

Tornado™ Series - Long Pathlength Gas Cells

A low-cost range of gas cells for routine analysis at ambient conditions.

The Tornado™ series of fixed, long pathlength gas cells is the latest development in low-cost, high performance cells designed for measuring the infrared spectra of gases and vapors at ambient temperatures and pressures. Manufactured from the finest materials and built to exacting tolerances, they are the ideal choice for the discerning analyst who demands superior performance and value for money.

The Tornado™ series is the ideal choice for analysts requiring a fixed, long pathlength gas cell for routine applications.

Based on the White cell principle of multiple light passes between an arrangement of reflecting mirrors, Tornado™ series is available in three sizes:

- **Tornado™ T5**

Pathlengths ranging from 1m to 8m in 1m steps

- **Tornado™ T10**

Pathlengths ranging from 2.1m to 10.6m in 1.06m steps

- **Tornado™ T20**

Pathlengths ranging from 2m to 20m in 2m steps.

Tornado™ series gas cells are suitable for operation in all modern FT-IR spectrometers using the Specac Benchmark™ baseplate provided as standard.

Borosilicate glass body material and anodised aluminium/stainless steel internal and external components provide superior corrosion resistance against a wide range of gases and vapors. Viton® 'O' rings ensure leak-free performance under vacuum and



ambient pressures. State-of-the-art optical design combined with gold mirrors ensures the highest possible light throughput giving superior analytical sensitivity.

The supreme, in-built flexibility of the Tornado™ series allows additional mirror carriages to be used in the same body shell, maximising analytical capability and minimising operational costs.

A choice of KBr, ZnSe or CaF₂ window materials allows users to make the optimum window choice for their applications, and the transfer optics box is equipped with purge ports to allow operation under inert atmospheres. A range of optional features further enhances the flexibility of the Tornado™ range.

Standard Features

- Wide pathlength range (1m - 20m)
- Vacuum to 15 p.s.i. operation
- Ambient temperature operation
- Borosilicate glass body
- Anodised components
- Gold mirrors (protected)
- Viton® 'O' ring seals
- KBr, ZnSe or CaF₂ windows
- Purgeable transfer optics box
- Benchmark™ series baseplate mounting

Optional Features

- Additional mirror carriage assemblies
- Vacuum / gas inlet & outlet taps
- Pressure gauge
- Desiccant storage caps
- Purge bellows

• Illustrations, descriptions and specifications in this data sheet were correct at the time of going to press. However, Specac's policy is one of continuous product development and we reserve the right to change descriptions and specifications at any time. For the latest details please contact your local Specac office or representative.

Tornado™ Series - Long Pathlength Gas Cells

Tornado™ Series – Specifications

Tornado™ T5

Pathlength (fixed):	1m - 8m
Pathlength steps:	1m
Volume:	1.33 liters
Cell body material:	Borosilicate glass
Pressure range:	Vacuum to 15 p.s.i.
Temperature range:	Ambient
Mirrors:	Gold (protected)
Windows:	KBr, ZnSe or CaF ₂
Inlet/outlet tubing:	1/4"
'O' rings:	Viton®
Internal components:	Anodised aluminium & stainless steel
Transfer optics:	Aluminium mirrors in purgeable optics box
Cell mount:	Benchmark™ series baseplate
Dimensions (mm):	H455 W153 D130



Tornado™ T10

Pathlength (fixed):	2.1m - 10.6m
Pathlength steps:	1.06m
Volume:	2.6 liters
Cell body material:	Borosilicate glass
Pressure range:	Vacuum to 15 p.s.i.
Temperature range:	Ambient
Mirrors:	Gold (protected)
Windows:	KBr, ZnSe or CaF ₂
Inlet/outlet tubing:	1/4"
'O' rings:	Viton®
Internal components:	Anodised aluminium & stainless steel
Transfer optics:	Aluminium mirrors in purgeable optics box
Cell mount:	Benchmark™ series baseplate
Dimensions (mm):	H470 W153 D146



