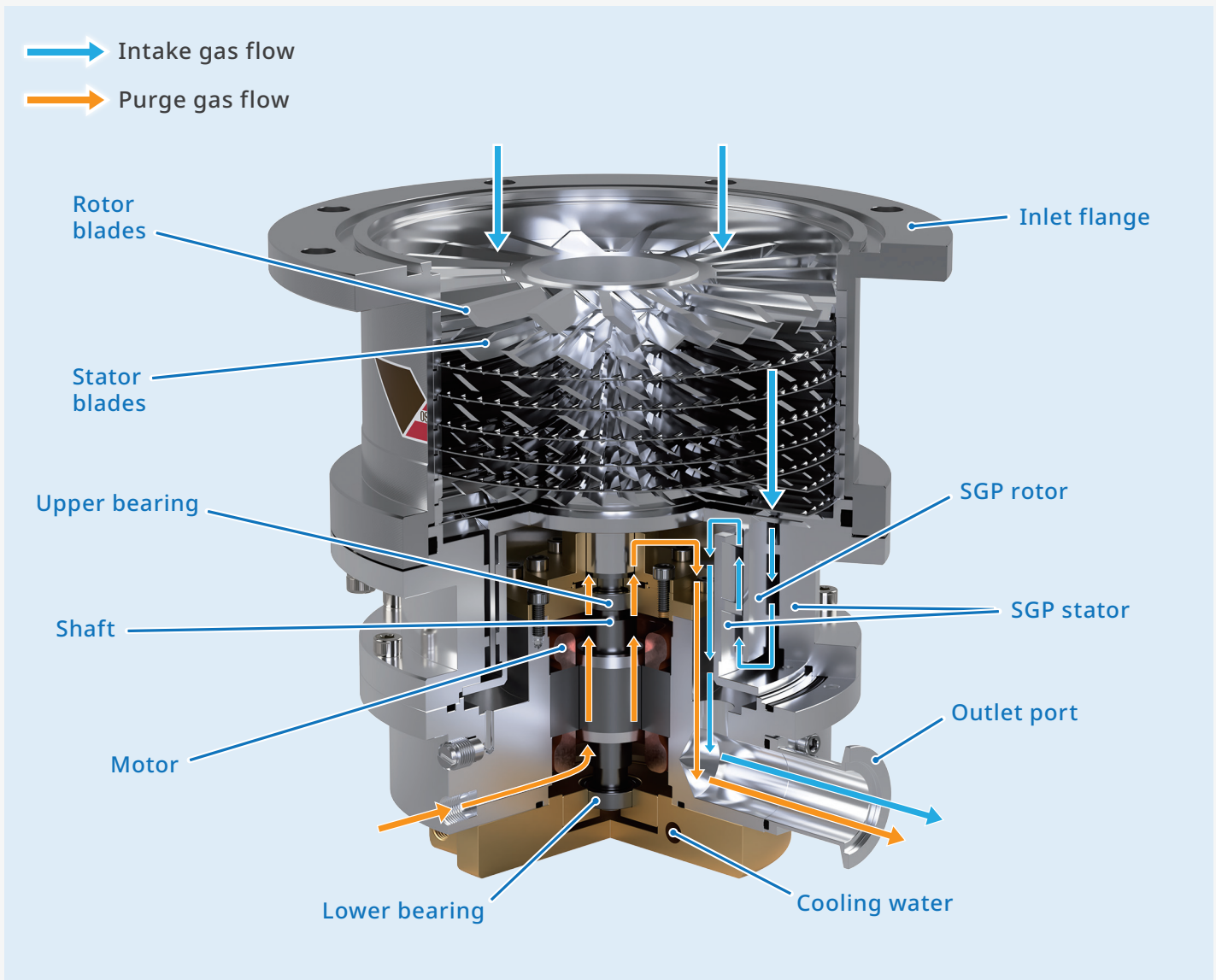
Grease-lubricated ball bearing models with a pumping speed of 50 to 2400 L/s.

Since its launch in 1999, the TG-F Series has been one of our best-selling turbo molecular pump models. Its grease-lubricated ball bearings make it compact and robust with high shock tolerance. This feature enables the pump to be installed on portable equipment or moving parts.

Point

- Mounting orientation free: flexibility in vacuum equipment design.
- Maintenance-free: No grease refill between the overhaul cycle of 20,000 to 30,000 hours.
- Compact and lightweight design.
- Models that can withstand air inrush are available. Models that can withstand shock are also available, making them suitable for use in portable systems or moving parts.
- Onboard controller models (TG60F, TG70F, TG240)

Cross-section



Specifications

| Model | | TG60F | TG60F-20 | TG70F | TG70F-20 | TG240F | TG240F-20 |
|----------------------------------|--|---|--------------|---|--------------|---------------------|--------------|
| Inlet flange | | ISO-R63 CF63 (KF40) *3 | | ISO-R63 CF63 | | ISO-R100 CF100 | |
| Outlet flange | | KF16 | | | | KF25 | |
| Cooling type | | Natural air cooling / Forced air cooling | | | | Forced air cooling | |
| Volume flow rate (L/s) | N ₂ | 60 | | 70 : ISO-R 75 : CF | | 240 | |
| | N ₂ (with protective screen) | 55 | | 65 : ISO-R 70 : CF | | 230 | |
| | H ₂ | 22 | | 40 : ISO-R 45 : CF | | 160 | |
| Max. compression ratio | N ₂ | 2×10 ⁷ | | 1×10 ⁸ | | | |
| | H ₂ | 3×10 ³ | | 1×10 ⁵ | | 4×10 ⁴ | |
| Base pressure (Pa) | ISO-R | <5×10 ⁻⁶ | | <5×10 ⁻⁷ | | <1×10 ⁻⁶ | |
| | CF | <1×10 ⁻⁶ | | <1×10 ⁻⁷ | | <5×10 ⁻⁷ | |
| Max. throughput (sccm) *1 | N ₂ | 10 : Natural air cooling 20 : Forced air cooling | | 10 : Natural air cooling 20 : Forced air cooling | | 70 | |
| Max. backing pressure (Pa) | | 800 | | 1200 | | 700 | |
| Recommended backing pump (L/min) | | ≥25 | | | | ≥80 | |
| Startup time (min) | | 1.5 ~ 2 | | 2 ~ 2.5 | | 5.5 ~ 7.5 | |
| Shutdown time (min) | | 15 ~ 25 | | 20 ~ 25 | | 45 ~ 60 | |
| Mounting orientation | | Any orientation | | | | | |
| Weight (kg) | ISO-R | 3.4 | 3 | 2.6 | 7.3 | 6.9 | |
| | CF | 5.4 | 5 | 4.6 | 10.5 | 10.1 | |
| Controller model *2 | | TC65 | TC66 | TC75 | TC76 | TC245 | TC246 |
| Input voltage | | DC 24 V | AC 100-230 V | DC 24 V | AC 100-230 V | DC 24 V | AC 100-230 V |
| Input Frequency | | 50 / 60 Hz | | | | | |
| Input Power | | 120 W | 240 VA | 120 W | 240 VA | 75 W | 170 VA |
| Input phases | | -- | Single-phase | -- | Single-phase | -- | Single-phase |
| Rated Output Frequency (Hz) | | 1150 | | 1500 | | 800 | |
| Weight (kg) | | -- | 2.4 | -- | 2.4 | -- | 2.4 |
| Communication interface | | Parallel I/O • RS232C | | | | | |

*1: This max throughput is based on a 25 L/min (TG60F/TG70F) or 80 L/min (TG240F) backing pump.

*2: Two types of controllers are available: the onboard type (TC65/TC75/TC245) and the rack-mounted type (TC66/TC76/TC246).

*3: Please contact us for models with KF40 inlet flange.

[Ambient Temperature] The base pressure is only guaranteed at an ambient temperature ranging from 10 to 23°C. The operating temperature range is 8 to 38°C.

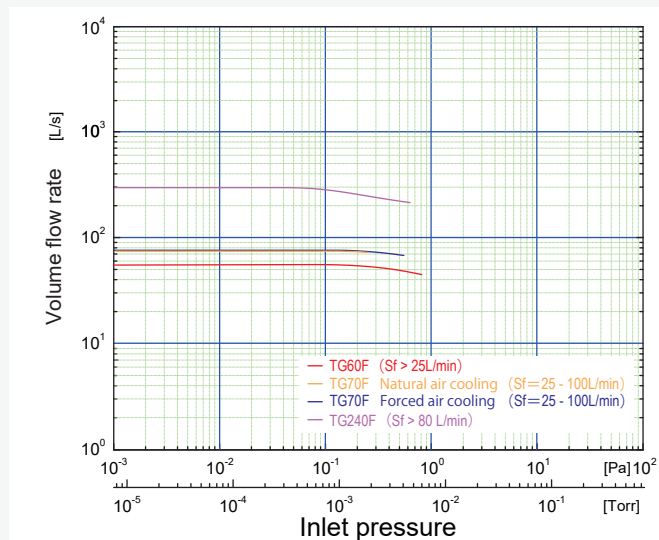
[Applicable Gases] Some gases may damage the bearing grease or internal components. Contact us about the types of gases that can be used.

[Standard Set] Pump + connector for controller

[Optional Accessories] Cooling fan unit (for forced air cooling models), controller + motor cable (for rack-mounted controller type), automatic slow leak valve, purge gas inlet connector, purge gas restrictor, and piping components.

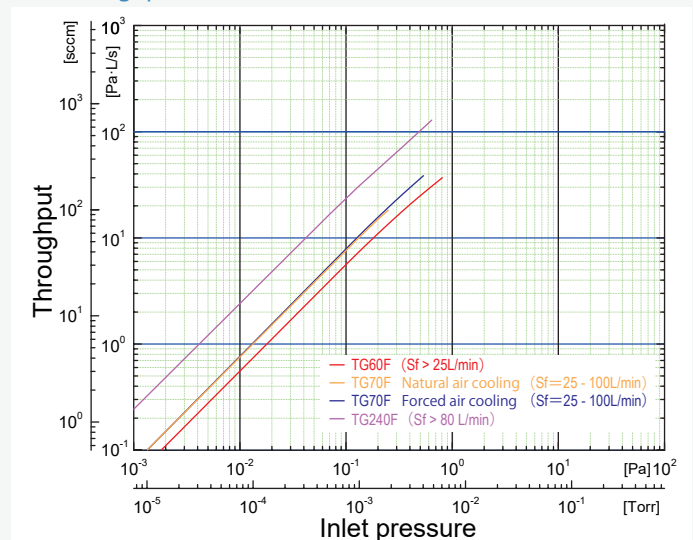
Performance curve

Volume flow rate (N₂)



* Sf: Volume flow rate of the backing pump

Gas throughput (N₂)



* Sf: Volume flow rate of the backing pump

Specifications

| Model | | TG50F | TG220F | TG350F | TG450F | TG800F□AB | TG800F□AB-60 *2 | |
|----------------------------------|--|------------------------------|----------------------------|-----------------------------|--|---------------------|-----------------|--|
| | | | | | | TG800F□WB *2 | | |
| Inlet flange | | VG65 ISO-R63 CF63 | VG100 ISO-R100 CF100 | | VG150 ISO-B160 CF160 | | | |
| Outlet flange | | KF16 | KF25 | | | KF40 | | |
| Cooling type | | Water cooling / Air cooling | | | Water cooling / Air cooling (TG800F-60 is air-cooled only) | | | |
| Volume flow rate (L/s) | N ₂ | 51 | 220 | 350 : VG 330 : ISO-R, CF | 450 | 820 | | |
| | N ₂ (with protective screen) | 49 | 210 | 330 : VG 310 : ISO-R, CF | 430 | 750 | | |
| | H ₂ | 12 | 100 | 210 | 230 | 650 | | |
| Max. compression ratio | N ₂ | 1.4×10 ⁷ | | | | 1×10 ⁸ | | |
| | H ₂ | 5×10 ² | 4×10 ² | 2×10 ³ | | 1×10 ⁴ | | |
| Base pressure (Pa) | | <3×10 ⁻⁶ | | | | <1×10 ⁻⁶ | | |
| Max. throughput (sccm) *1 | N ₂ | 80 | 400 | 500 | | 330 | 860 | |
| Max. backing pressure (Pa) | | 1330 | | 260 | | 330 | | |
| Recommended backing pump (L/min) | | ≥50 | | ≥80 | | ≥250 | | |
| Startup time (min) | | 1 ~ 1.5 | 1 ~ 1.2 | 2 ~ 2.5 | | 7 ~ 9 | 5.5 ~ 7 | |
| Shutdown time (min) | | 1 ~ 1.5 | 2.5 ~ 3.5 | 5 ~ 6.5 | | 27 ~ 32 | 12 ~ 15 | |
| Mounting orientation | | Any orientation | | | | | | |
| Weight (kg) | VG, ISO-R | 4.2 | 5.5 | 6 | 7 | 26 | | |
| | CF | 6 | 8 | 9 | 10 | 27 | | |
| Controller model | | TC64A | TC223A | TC353A | | TC1104A | TC1103 | |
| Input voltage | | AC 100-110 V AC 200-230 V | | | | | AC 200-230 V | |
| Input Frequency | | 50 / 60 Hz | | | | | | |
| Input Power (VA) | | 220 | 590 | 610 | | 810 | | |
| Input phases | | Single-phase | | | | | | |
| Rated Output Frequency (Hz) | | 800 | | 750 | | 560 | | |
| Weight (kg) | | 2.7 | | | | 8.2 | | |
| Communication interface | | Parallel I/O • RS232C | | | | | | |

*1: This max throughput is based on a 100 L/min (TG50F), 160 L/min (TG220F/350F/450F), or 500 L/min (TG800F) backing pump.

*2: For the part marked □, refer to the Model Number Chart on page 12.

[Ambient Temperature] The base pressure is only guaranteed at an ambient temperature ranging from 10 to 23°C. The operating temperature range is 10 to 32°C for the air-cooling models and 10 to 40°C for the water-cooling models. The base pressure is only guaranteed at a water temperature of 30°C or below. The water temperature range is 10 to 35°C.

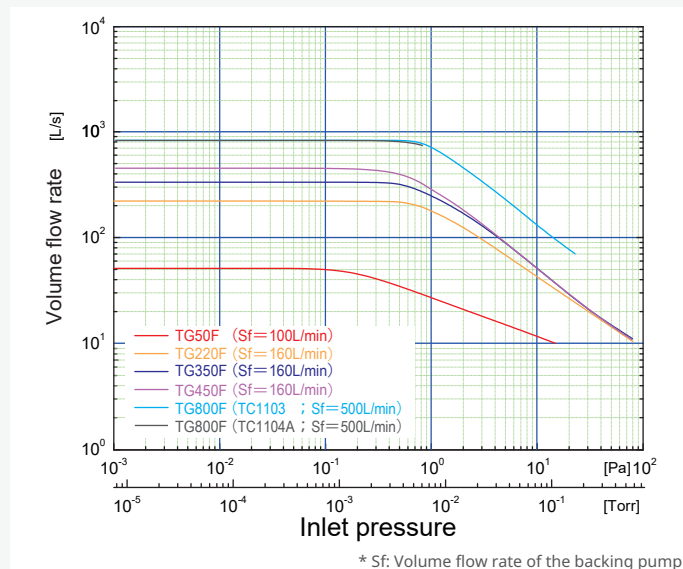
[Applicable Gases] Some gases may damage the bearing grease or internal components. Contact us about the types of gases that can be used.

[Standard Set] Pump + controller + motor cable (3 meters) + fan cable (3 meters, for air-cooled type only)

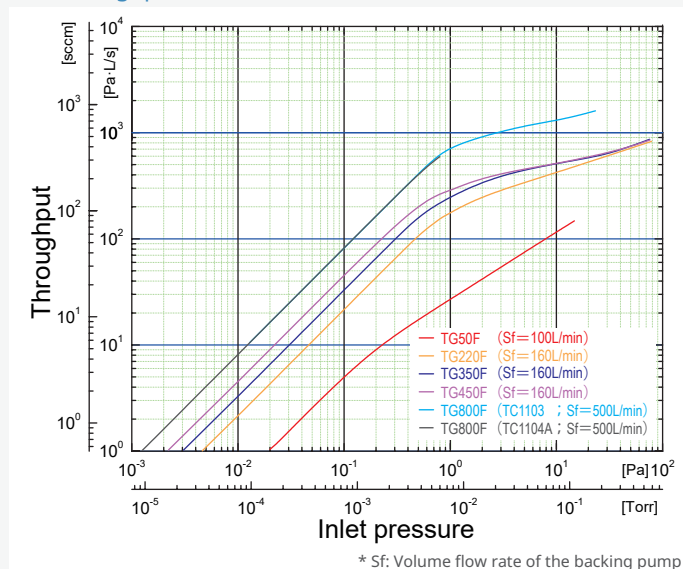
[Optional Accessories] Baking heater, automatic slow leak valve, purge gas inlet connector, purge gas restrictor, and piping components.

Performance curve

Volume flow rate (N₂)



Gas throughput (N₂)



Specifications

| Model | | TG1100F□AB | TG1100F□AB-60 *2 | TG1400F | TG2400F | TG2400F-40 | |
|----------------------------------|---|---|------------------|-----------------------------|---------------------|---------------|--|
| | | TG1100F□WB *2 | | | | | |
| Inlet flange | | VG200 ISO-B200 CF200 | | | VG250 ISO-B250 | | |
| Outlet flange | | KF40 | | | | | |
| Cooling type | | Water cooling / Air cooling (TG1100F-60 is air-cooled only) | | Water cooling / Air cooling | | Water cooling | |
| Volume flow rate (L/s) | N ₂ | 1100 | | 1400 | 2400 | | |
| | N ₂ (with protective screen) | 1000 | | 1300 | 2300 | | |
| | H ₂ | 720 | | 750 | 1100 | | |
| Max. compression ratio | N ₂ | | | 1×10 ⁸ | | | |
| | H ₂ | 1×10 ⁴ | | 4.3×10 ³ | 1.4×10 ³ | | |
| Base pressure (Pa) | | <1×10 ⁻⁶ | | | | | |
| Max. throughput (sccm) *1 | N ₂ | 330 | 860 | 450 | 900 | 1500 | |
| Max. backing pressure (Pa) | | 330 | | | 200 | | |
| Recommended backing pump (L/min) | | ≥250 | | | ≥500 | | |
| Startup time (min) | | 7 ~ 9 | 5.5 ~ 7 | | 5 ~ 7 | | |
| Shutdown time (min) | | 27 ~ 32 | 12 ~ 15 | | 15 ~ 18 | | |
| Mounting orientation | | Any orientation | | | | | |
| Weight (kg) | VG, ISO-B | 27 | | 29 | 45 | | |
| | CF | 28 | | 30 | | | |
| Controller model | | TC1104A | TC1103 | | TC2403 | TC2403-10 | |
| Input voltage | | AC 100-110 V AC 200-230 V | AC 200-230 V | | | | |
| Input Frequency | | 50 / 60 Hz | | | | | |
| Input Power (VA) | | 610 | 810 | | 1200 | | |
| Input phases | | Single-phase | | | | | |
| Rated Output Frequency (Hz) | | 560 | | | 520 | | |
| Weight (kg) | | 2.7 | | 8.2 | | | |
| Communication interface | | Parallel I/O · RS232C | | | | | |

*1: This max throughput is based on a 500 L/min (TG1100F/1400F), or 1000 L/min (TG2400F) backing pump.

*2: For the part marked □, refer to the Model Number Chart on page 12.

[Ambient Temperature] The base pressure is only guaranteed at an ambient temperature ranging from 10 to 23°C. The operating temperature range is 10 to 32°C for the air-cooling models and 10 to 40°C for the water-cooling models. The base pressure is only guaranteed at a water temperature of 30°C or below. The water temperature range is 10 to 35°C.

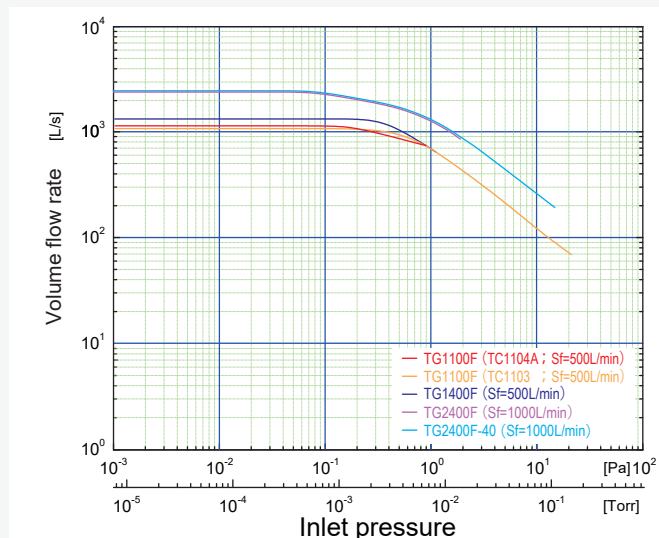
[Applicable Gases] Some gases may damage the bearing grease or internal components. Contact us about the types of gases that can be used.

[Standard Set] Pump + controller + motor cable (3 meters) + fan cable (3 meters, for air-cooled type only)

[Optional Accessories] Baking heater, automatic slow leak valve, purge gas inlet connector, purge gas restrictor, and piping components.

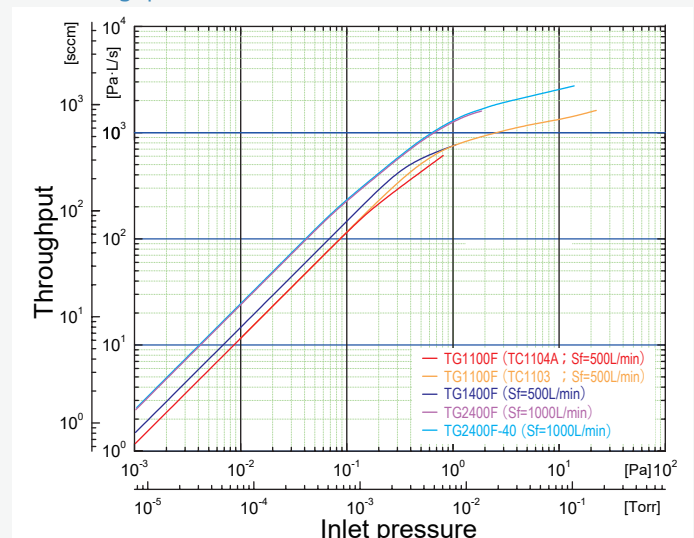
Performance curve

Volume flow rate (N₂)



* Sf: Volume flow rate of the backing pump

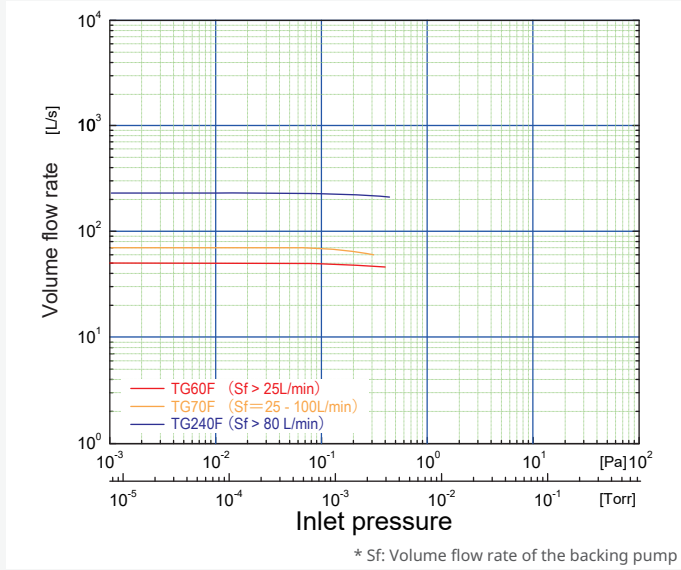
Gas throughput (N₂)



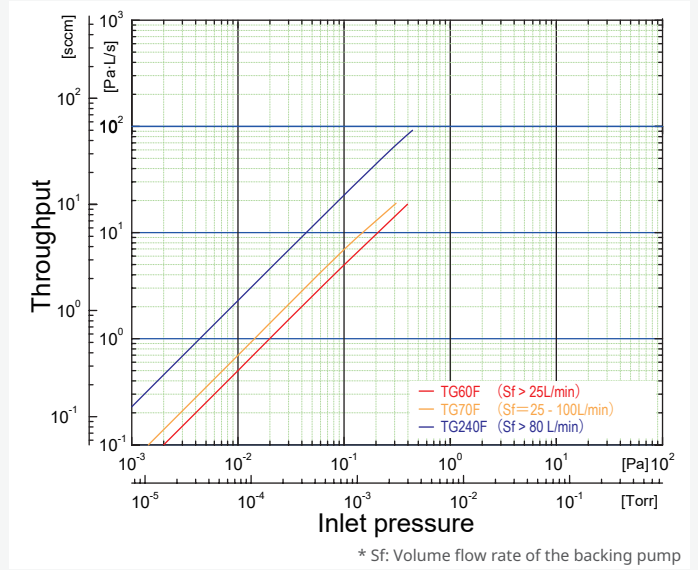
* Sf: Volume flow rate of the backing pump

Performance curve (Ar) (① TG60F/70F/240F, ② TG50F/220F/350F/450F/800F, ③ TG1100F/1400F/2400F)

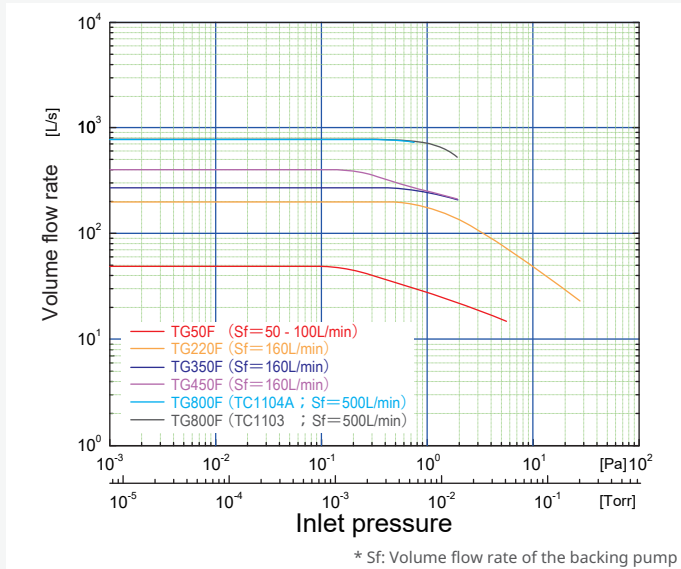
① Volume flow rate (Ar)



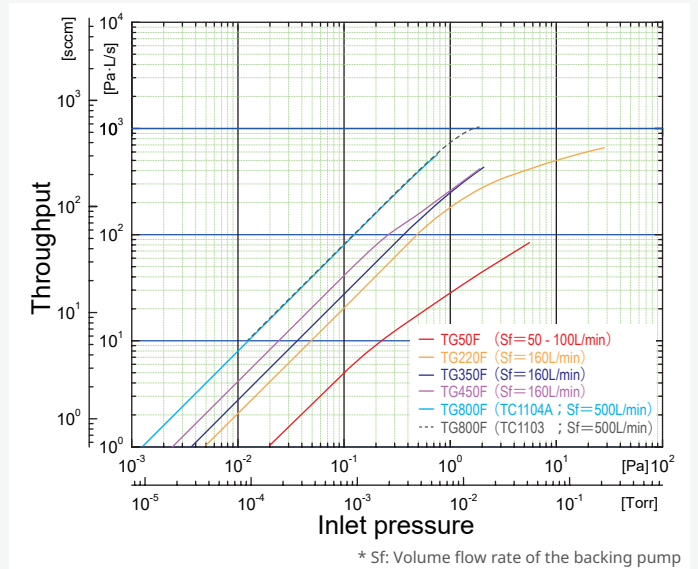
① Gas throughput (Ar)



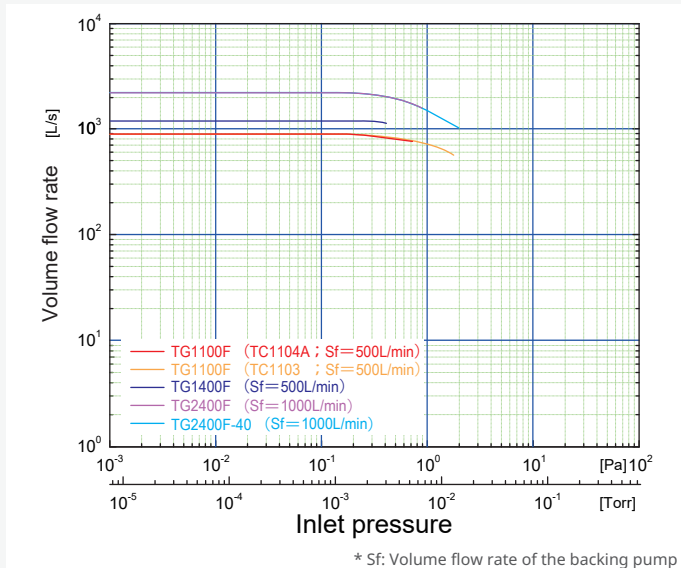
② Volume flow rate (Ar)



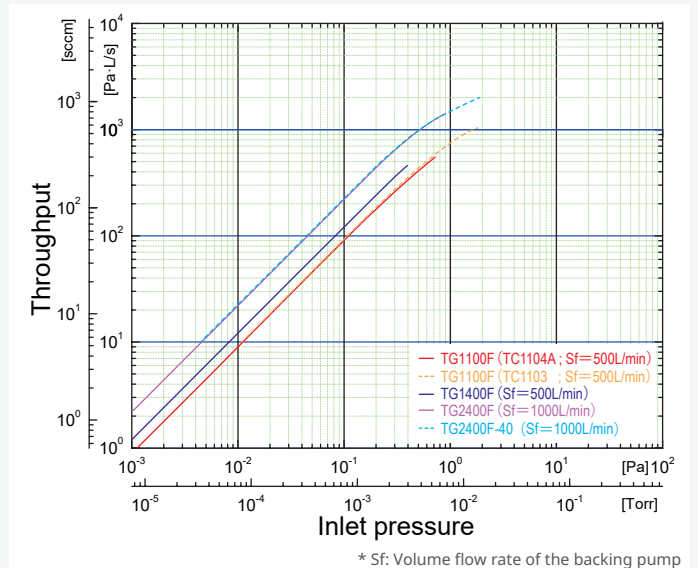
② Gas throughput (Ar)