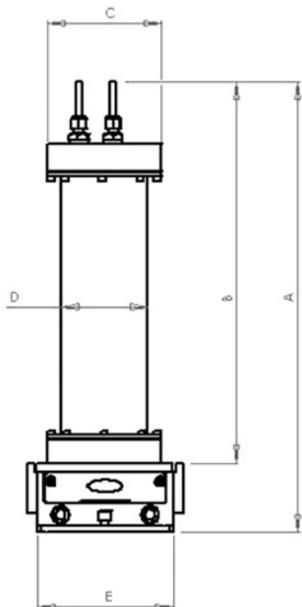
Tornado™ T20

Pathlength (fixed):	2m - 20m
Pathlength steps:	2m
Volume:	4.7 liters
Cell body material:	Borosilicate glass
Pressure range:	Vacuum to 15 p.s.i.
Temperature range:	Ambient
Mirrors:	Gold (protected)
Windows:	KBr, ZnSe or CaF ₂
Inlet/outlet tubing:	1/4"
'O' rings:	Viton®
Internal components:	Anodised aluminium & stainless steel
Transfer optics:	Aluminium mirrors in purgeable optics box
Cell mount:	Benchmark™ series baseplate
Dimensions (mm):	H675 W153 D146



Tornado™ Series - Long Pathlength Gas Cells

Tornado™ Series – Key Dimensions

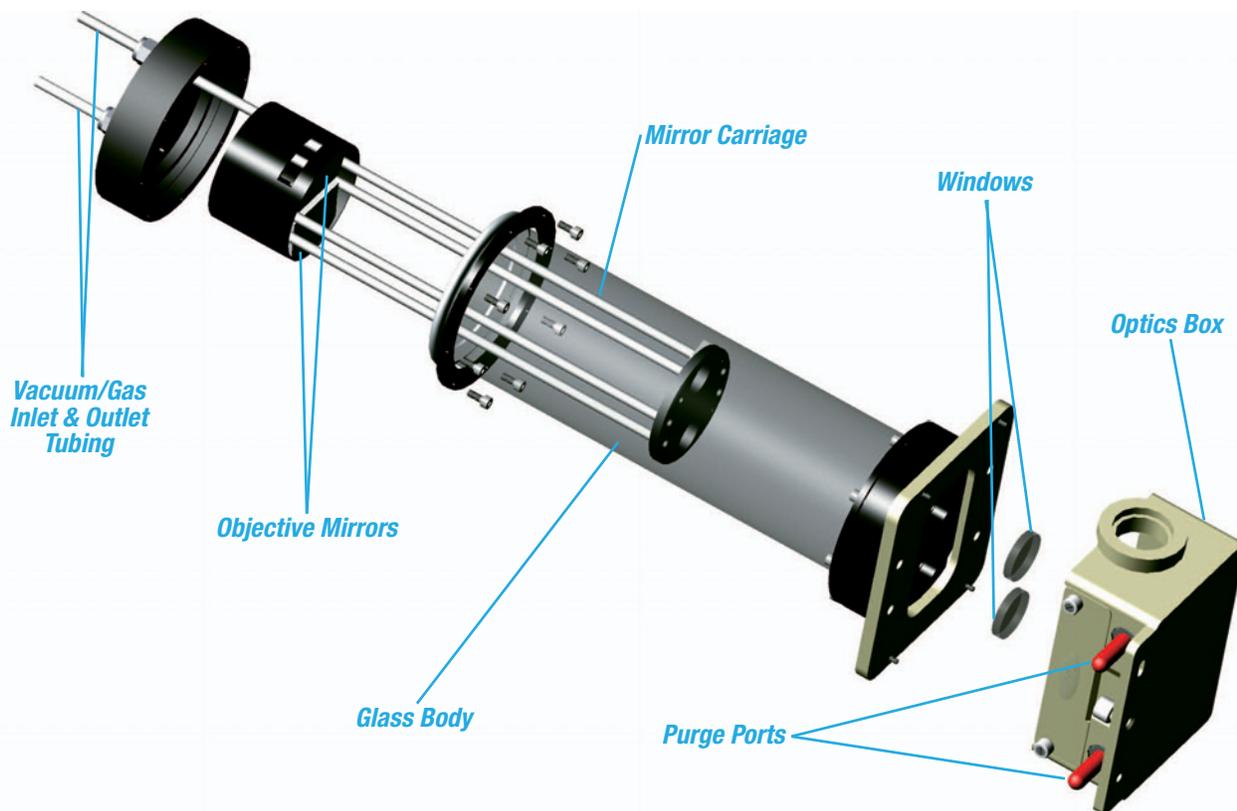


Cell	Base Pathlength	Pathlength Range	Volume
T5	25 cm	1m to 8m (in 1m steps)	1.33 liters
T10	26.4 cm	2.1m to 10.6m (in 1.06m steps)	2.6 liters
T20	50 cm	2m to 20m (in 2m steps)	4.7 liters

Cell	A	B	C	D	E
T5	455	385	114	86	153
T10	470	400	143	113	153
T20	675	606	143	113	153

All dimensions in mm

Tornado™ Series – Features of The Range



Tornado™ Series Gas Cells - Optional Features

Tornado™ series long pathlength gas cells have been designed with the serious analyst in mind. These high performance, superior quality cells are backed by a range of optional upgrades to further enhance their performance.

Pressure Gauge Kit

A pressure gauge kit is available to fit the Tornado™ series gas cells. Gauges are designed for low pressure operation (vacuum to 15 p.s.i.) and an integral pressure relief valve ensures that cells are automatically depressurised in the event of accidental over pressurisation.

GS24160 Pressure Gauge Kit
(Specify for Tornado™ series).



Mirror Carriage Assembly

Additional mirror carriages can be specified for use within a single Tornado™ body. This feature greatly enhances the analytical flexibility of the series, and significantly reduces operating costs.

GS24252 Mirror Carriage Assembly

(Specify model and pathlength).



Purge Bellows