③ Volume flow rate (Ar)

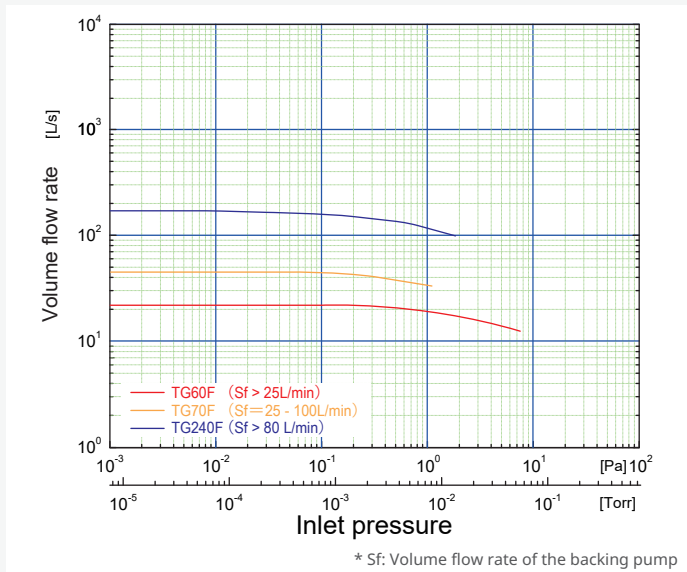


③ Gas throughput (Ar)

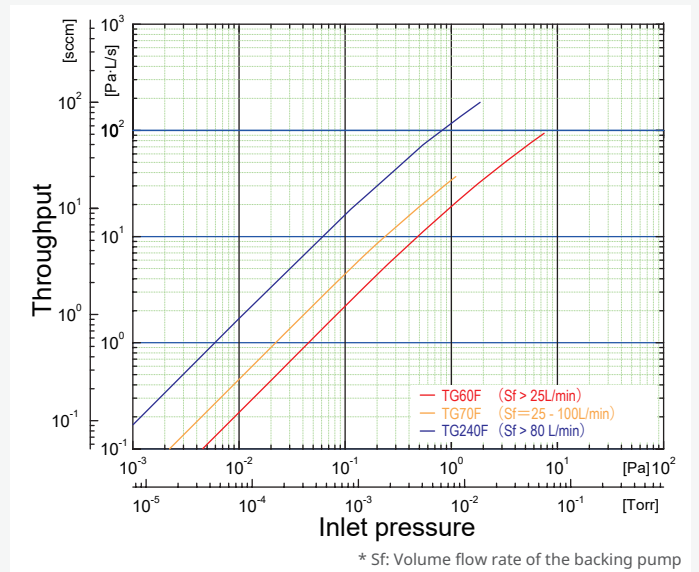


Performance curve (H₂) (① TG60F/70F/240F, ② TG50F/220F/350F/450F/800F, ③ TG1100F/1400F/2400F)

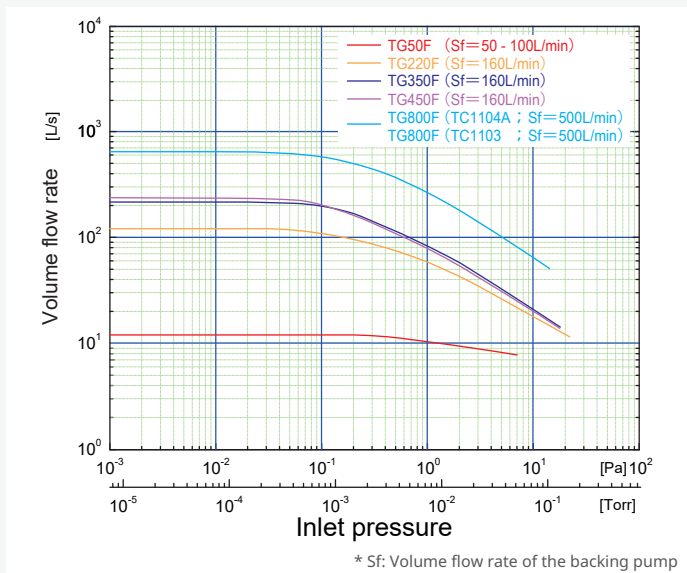
① Volume flow rate (H₂)



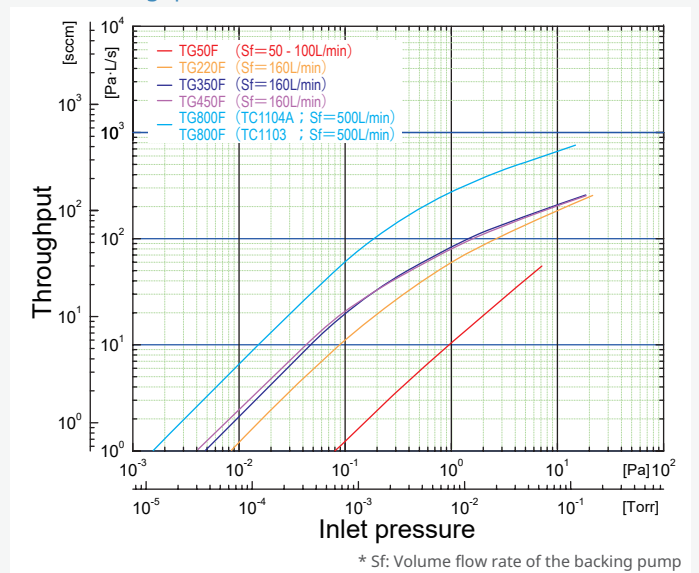
① Gas throughput (H₂)



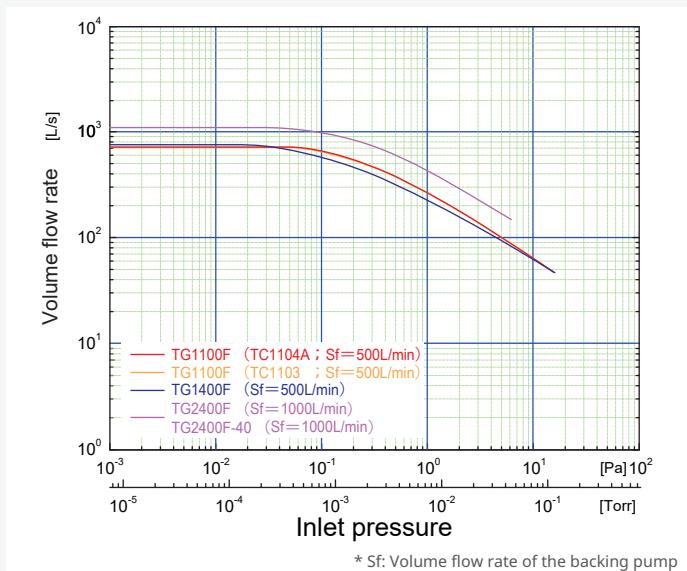
② Volume flow rate (H₂)



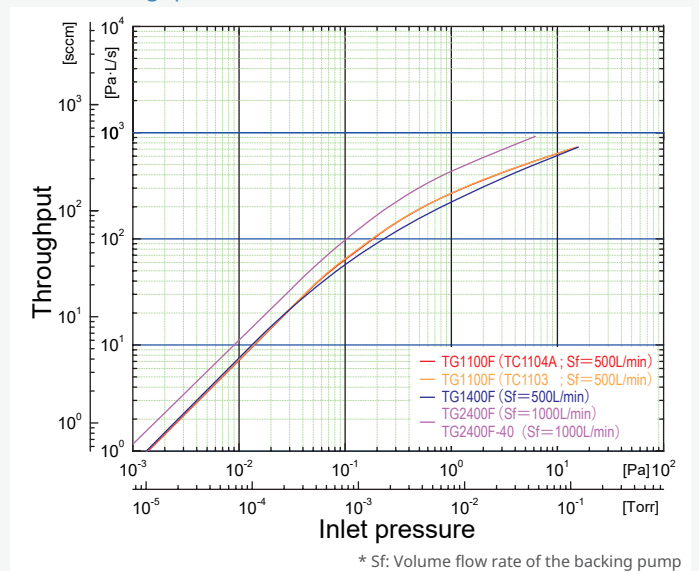
② Gas throughput (H₂)



③ Volume flow rate (H₂)



③ Gas throughput (H₂)



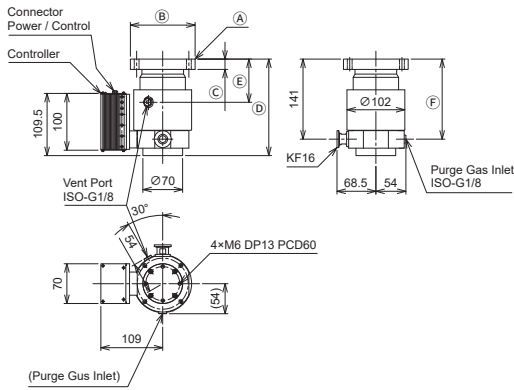
TG-F SERIES

Dimensions * All inlet flange bolt holes straddle the centerlines.

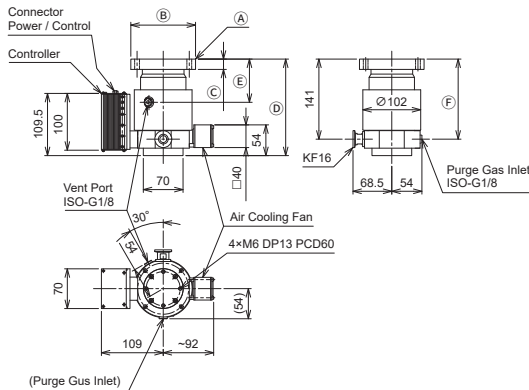
TG60F



Natural air cooling



Forced air cooling



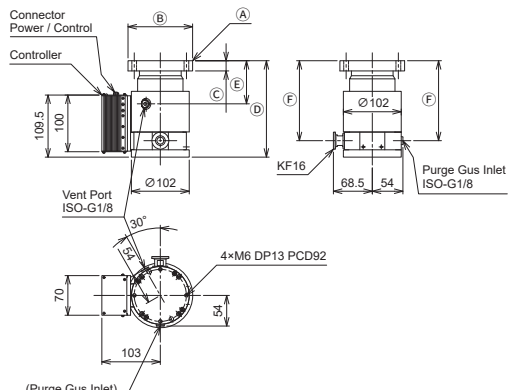
| | A | B | C | D | E | F |
|---------|------|----|-------|------|-------|---|
| CF63 | Ø114 | 18 | 170 | 76 | 141 | |
| ISO-R63 | Ø95 | 12 | 144.5 | 50.5 | 115.5 | |

* The drawing above is for the TG60F with an onboard controller. The TG60F-20 does not have an onboard controller and instead has a rack-mounted controller.

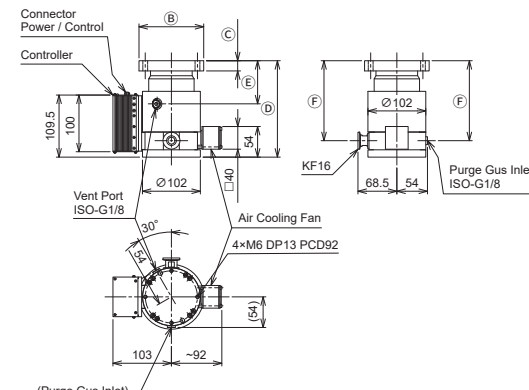
TG70F



Natural air cooling



Forced air cooling



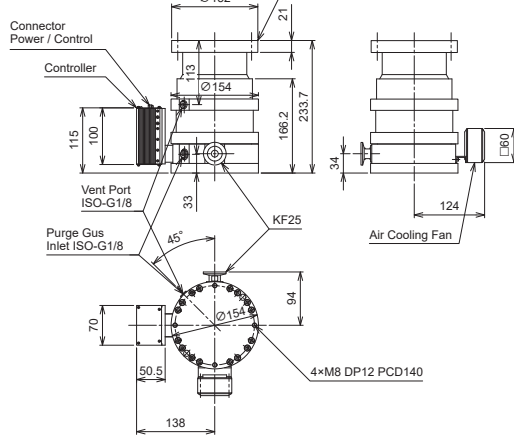
| | A | B | C | D | E | F |
|---------|------|----|-------|------|-------|---|
| CF63 | Ø114 | 18 | 170 | 76 | 141 | |
| ISO-R63 | Ø95 | 12 | 144.5 | 50.5 | 115.5 | |

* The drawing above is for the TG70F with an onboard controller. The TG70F-20 does not have an onboard controller and instead has a rack-mounted controller.

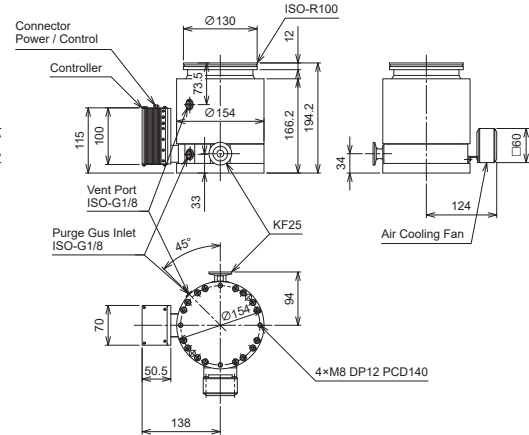
TG240F



CF flange



ISO-R flange

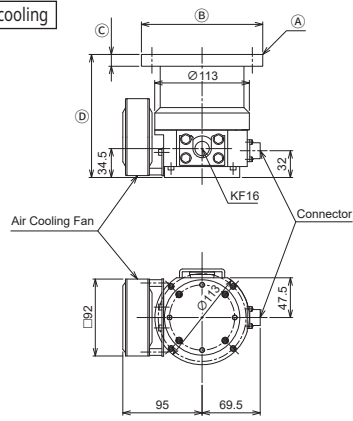


* The drawing above is for the TG240F with an onboard controller. The TG240F-20 does not have an onboard controller and instead has a rack-mounted controller.

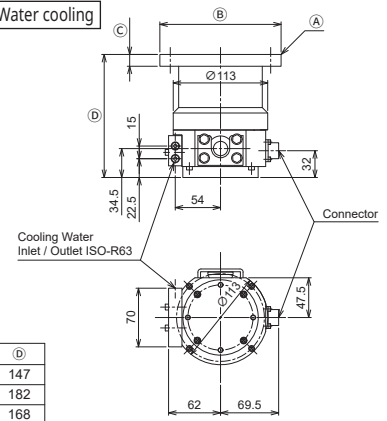
TG50F



Air cooling



Water cooling

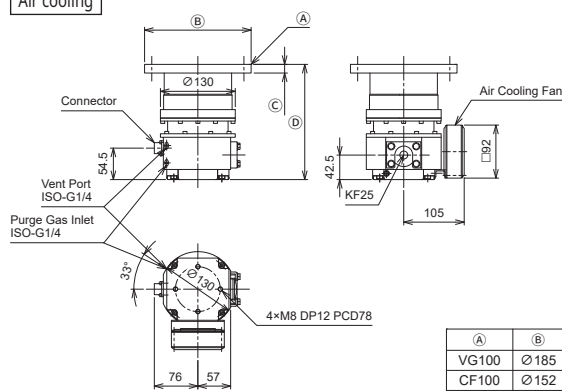


| | A | B | C | D |
|---------|------|----|-----|---|
| VG65 | Ø145 | 14 | 147 | |
| CF63 | Ø114 | 18 | 182 | |
| ISO-R63 | Ø95 | 12 | 168 | |

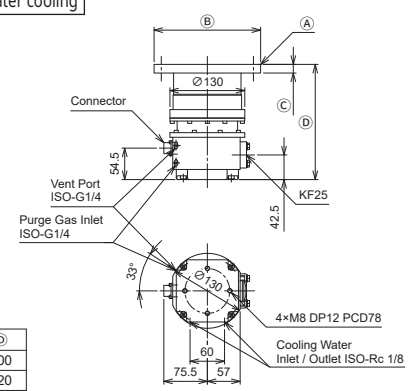
TG220F



Air cooling



Water cooling

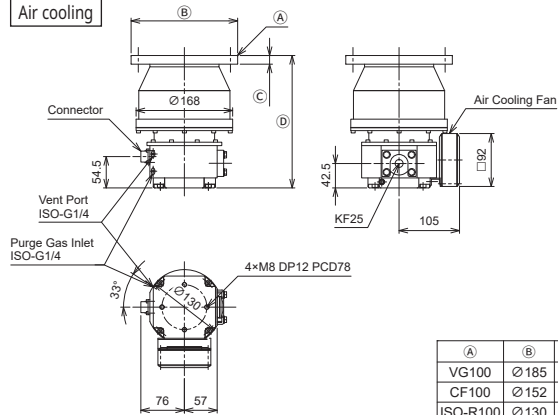


| | A | B | C | D |
|----------|------|----|-----|---|
| VG100 | Ø185 | 15 | 200 | |
| CF100 | Ø152 | 21 | 220 | |
| ISO-R100 | Ø130 | 12 | 200 | |

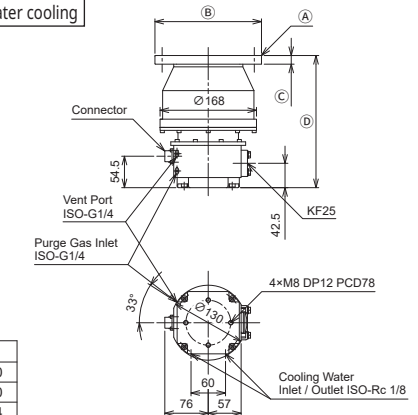
TG350F



Air cooling



Water cooling

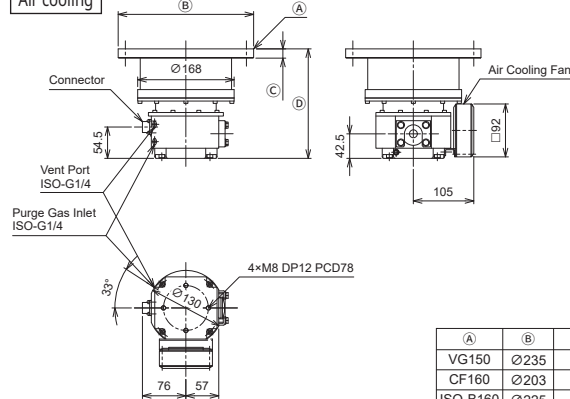


| | A | B | C | D |
|----------|------|----|-----|---|
| VG100 | Ø185 | 15 | 230 | |
| CF100 | Ø152 | 21 | 230 | |
| ISO-R100 | Ø130 | 12 | 214 | |

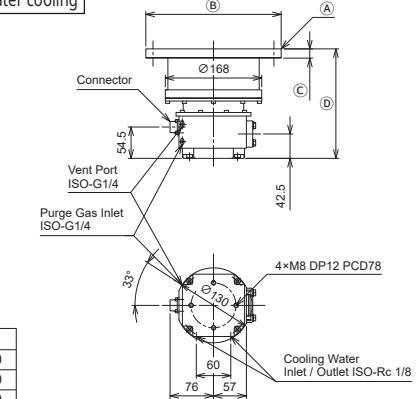
TG450F



Air cooling



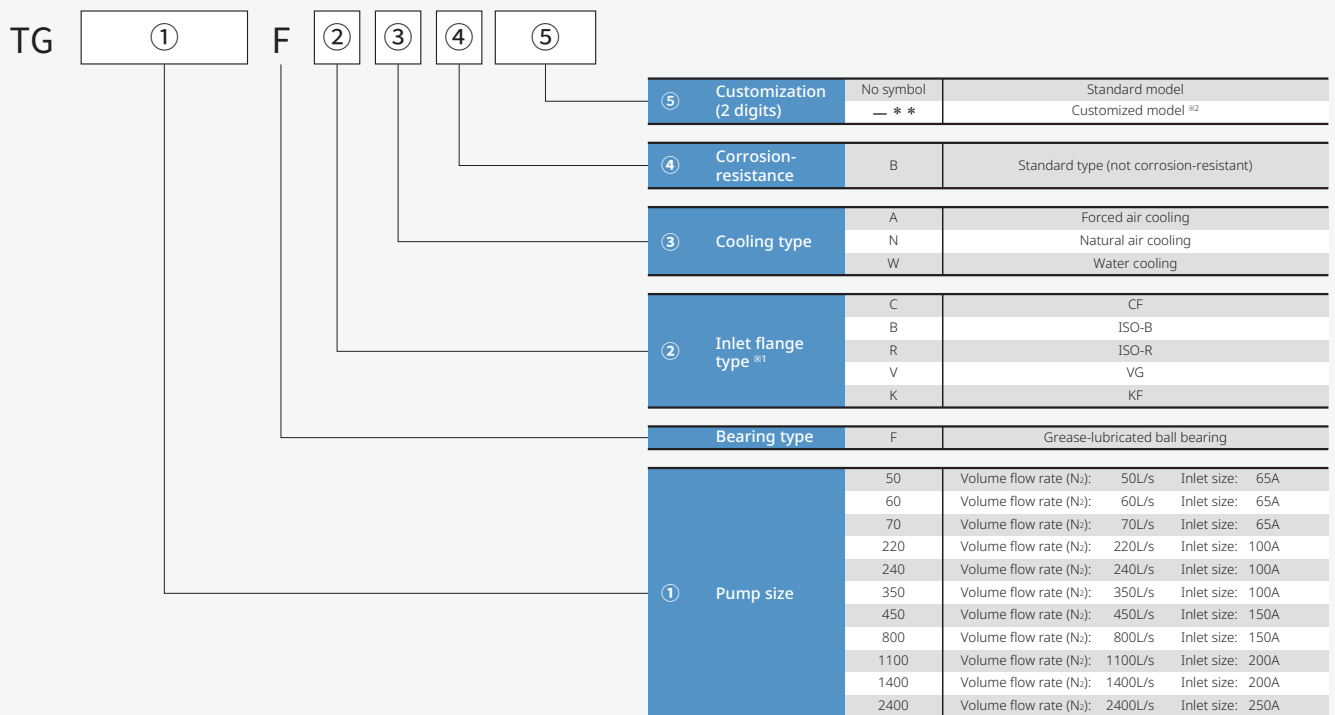
Water cooling



| | A | B | C | D |
|----------|------|----|-----|---|
| VG150 | Ø235 | 16 | 190 | |
| CF160 | Ø203 | 22 | 190 | |
| ISO-B160 | Ø225 | 16 | 190 | |

Model Number Chart

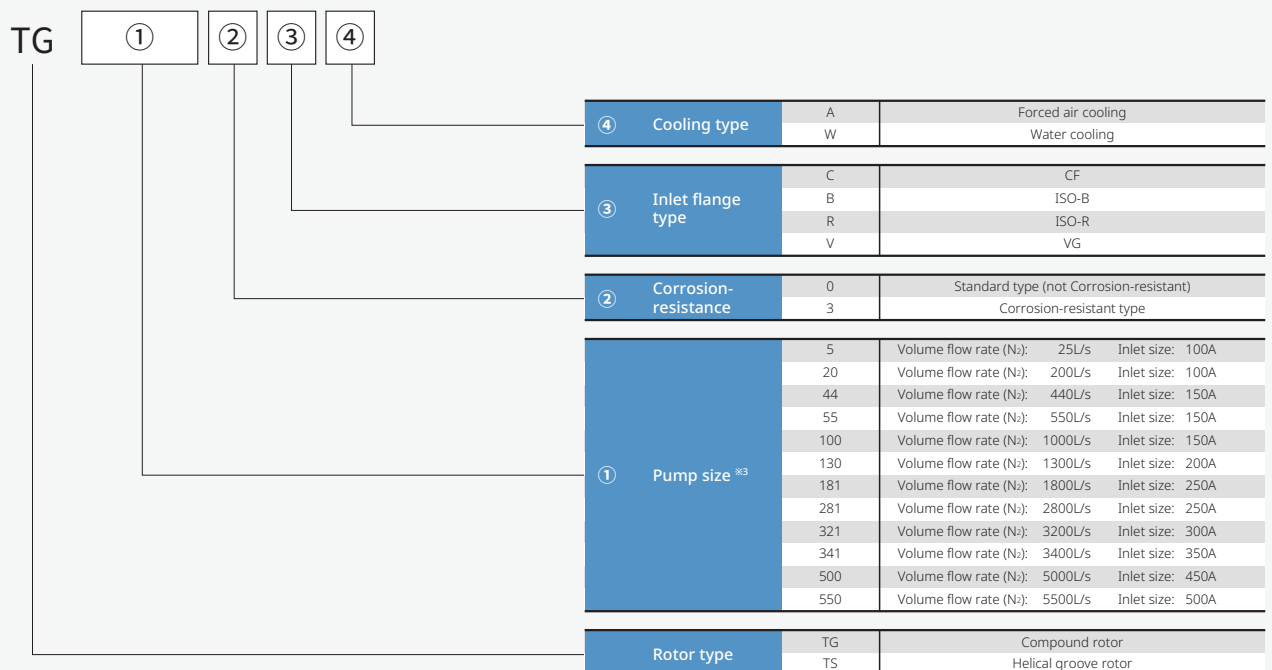
TG-F Series Model Number Chart



※1 Flange standards
 VG : JISB2290: 1998 Vacuum technology-Flange: dimensions (Vacuum flange with O-ring groove)
 CF : JVIS 003 Bakeable Flanges: dimensions (Knife edge sealed type)
 KF : ISO2861/1: 1974 Vacuum clamp-Quick-release couplings-Dimensions-Part 1 (Clamped type)
 ISO-B : ISO1609: 1986 Vacuum technology - Flange dimensions (Bolted type)
 ISO-R : ISO1609: 1986 Vacuum technology - Flange dimensions (Clamped or rotatable type)

※2 Please contact us for customization details.

TG & TS Series Model Number Chart



※3 TS series only includes TS50 and TS440/443. TG series includes other models. TG5000/5003 are made-to-order. Please contact us for details.

TG SERIES

Industrial fields

| | | | | |
|------------------|--------|----------|-----------------------|-----------------|
| Optical Industry | Energy | Material | Automotive / Aviation | Aerospace / R&D |
|------------------|--------|----------|-----------------------|-----------------|

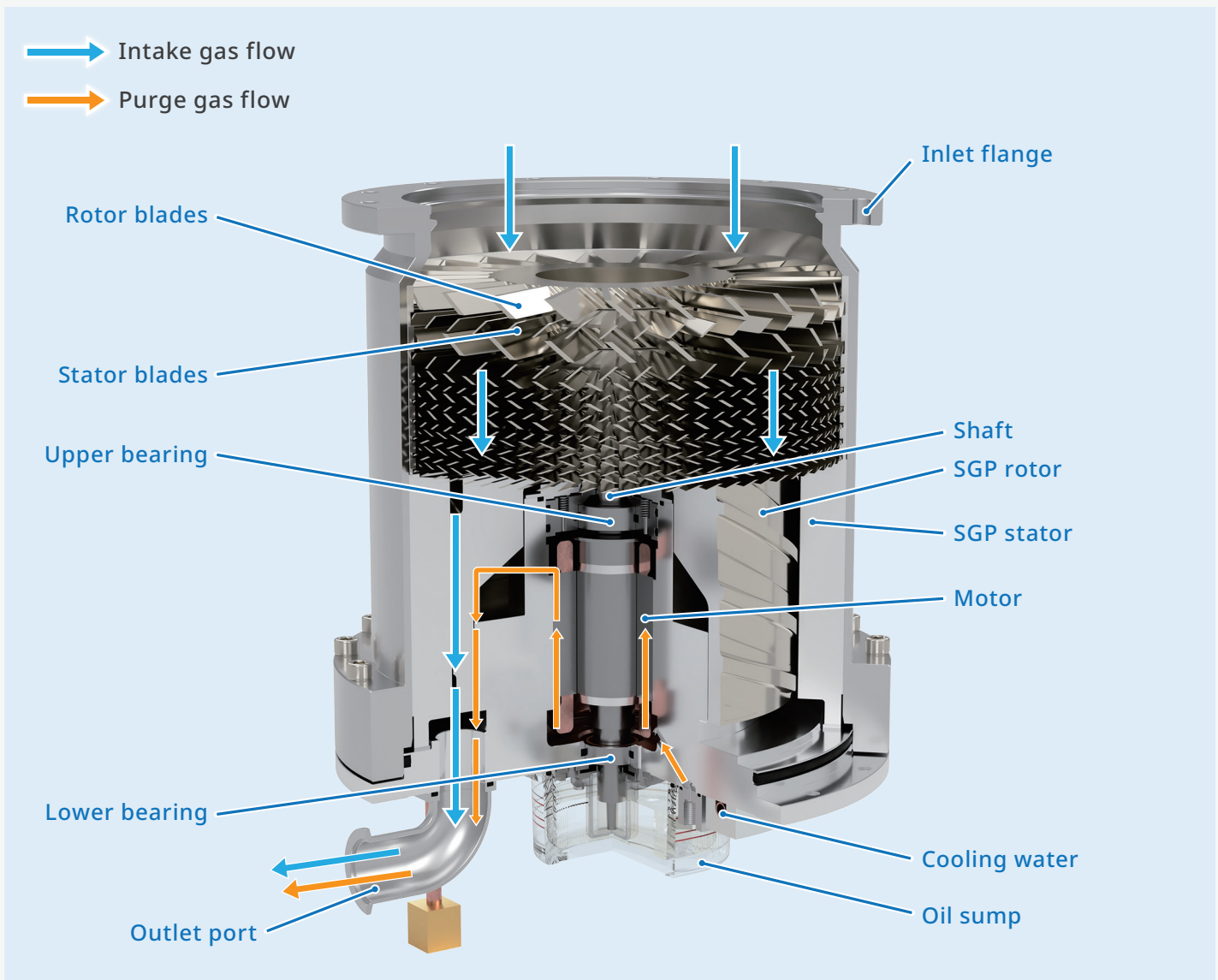
Oil-lubricated ball bearing models with pumping speeds of 50 to 2400 L/s.

Featuring a compound rotor design, the pump offers an excellent balance of performance and durability, making it widely used across a variety of applications, from general industries such as optics, energy, and automotive to R&D. Corrosion-resistant models are also available for applications involving corrosive gases.

Point

- Reliable operation, even under harsh conditions.
- TG203-TG1813 (200 - 1800 L/s): Corrosion-resistant models for applications involving corrosive gases.
- TG2810-TG5500 (2800 - 5500 L/s): Standard models for clean applications and corrosion-resistant models for applications involving corrosive gases.