A pair of purge bellows is available for the Tornado™ series gas cells. These fit between the optics box of the cell and the spectrometer to allow the purging of transfer optics with inert gases such as nitrogen. This feature allows absorbances due to atmospheric H₂O and CO₂ to be eliminated from spectral measurements.

These bellows are designed to fit all Specac Benchmark™ sampling accessories.

GS10707 Purge Bellows (pair)



Desiccant Storage Caps

These caps are designed to fit over the optical inlet and outlet ports of the Tornado™ series gas cells to seal the transfer optics when the cells are not in use. One of the caps contains a desiccant material, which maintains a dry atmosphere within the transfer optics box and extends the life of KBr windows.

GS24150 Desiccant Storage Caps



Ordering information

(Specify spectrometer make and model)

GS24205	Tornado™ T5	1m - 8m Fixed Long Pathlength Gas Cell (specify pathlength and windows)
GS24210	Tornado™ T10	2.1m - 10.6m Fixed Long Pathlength Gas Cell (specify pathlength and windows)
GS24220	Tornado™ T20	2m - 20m Fixed Long Pathlength Gas Cell (specify pathlength and windows)

Pathlengths Available:

Tornado™ T5	1, 2, 3, 4, 5, 6, 7, 8m
Tornado™ T10	2.1, 3.2, 4.2, 5.3, 6.3, 7.4, 8.5, 9.5, 10.6m
Tornado™ T20	2, 4, 6, 8, 10, 12, 14, 16, 18, 20m

Options

GS10707	Purge Bellows (pair)
GS24150	Desiccant Storage Caps
GS24252	Mirror Carriage Assembly for Tornado™ series gas cells (specify model and pathlength)
GS24160	Pressure Gauge Kit to fit Tornado™ and Cyclone™ series gas cells (specify model and High or Low pressure)
GS24161	Vacuum / Gas Inlet & Outlet Taps with push-on connectors for Tornado™ series gas cells

Replacement Windows

GS24153	Replacement KBr windows for Tornado™ and Cyclone™ series gas cells (specify model)
GS24154	Replacement ZnSe windows for Tornado™ and Cyclone™ series gas cells (specify model)
GS24155	Replacement CaF ₂ windows for Tornado™ and Cyclone™ series gas cells (specify model)

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