Cross-section



Specifications

| Model | TG203 | TG553 | TG1003 | TG1303 | TG1813 | |
|----------------------------------|--|-------------------|--|----------------------------|---------------------|------|
| Inlet flange | VG100 CF100 ISO-R100 | | VG150 CF160 ISO-B160 | VG200 CF200 ISO-B200 | VG250 ISO-B250 | |
| Outlet flange | KF25 | | KF40 | | | |
| Cooling type | Water cooling / Air cooling | | Water cooling | | | |
| Volume flow rate (L/s) | N ₂ | 200 | 550 | 1000 | 1300 | 1800 |
| | N ₂ (with protective screen) | 140 | 430 | 940 | 1100 | 1700 |
| | H ₂ | 150 | 370 | 1000 | | 1100 |
| Max. compression ratio | N ₂ | 1×10 ⁸ | | | | |
| | H ₂ | 4×10 ³ | 3×10 ³ | 4×10 ³ | 3×10 ³ | |
| Base pressure (Pa) | <1×10 ⁻⁶ : VG·ISO-R <1×10 ⁻⁷ : CF | | <1×10 ⁻⁶ : VG·ISO-B <1×10 ⁻⁷ : CF | | <1×10 ⁻⁶ | |
| Max. throughput (sccm) *1 | N ₂ | 543 | 1500 | 2715 | 2444 | |
| Max. backing pressure (Pa) | 550 | | 300 | | 270 | |
| Recommended backing pump (L/min) | ≥80 | ≥250 | | ≥500 | | |
| Startup time (min) | 4 ~ 6 | 8 ~ 13 | | 9 ~ 12 | 11 ~ 16 | |
| Shutdown time (min) | 4 ~ 6 | 8 ~ 11 | | 9 ~ 13 | 23 ~ 28 | |
| Mounting orientation | Vertical (±10°) | | | | | |
| Weight (kg) | 11 | 41 | 50 | | 80 | |
| Controller model | TC203A | TC553 | TC1003 | | TC1813 | |
| Input voltage | AC 100-110 V AC 200-230 V | | AC 200-230 V | | | |
| Input Frequency | 50 / 60 Hz | | | | | |
| Input Power (VA) | 610 | 1200 | 1600 | | 2200 | |
| Input phases | Single-phase | | | | | |
| Rated Output Frequency (Hz) | 800 | | 400 | | 340 | |
| Weight (kg) | 2.7 | | 8.2 | | | |
| Communication interface | Parallel I/O · RS232C | | | | | |

*1: This max throughput is based on a 160 L/min (TG203), 500 L/min (TG553), or 1000 L/min (TG1003, TG1303, TG1813) backing pump.

[Ambient Temperature] The base pressure is only guaranteed at an ambient temperature ranging from 10 to 23°C. The operating temperature range is 10 to 32°C for the air-cooling models and 10 to 40°C for the water-cooling models. The base pressure is only guaranteed at a water temperature of 30°C or below. The water temperature range is 10 to 35°C.

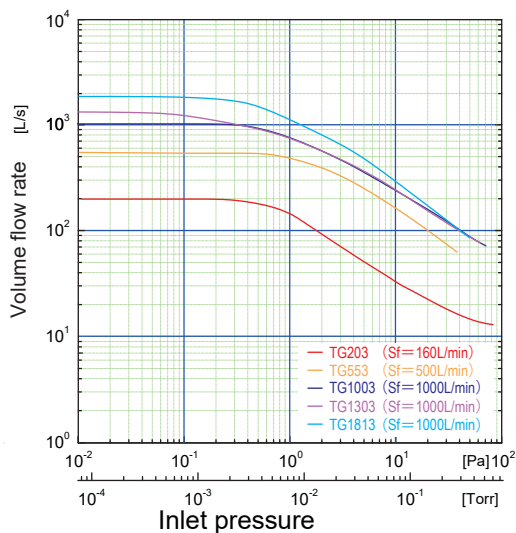
[Applicable Gases] Some gases may damage the bearing grease or internal components. Contact us about the types of gases that can be used.

[Standard Set] Pump + controller + motor cable (3 meters) + fan cable (3 meters, for air-cooled type only)

[Optional Accessories] Baking heater, automatic slow leak valve, purge gas inlet connector, purge gas restrictor, and piping components.

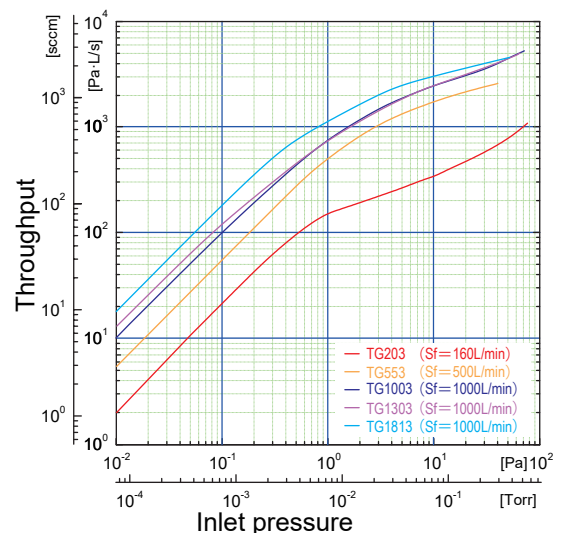
Performance curve

Volume flow rate (N₂)



* Sf: Volume flow rate of the backing pump

Gas throughput (N₂)



* Sf: Volume flow rate of the backing pump

Specifications

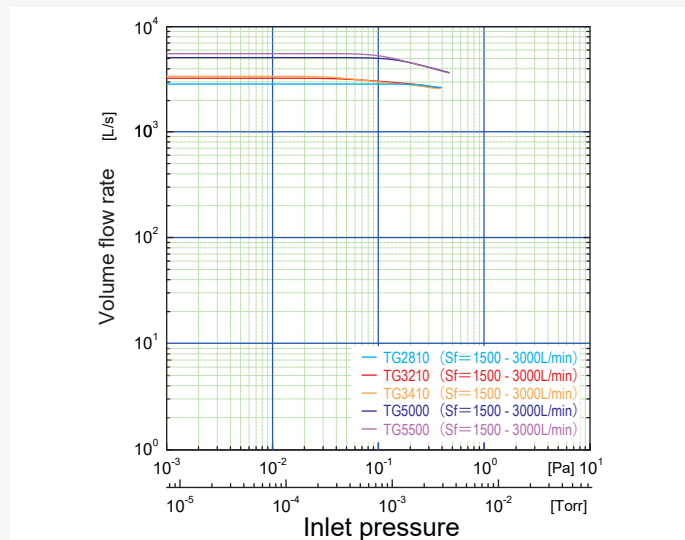
| Model | | TG2810/2813 | TG3210/3213 | TG3410/3413 | TG5000/5003 | TG5500/5503 |
|----------------------------------|--|-----------------------|-------------------|-------------|-------------------|-------------|
| Inlet flange | | VG250 ISO-B250 | VG300 ISO-B320 | VG350 | VG450 | VG500 |
| Outlet flange | | KF40 | | | KF50 | |
| Cooling type | | Water cooling | | | | |
| Volume flow rate (L/s) | N ₂ | 2800 | 3200 | 3400 | 5000 | 5500 |
| | N ₂ (with protective screen) | 2600 | 3000 | 3200 | 4700 | 5200 |
| | H ₂ | 2400 | 2500 | 2600 | 4000 | 4400 |
| Max. compression ratio | N ₂ | 1×10 ⁸ | | | | |
| | H ₂ | 6×10 ³ | | | 5×10 ³ | |
| Base pressure (Pa) | | <1×10 ⁻⁶ | | | | |
| Max. throughput (sccm) *1 | N ₂ | 543 | | | 1200 | |
| Max. backing pressure (Pa) | | 270 | | | 200 | |
| Recommended backing pump (L/min) | | ≥1500 | | | | |
| Startup time (min) | | 10 ~ 15 | | | 25 ~ 35 | |
| Shutdown time (min) | | 25 ~ 30 | | | 30 ~ 40 | |
| Mounting orientation | | Vertical (±10°) | | | | |
| Weight (kg) | | 100 | | | 250 | |
| Controller model | | TC3213 | | | TC5503 | |
| Input voltage | | AC 200-230 V | | | | |
| Input Frequency | | 50 / 60 Hz | | | | |
| Input Power (VA) | | 2200 | | | | |
| Input phases | | Single-phase | | | | |
| Rated Output Frequency (Hz) | | 360 | | | 500 | |
| Weight (kg) | | 8.2 | | | 8.7 | |
| Communication interface | | Parallel I/O • RS232C | | | | |

*1: This max throughput is based on a 3000 L/min backing pump (TG2810/2813 - TG5500/5503).

| | |
|------------------------|--|
| [Ambient Temperature] | The base pressure is only guaranteed at an ambient temperature ranging from 10 to 23°C. The operating temperature range is 10 to 32°C for the air-cooling models and 10 to 40°C for the water-cooling models. The base pressure is only guaranteed at a water temperature of 30°C or below. The water temperature range is 10 to 35°C. |
| [Applicable Gases] | Some gases may damage the bearing grease or internal components. Contact us about the types of gases that can be used. |
| [Standard Set] | Pump + controller + motor cable (3 meters) + fan cable (3 meters, for air-cooled type only) |
| [Optional Accessories] | Baking heater, automatic slow leak valve, purge gas inlet connector, purge gas restrictor, and piping components. |

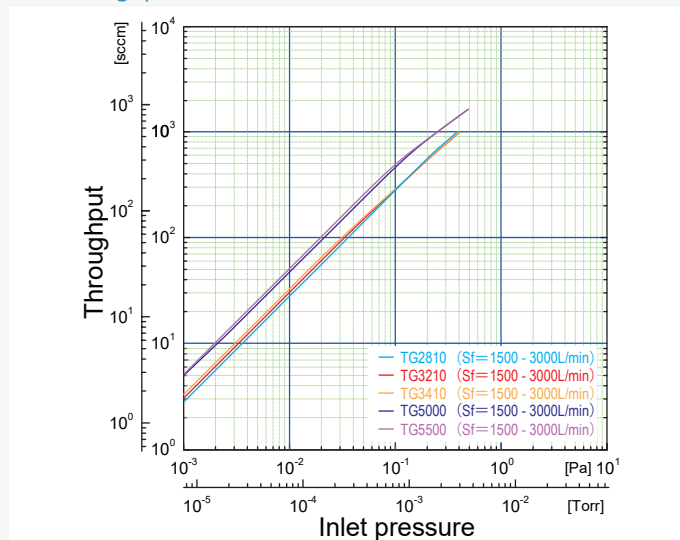
Performance curve

Volume flow rate (N₂)



* Sf: Volume flow rate of the backing pump

Gas throughput (N₂)

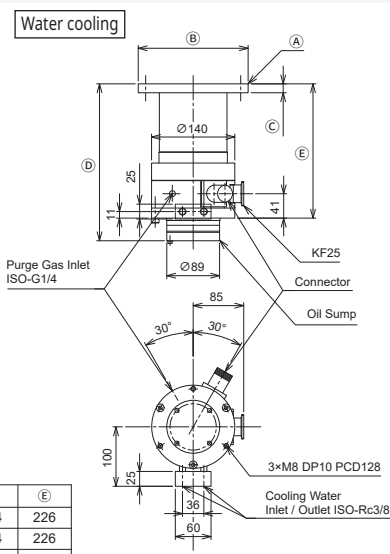
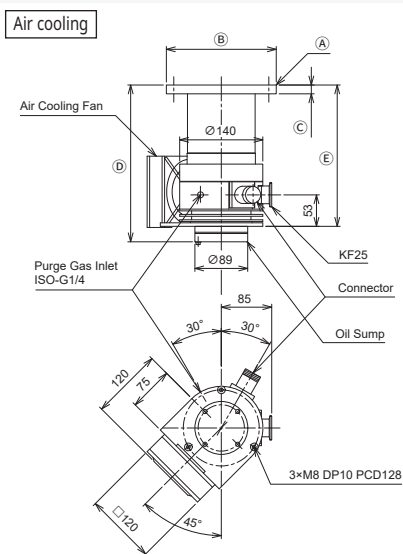


* Sf: Volume flow rate of the backing pump

TG SERIES

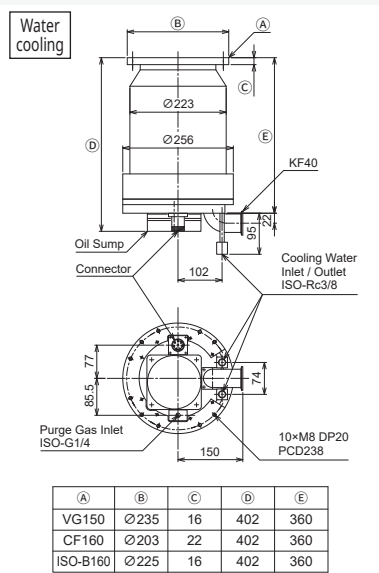
Dimensions * All inlet flange bolt holes straddle the centerlines.

TG203



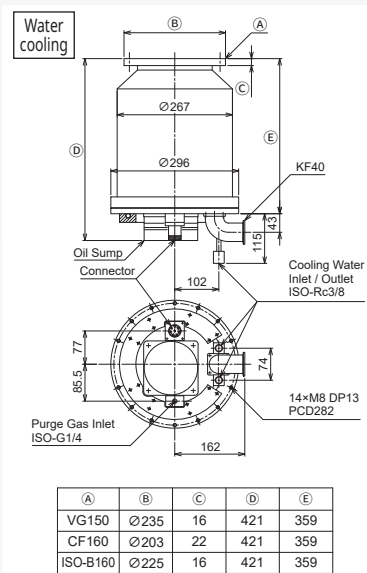
| | A | B | C | D | E |
|----------|------|----|-----|-----|---|
| VG100 | Ø185 | 15 | 264 | 226 | |
| CF100 | Ø152 | 21 | 264 | 226 | |
| ISO-R100 | Ø130 | 12 | 262 | 224 | |

TG553



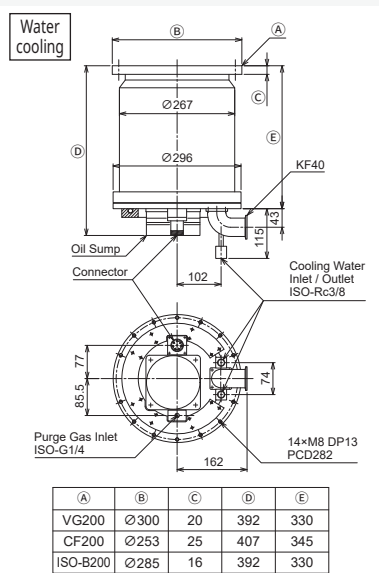
| | A | B | C | D | E |
|----------|------|----|-----|-----|---|
| VG150 | Ø235 | 16 | 402 | 360 | |
| CF160 | Ø203 | 22 | 402 | 360 | |
| ISO-B160 | Ø225 | 16 | 402 | 360 | |

TG1003



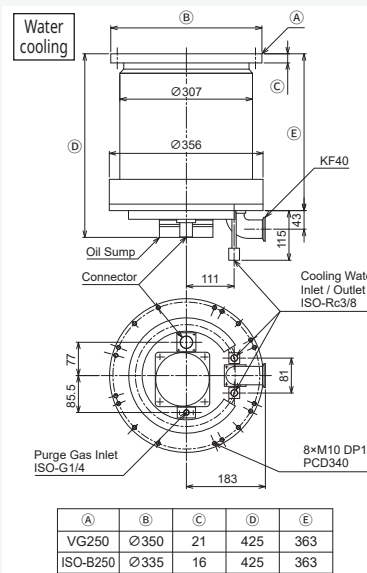
| | A | B | C | D | E |
|----------|------|----|-----|-----|---|
| VG150 | Ø235 | 16 | 421 | 359 | |
| CF160 | Ø203 | 22 | 421 | 359 | |
| ISO-B160 | Ø225 | 16 | 421 | 359 | |

TG1303



| | A | B | C | D | E |
|----------|------|----|-----|-----|---|
| VG200 | Ø300 | 20 | 392 | 330 | |
| CF200 | Ø253 | 25 | 407 | 345 | |
| ISO-B200 | Ø285 | 16 | 392 | 330 | |

TG1813

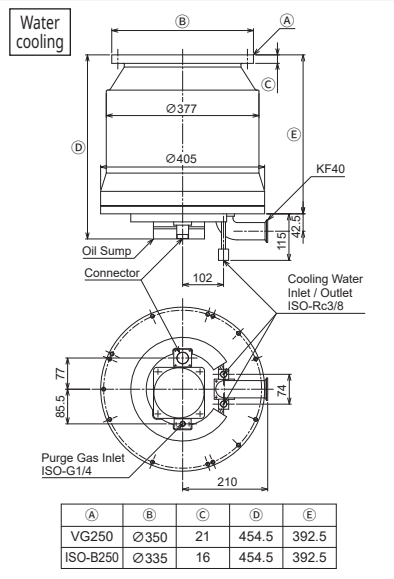


| | A | B | C | D | E |
|----------|------|----|-----|-----|---|
| VG250 | Ø350 | 21 | 425 | 363 | |
| ISO-B250 | Ø335 | 16 | 425 | 363 | |

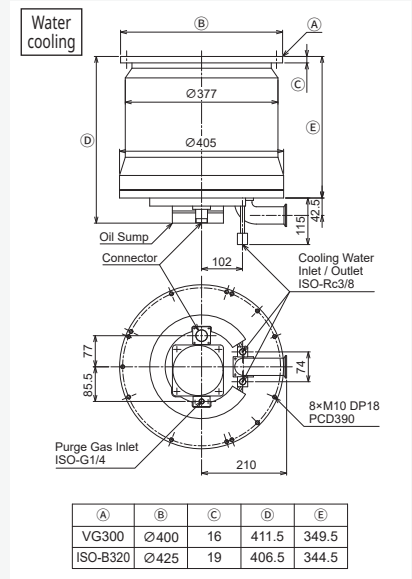
TG SERIES

Dimensions * All inlet flange bolt holes straddle the centerlines.

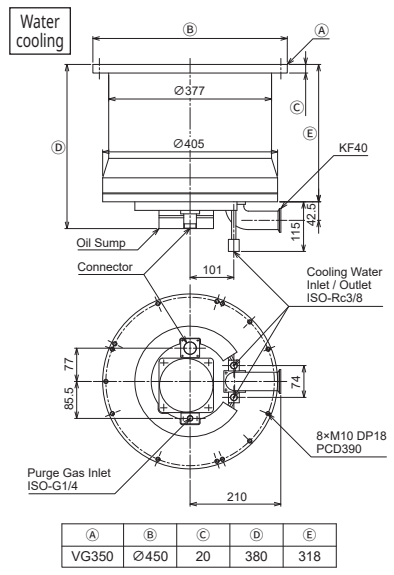
TG2810
TG2813



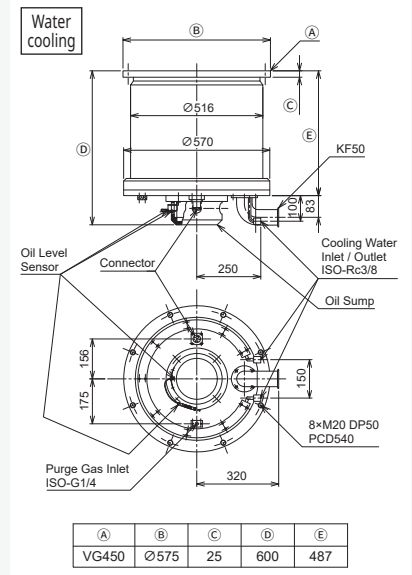
TG3210
TG3213



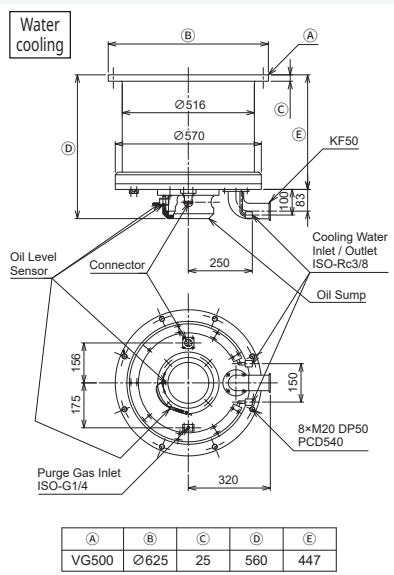
TG3410
TG3413



TG5000
TG5003



TG5500
TG5503



TS SERIES

Industrial fields

| | | | | | |
|------------------|------------------------|--------|----------|-----------------------|-----------------|
| Optical Industry | Laboratory instruments | Energy | Material | Automotive / Aviation | Aerospace / R&D |
|------------------|------------------------|--------|----------|-----------------------|-----------------|

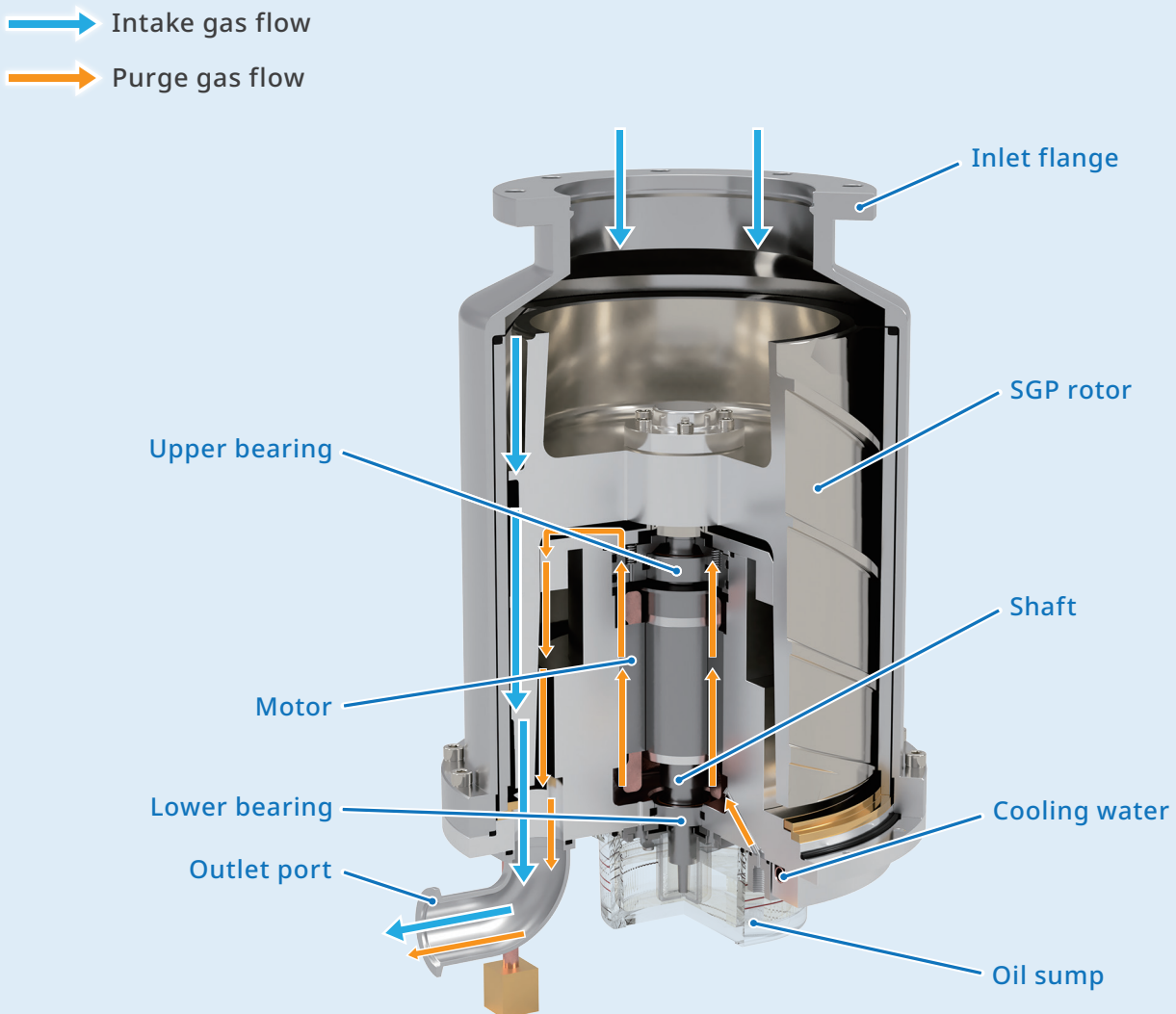
Oil-lubricated ball bearing type molecular drag vacuum pumps with pumping speed of 25 and 440 L/s.

With an all-drag stage design, the pump provides high throughput and a high compression ratio at medium to low vacuum. Its ability to operate under high load or long duration makes it ideal for evacuating large chambers.

Point

- High throughput at medium to low vacuum.
- Capable of withstanding 300,000 times or more air inrushes (TS50)

Cross-section



Specifications

| Model | | TS50 | TS440 / TS443 |
|----------------------------------|--|-----------------------------|----------------------------|
| Inlet flange | | VG100 CF100 ISO-R100 | VG150 CF160 ISO-B160 |
| Outlet flange | | KF25 | KF40 |
| Cooling type | | Water cooling / Air cooling | Water cooling |
| Volume flow rate (L/s) | N ₂ | 25 | 440 |
| | N ₂ (with protective screen) | 23 | 410 |
| | H ₂ | 13 | 320 |
| Max. compression ratio | N ₂ | 2×10 ⁶ | |
| | H ₂ | 50 | 1×10 ³ |
| Base pressure (Pa) *1 | | < 1×10 ⁻⁴ | < 1×10 ⁻⁵ |
| Max. throughput (sccm) *2 | N ₂ | 600 | 10860 |
| Max. backing pressure (Pa) | | 1200 | 2000 |
| Recommended backing pump (L/min) | | ≥80 | ≥500 |
| Startup time (min) | | 2.5 ~ 3.5 | 10 ~ 14 |
| Shutdown time (min) | | 2.5 ~ 5 | 23 ~ 28 |
| Mounting orientation | | Vertical (±10°) | |
| Weight (kg) | | 11 | 60 |
| Controller model | | TC203A | TC443S |
| Input voltage | | AC100-110 V AC200-230 V | AC180-253V |
| Input Frequency | | 50 / 60 Hz | |
| Input Power (VA) | | 610 | 2200 |
| Input phases | | Single-phase | |
| Rated Output Frequency (Hz) | | 800 | 330 |
| Weight (kg) | | 2.7 | 8.2 |
| Communication interface | | Parallel I/O • RS232C | |

*1: Pressure attained after 48 hours of bake-out.

*2: This max throughput is based on a 160 L/min (TS50), or 1000 L/min (TS440/TS443) backing pump.

[Ambient Temperature] The base pressure is only guaranteed at an ambient temperature ranging from 10 to 23°C. The operating temperature range is 10 to 32°C for the air-cooling models and 10 to 40°C for the water-cooling models. The base pressure is only guaranteed at a water temperature of 30°C or below. The water temperature range is 10 to 35°C.

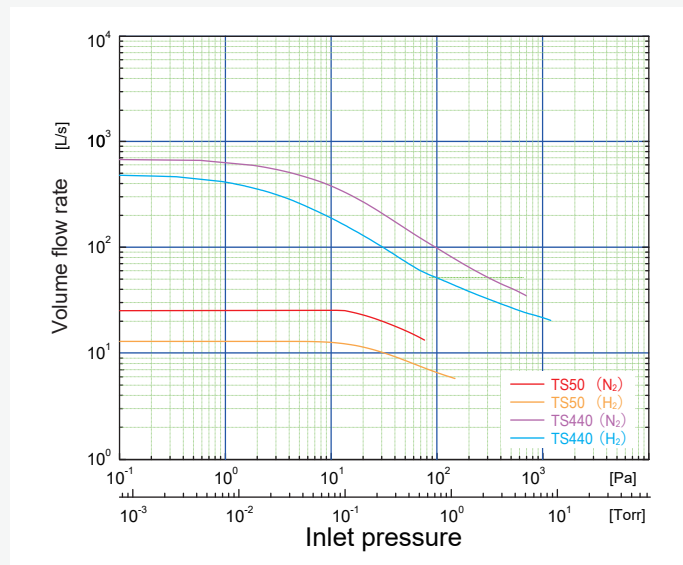
[Applicable Gases] Some gases may damage the bearing grease or internal components. Contact us about the types of gases that can be used.

[Standard Set] Pump + controller + motor cable (3 meters) + fan cable (3 meters, for air-cooled type only)

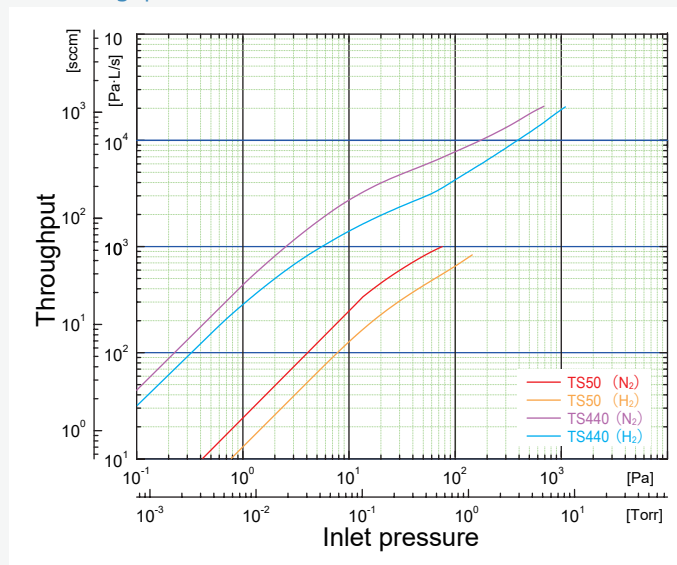
[Optional Accessories] Baking heater, automatic slow leak valve, purge gas inlet connector, purge gas restrictor, and piping components.

Performance curve

Volume flow rate

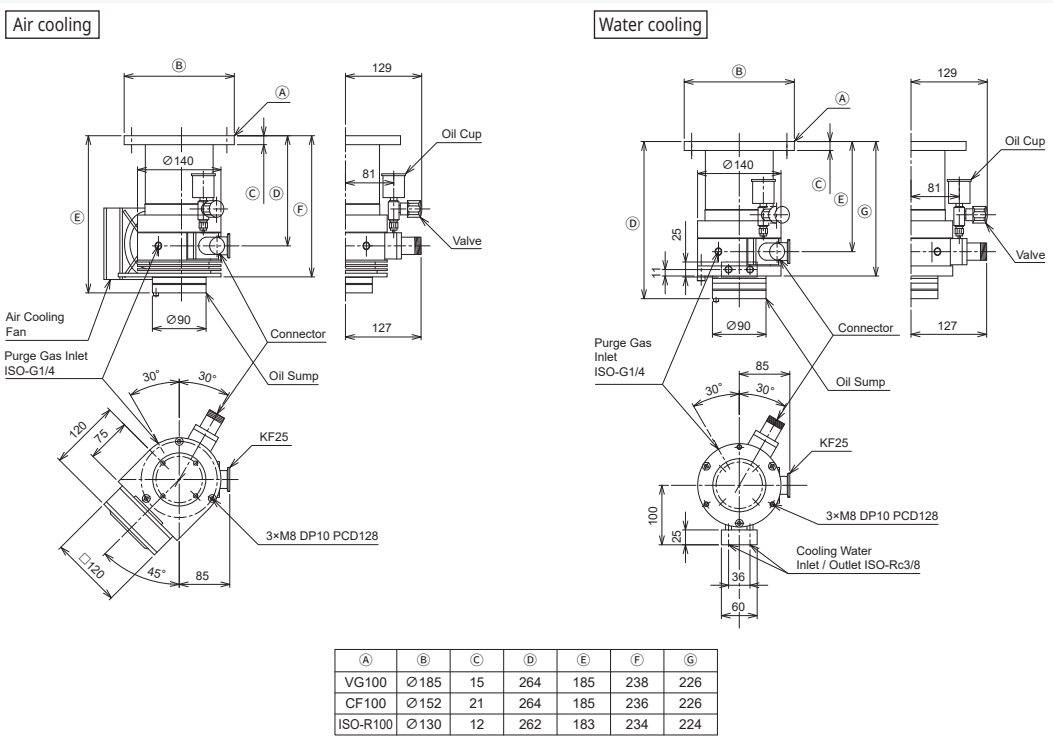


Gas throughput

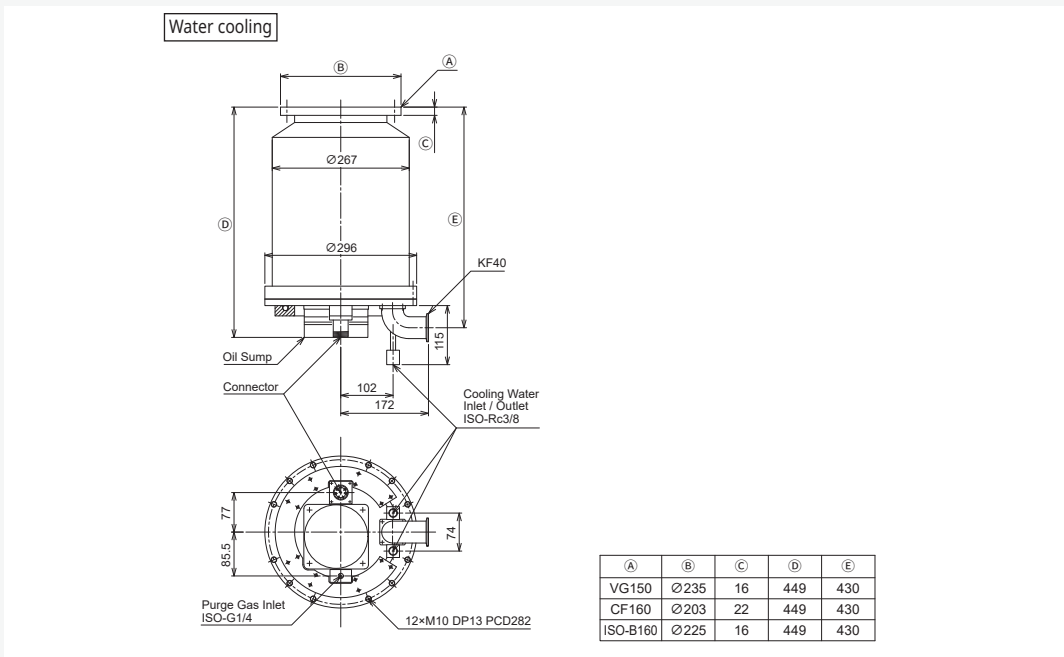


TS SERIES

Dimensions * All inlet flange bolt holes straddle the centerlines.



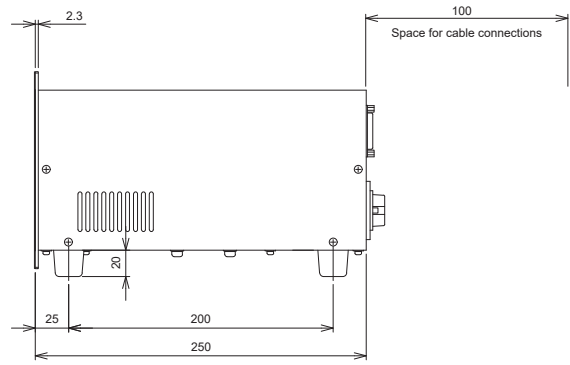
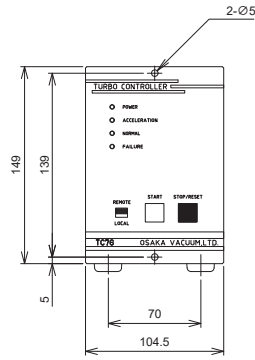
TS440 / TS443



Controller

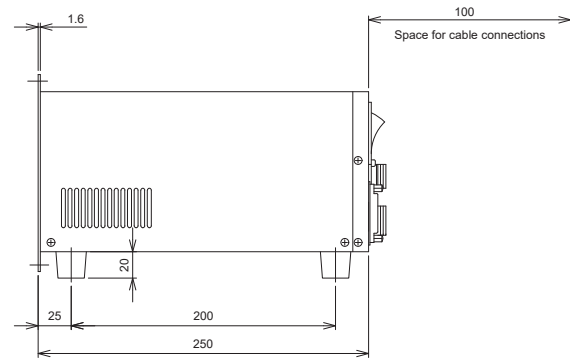
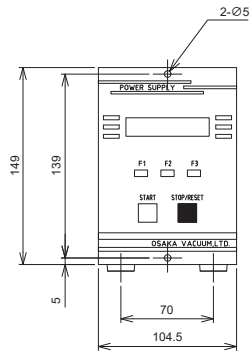
TC66 / TC76 / TC246

(Panel cutout dimensions: 128H×103.5W)



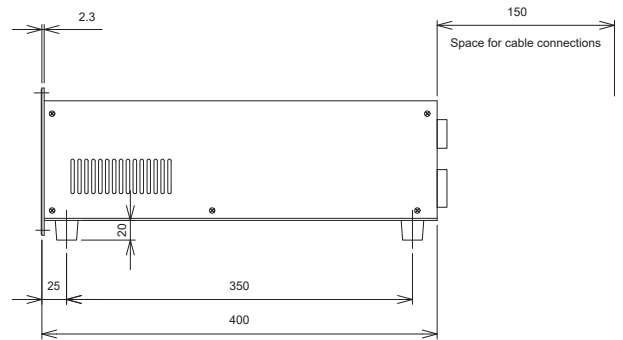
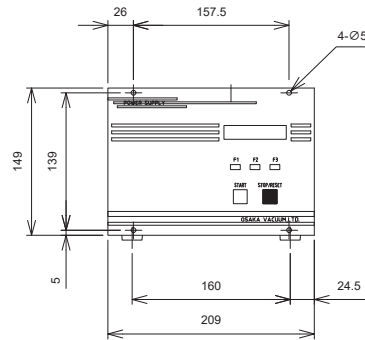
TC64A / TC203A / TC223A / TC353A / TC1104A

(Panel cutout dimensions: 128H×104W)



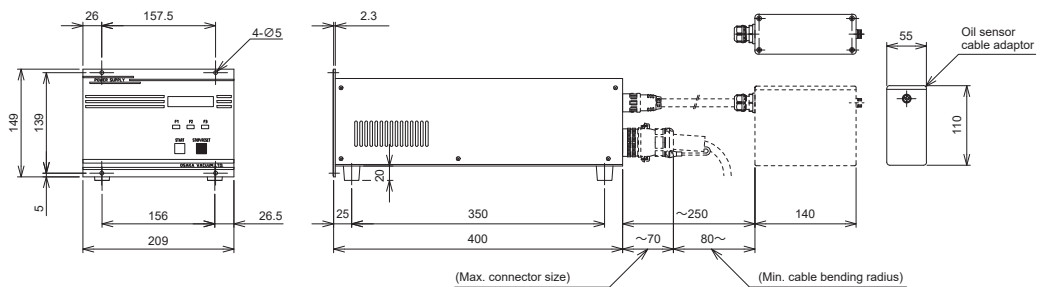
TC443S / TC553 / TC1003 / TC1103 / TC1813 / TC2403 / TC2403-10 / TC3213

(Panel cutout dimensions: 124H×203W)



TC5503

(Panel cutout dimensions: 124H×203W)



Specifications

| Controller model | TC66 | TC76 | TC246 | TC64A | TC203A | TC223A | TC353A | TC1104A |
|-----------------------------|-----------------------|----------|-----------|--------------------------|---------------|--------|------------------|-------------------|
| Input voltage (ACV) | 100-230 (±10%) | | | 100-110 / 200-230 (±10%) | | | | |
| Input Frequency (Hz) | 50 / 60 | | | | | | | |
| Input Power (VA) | 240 | | 170 | 220 | 610 | 590 | 610 | |
| Input phases | Single-phase | | | | | | | |
| Rated Output Frequency (Hz) | 1150 | 1500 | 800 | | | | 750 | 560 |
| Weight (kg) | 2.4 | | | 2.7 | | | | |
| Communication interface | Parallel I/O • RS232C | | | | | | | |
| Compatible Pump Models | TG60F-20 | TG70F-20 | TG240F-20 | TG50F | TG203 TS50 | TG220F | TG350F TG450F | TG800F TG1100F |

| Controller model | TC443S | TC553 | TC1003 | TC1103 | TC1813 | TC2403 TC2403-10 | TC3213 | TC5503 |
|-----------------------------|-----------------------|-------|------------------|---|--------|-----------------------|--|--------------------------------------|
| Input voltage (ACV) | 200-230 (±10%) | | | | | | | |
| Input Frequency (Hz) | 50 / 60 | | | | | | | |
| Input Power (VA) | 2200 | 1200 | 1600 | 810 | 2200 | 1200 | 2200 | |
| Input phases | Single-phase | | | | | | | |
| Rated Output Frequency (Hz) | 330 | 400 | | 560 | 340 | 520 | 360 | 500 |
| Weight (kg) | 8.2 | | | | | | | 8.7 |
| Communication interface | Parallel I/O • RS232C | | | | | | | |
| Compatible Pump Models | TS440 TS443 | TG553 | TG1003 TG1303 | TG800F□AB-60 TG800F□WB TG1100F□AB-60 TG1100F□WB TG1400F | TG1813 | TG2400F TG2400F-40 | TG2810 TG2813 TG3210 TG3213 TG3410 TG3413 | TG5000 TG5003 TG5500 TG5503 |

Cable

Motor cable / Fan cable

| Cable length (Standard: 3 meters *1) | Model | |
|---|----------------|----------------|
| | Motor cable | Fan cable |
| 1m | M1/TC●●●/SS/C | F1/TC◆◆◆/SS/C |
| 3m | M3/TC●●●/SS/C | F3/TC◆◆◆/SS/C |
| 5m | M5/TC●●●/SS/C | F5/TC◆◆◆/SS/C |
| 7m | M7/TC●●●/SS/C | F7/TC◆◆◆/SS/C |
| 10m | M10/TC●●●/SS/C | F10/TC◆◆◆/SS/C |
| 15m | M15/TC●●●/SS/C | F15/TC◆◆◆/SS/C |
| 20m | M20/TC●●●/SS/C | F20/TC◆◆◆/SS/C |

●●● {
 -S2A TG60F-20 / TG70F-20 / TG240F-20 / TG50F / TG220F / TG350F / TG450F
 -S2 TS50 / TG203 / TG800F / TG1100F
 -M2 TS440 / TS443 / TG553 / TG1003 / TG1303 / TG1813 / TG2810 / TG2813 / TG3210 / TG3213 / TG3410 /
 TG3413 / TG5000 / TG5003 / TG5500 / TG5503 / TG800F-60 / TG1100F-60 / TG1400F / TG2400F

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 76 TG60F-20 / TG70F-20 / TG240F-20
 -S2 TS50 / TG203 / TG50F / TG220F / TG350F / TG450F / TG800F / TG1100F
 -M2 TG800F-60 / TG1100F-60 / TG1400F / TG2400F

*1 Please contact us for delivery time and other details regarding non-standard long cables.

ST SERIES

① Turbo molecular pump + Rotary vane pump ② Turbo molecular pump + Dry vacuum pump



Point

- A compact turbo molecular pumping system that integrates all the essential components required for high-vacuum pumping *1.
- *1: Turbo molecular pump, backing pump, vacuum piping, automatic slow leak valve, and control unit
- Pumping down to high vacuum with a simple operation.
- Equipped with casters, allowing easy relocation to wherever and whenever it's needed.
- Features the TG-F Series turbo molecular pump, known for its high tolerance to external shocks (can even be moved while operating).

* Optional accessories are available to match your needs.

Model Number Chart

| ST | ① | ② | ③ | ④ | ⑤ | ⑥ | ⑦ |
|----|------------------------------|------------------------------|---------------------|----------------------|---------------------------------------|-----------------|---|
| | | | | | | | ⑦ Customization |
| | | | | | | | No symbol S |
| | | | | | | | Standard model Customized model |
| | | | | | | ⑥ Input voltage | 1 2 3 |
| | | | | | | | AC100V, single-phase AC200V, single-phase AC200V, three-phase |
| | | | | | ⑤ Suction filter for the backing pump | No symbol F | No Suction Filter With Suction Filter |
| | | | | ④ Backing pump model | 060 251 | | VRD-4 DSP251 |
| | | | | ③ Backing pump type | No symbol D | | Direct-drive oil-sealed rotary vane pump Dry vacuum pump |
| | | | ② Inlet flange type | V C R B | | | VG* CF* ISO-R* ISO-B* |
| | ① Turbo molecular pump Model | 050F 220F 350F 450F | | | | | TG50F TG220F TG350F TG450F |

※ Flange standards
 VG : JISB2290: 1998 Vacuum technology-Flange: dimensions (Vacuum flange with O-ring groove)
 CF : JVIS 003 Bakeable Flanges: dimensions (Knife edge sealed type)
 ISO-B : ISO1609: 1986 Vacuum technology - Flange dimensions (Bolted type)
 ISO-R : ISO1609: 1986 Vacuum technology - Flange dimensions (Clamped or rotatable type)

Standard Specifications

| (1) Model | ST050F | ST220F | ST350F |
|---------------------------------------|--|---|------------|
| Turbo molecular pumps | TG50F | TG220F | TG350F |
| Volume flow rate N ₂ (L/s) | 51(49)*1 | 220(210)*1 | 350(330)*1 |
| Base pressure | <3×10 ⁻⁶ Pa (<2.3×10 ⁻⁸ Torr) | <1×10 ⁻⁶ Pa (<7.5×10 ⁻⁹ Torr) | |
| Inlet flange | VG65/ISO-R63/CF63 | VG100/ISO-R100/CF100 | |
| Backing pump | Oil-sealed rotary vane pump with oil mist separator *2 | | |
| Cooling type | Forced air cooling | | |
| Power supply | Single-phase, AC100V/200V | | |

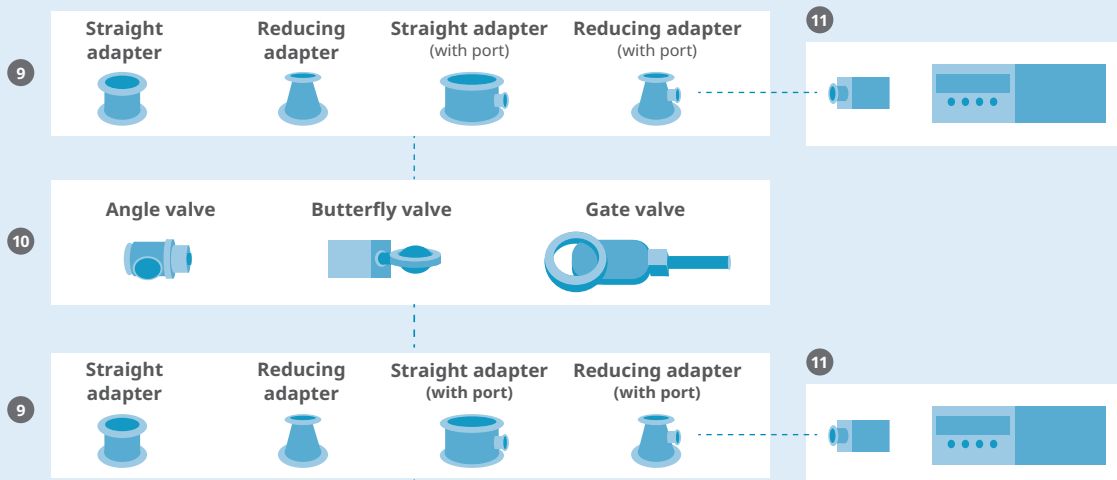
*1: The values in parentheses indicate the volume flow rate with a protective mesh attached. *2: The inlet vacuum filter is not included.

| (2) Model | ST220F*D | ST350F*D | ST450F*D |
|---------------------------------------|--|------------|----------------------|
| Turbo molecular pumps | TG220F | TG350F | TG450F |
| Volume flow rate N ₂ (L/s) | 220(210)*3 | 350(330)*3 | 450(430)*3 |
| Base pressure | 1×10 ⁻⁶ Pa | | |
| Inlet flange | VG100/CF100/ISO-R100 | | VG150/CF160/ISO-B160 |
| Backing pump | Dry vacuum pump DSP251 230 (200) L/min*4 | | |
| Cooling type | Forced air cooling | | |
| Power supply | Single-phase, AC100V/200V, 15A | | |

*3: The values in parentheses indicate the volume flow rate with a protective mesh attached. *4: The values in parentheses indicate the volume flow rate when the gas ballast valve is opened.

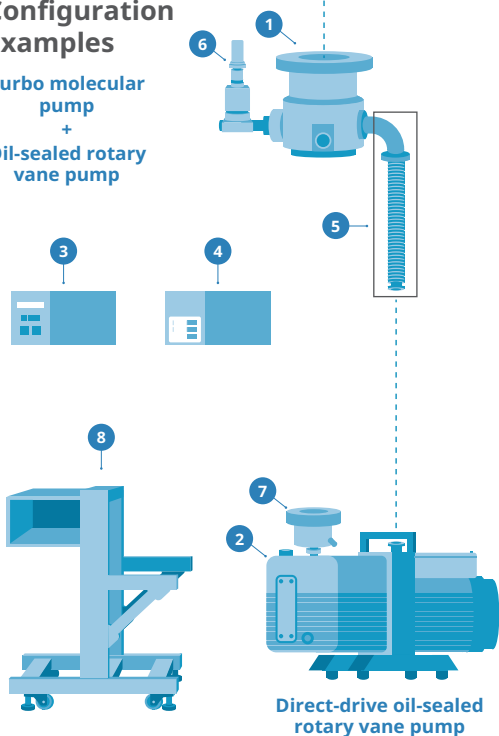
ST SERIES

Examples of Standard System Configurations and Optional Components



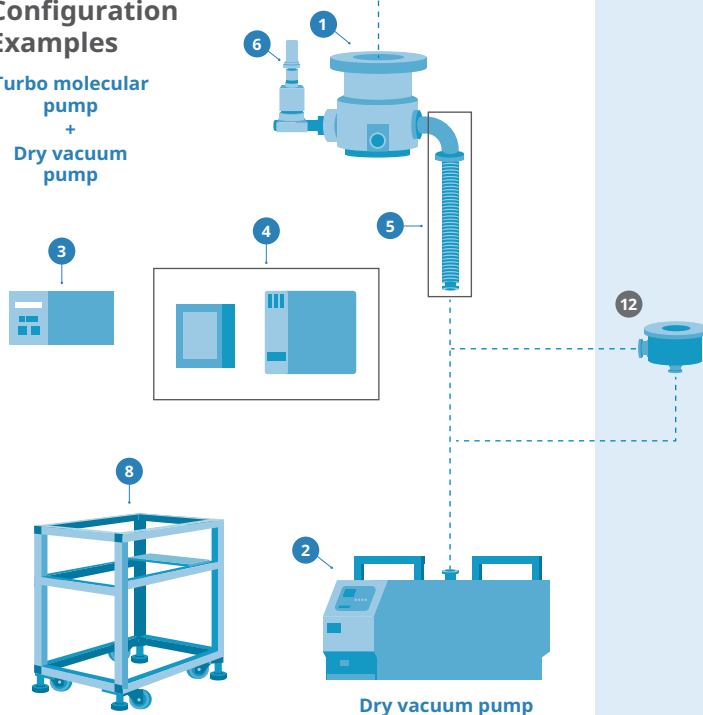
Standard System Configuration Examples

Turbo molecular pump + Oil-sealed rotary vane pump



Standard System Configuration Examples

Turbo molecular pump + Dry vacuum pump



Standard Components

| No. | Item |
|-----|--|
| 1 | Turbo molecular pump (TG50F ~ TG450F) * Other models can also be applied. |
| 2 | Backing pump (Dry vacuum pump: DSP251 / Direct-drive oil-sealed rotary vane pump: VRD-4) |
| 3 | Controller |
| 4 | ST Controller * For the touch panel type, the operation unit and control unit are separated. |
| 5 | Vacuum fittings (Flexible tube, elbow, clamp, etc.) |
| 6 | Automatic slow leak valve |
| 7 | Oil mist trap * Optional when the oil-sealed rotary vane pump is used for a backing pump. |
| 8 | Aluminum frame (with casters) |

Optional Parts

| No. | Item |
|-----|--|
| 9 | Straight adapter (with/without port) |
| 9 | Reducing adapter (with/without port) |
| 10 | Main valve: Gate valve / Butterfly valve / Angle valve (manual or pneumatic) |
| 11 | Vacuum gauge / Vacuum gauge controller |
| 12 | Inlet vacuum filter |

In addition to the standard configurations, the pumping system can be customized to meet your needs. For more details, please contact us.

ST-Compact SERIES

Turbo molecular pump + Diaphragm pump



STC70FR005



STC70FR013

Point

- Equipped with the high-compression turbomolecular pump TG70F!
- Two diaphragm pump options available to match the exhausting chamber!
- Space-saving, laptop-sized design!
- Suitable for use as a portable pumping unit for R&D!

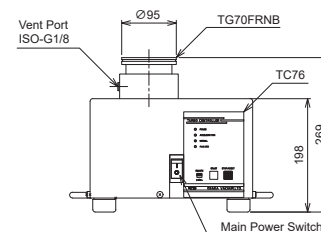
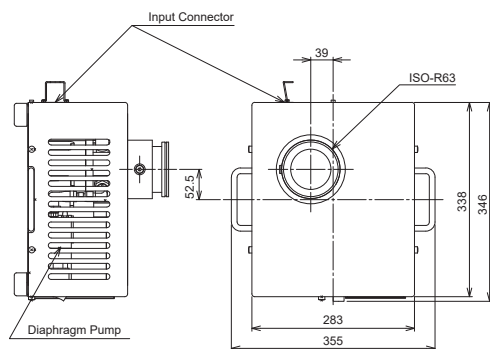
Standard Specifications

| Pumping system model | STC70FR005 | STC70FR013 |
|---------------------------------|--|-------------------|
| Inlet | ISO-R63 | |
| Outlet | G1/8 *1 | |
| Turbo molecular pumps | TG70FRAB | TG70FRNB |
| Backing pump | Diaphragm pump | |
| | 4.2L/min | 13L/min |
| Volume flow rate N ₂ | 70L/s | |
| Base pressure | 10 ⁻⁶ Pa | |
| Weight | 14kg | 19kg |
| Input voltage | AC100V | AC100V (-10%~+6%) |
| Input Power | 200VA | 210VA |
| Cooling type | Forced air cooling | |
| Accessories | Instruction manual: one copy, Input cable (5m): 1 pc | |

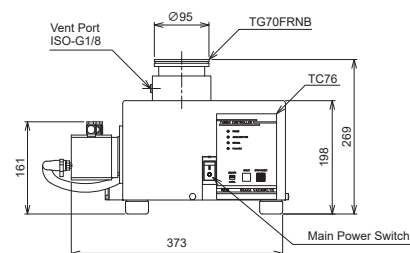
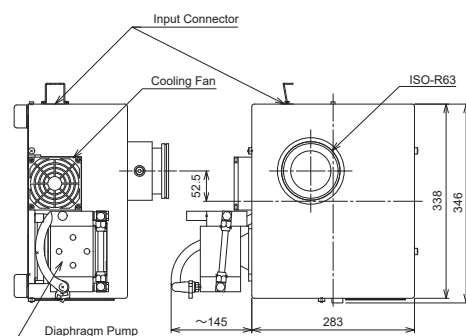
*1 : The muffler is installed in the outlet of diaphragm pump.

Dimensions

STC70FR005

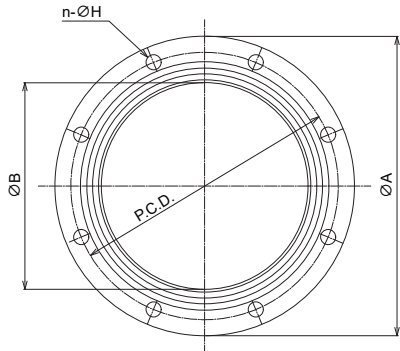


STC70FR013



Turbo Molecular Pump – Inlet Flanges

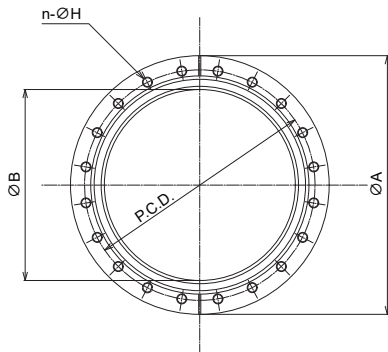
■ VG flange



Unit: mm

| Flange | VG65 | VG100 | VG150 | VG200 | VG250 | VG300 | VG350 | VG400 | VG450 | VG500 |
|--------------|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Nominal bore | 65 | 100 | 150 | 200 | 250 | 300 | 350 | 400 | 450 | 500 |
| ØA | 145 | 185 | 235 | 300 | 350 | 400 | 450 | 520 | 575 | 625 |
| ØB | 76.3 | 114.3 | 165.2 | 216.3 | 267.4 | 318.5 | 355.6 | 406.4 | 457.2 | 508 |
| P.C.D. | 120 | 160 | 210 | 270 | 320 | 370 | 420 | 480 | 535 | 585 |
| n | 4 | 8 | 8 | 8 | 12 | 12 | 12 | 12 | 16 | 16 |
| ØH | 12 | 12 | 12 | 15 | 15 | 15 | 15 | 18.5 | 18.5 | 18.5 |

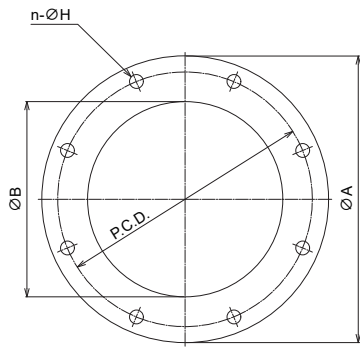
■ CF flange



Unit: mm

| Flange | CF63 (ICF114) | CF100 (ICF152) | CF160 (ICF203) | CF200 (ICF253) |
|--------------|------------------|-------------------|-------------------|-------------------|
| Nominal bore | 63 | 100 | 160 | 200 |
| ØA | 114 | 152 | 203 | 253 |
| ØB | 64 | 102 | 153.5 | 203.5 |
| P.C.D. | 92.1 | 130.2 | 181 | 231.8 |
| n | 8 | 16 | 20 | 24 |
| ØH | 8.5 | 8.5 | 8.5 | 8.5 |

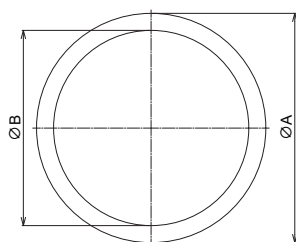
■ ISO-B flange



Unit: mm

| Flange | ISO-B100 | ISO-B160 | ISO-B200 | ISO-B250 | ISO-B320 |
|--------------|----------|----------|----------|----------|----------|
| Nominal bore | 100 | 160 | 200 | 250 | 320 |
| ØA | 165 | 225 | 285 | 335 | 425 |
| ØB | 102.2 | 153.2 | 213.2 | 261 | 318 |
| P.C.D. | 145 | 200 | 260 | 310 | 395 |
| n | 8 | 8 | 12 | 12 | 12 |
| ØH | 9 | 11 | 11 | 11 | 14 |

■ ISO-R flange



Unit: mm

| Flange | ISO-R63 | ISO-R100 |
|--------------|---------|----------|
| Nominal bore | 63 | 100 |
| ØA | 95 | 130 |
| ØB | 70.2 | 102.2 |



! To ensure proper usage the products described in this catalogue, please make sure to read the instruction manual thoroughly prior to use.
Notice: Freight that is regulated by the Foreign Exchange and Foreign Trade Law may require official permission before shipment in accordance with the law.

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ISO9001

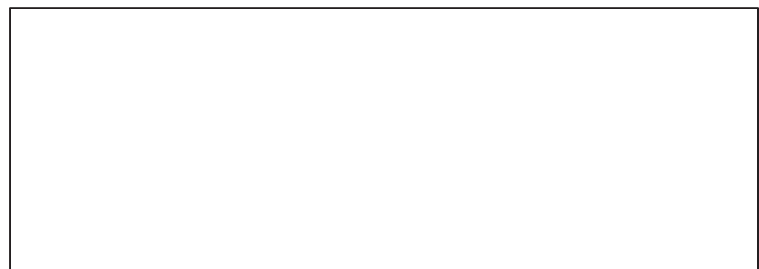


JQA-1902
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ISO14001



JQA-EM5143



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