

Torrento® AT Series Filters

Advanced 12 nm filters enabling superior particle protection and ultra cleanliness in advanced wet, etch and clean applications

Torrento® AT series filters provide the ultimate particle retention with ultra-high flow rate performance using an advanced non-dewetting PTFE membrane. Torrento filters are specially designed to meet the critical customer demands for advanced technology during wet, etch and cleaning processes. These filters provide high-yield, rapid bath cleanup cycles, extended filter life, fast changeouts, and cleanliness – all in a prewet package for ease of use.

Advanced retention membrane technology

Torrento filters use an applications-optimized filter membrane that provides an ultra-high flow rate at the specified retention rating. The combination of high flow and retention performance provides an optimal bath cleanup profile to minimize particle-related wafer defects and reduce process cycle time. The capability to maintain flow rate at an extremely small pore size in outgassing chemistries such as SPM, SC1, and SC2 ensures the stable processing conditions needed for the high CpK results demanded at advanced technology nodes.

Cost-minimized performance

Incorporating Entegris' advanced device construction technology, Torrento AT3 and ATE filters provide more surface area in each filter, leading to extended filter lifetime. The membrane also reduces overall maintenance and replacement costs related to wet bench pumps. This is because the low filter resistance design reduces pump strokes, thereby reducing wear and tear.

Rapid changeouts and safety

Torrento filters come in a wide variety of cartridge and disposable formats to maximize installation flexibility and upgrades. Torrento ATE and AT3 cartridges and disposable filters are designed for re-circulation bath applications, while Torrento 1500/3000 disposables are targeted to single wafer processing.



The disposable filters eliminate operator handling of the filter element, thus minimizing contamination risk. The disposable design also reduces the potential for operator exposure to chemicals during installation and disposal.

Ultra cleanliness

Torrento 12 nm filters include both standard and ultra-clean metallics (UCM) cleanliness options. The Torrento P1500 and P3000 small disposables come standard with UCM specifications. Torrento 12 nm ATE and AT3 filters are offered with UCM cleanliness as an option.

Use of UCM ultra-low extractable products will ensure bath cleanliness for critical cleaning processes, like SC1. These filters are certified to low cleanliness limits.

APPLICATIONS

- Semiconductor technologies
- Wet etch and clean (WEC)
- Bulk chemical delivery systems (BCDS)

FEATURES & BENEFITS

High-performance membrane	Low membrane resistance design allows high particle retention with high flow
Nondewetting PTFE membrane filter in a prewet package	Eliminates prewetting and flushing cycle High-purity, clean, ready-to-use filter Excellent performance in outgassing chemistries
Minimized cost of ownership	ATE and AT3 designs incorporate more membrane for ultra-high flow and extended filter lifetime Nondewetting membrane enables rapid filter changeout to maximize process uptime Reduced wear and tear of wet bench pumps minimizes maintenance and replacement costs
Disposable filter options	Requires less space for changeout Allows quick installation and minimizes downtime while limiting the handling and exposure to hazardous chemicals
UCM option	Ensures bath cleanliness for sensitive wet cleaning processes
Applications-optimized chemical compatibility	Recommended for aqueous-based chemicals at ambient temperatures (including H ₂ SO ₄ , H ₃ PO ₄ , HNO ₃ , HCL, NH ₄ F, H ₂ O ₂ , TMAH, NH ₄ OH, and ozonated water) and elevated temperature applications (including SC1, SC2, SPM, nitride etch, metal etch, and various other resist stripping chemistries)

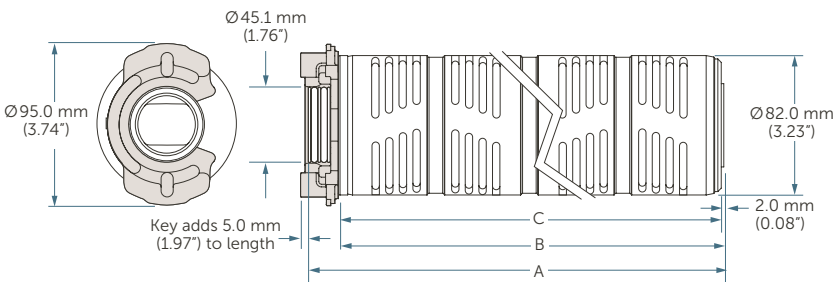
SPECIFICATIONS

		TORRENTO ATE/AT3	TORRENTO 1500/3000
Materials	Membrane	Prewet, nondewetting PTFE	
	Supports	PFA	
	Cartridge O-ring options	FFKM, Viton® Extreme™ ETP	—
	Disposable shell	PFA	
Retention rating		12 nm	12 nm
Membrane area		ATE 10": 2 m² (21 ft²)	1500 type: 0.19 m² (2.05 ft²)
		ATE 20": 4 m² (42 ft²)	3000 type: 0.44 m² (4.74 ft²)
		AT3 10": 3 m² (32 ft²)	—
		AT3 20": 6 m² (64 ft²)	—
Maximum operating conditions	Maximum operating pressure	0.58 MPa (5.8 bar; 84 psi) @ 25°C (77°F)	0.44 MPa (4.4 bar; 64 psi) @ 25°C (77°F)
		0.097 MPa (0.97 bar; 14 psi) @ 180°C (356°F)	0.19 MPa (1.9 bar; 28 psi) @ 95°C (203°F)
	Maximum forward differential pressure	0.44 MPa (4.4 bar; 64 psi) @ 25°C (77°F)	0.39 MPa (3.9 bar; 57 psi) @ 25°C (77°F)
		0.05 MPa (0.52 bar; 7.5 psi) @ 180°C (356°F)	0.19 MPa (1.9 bar; 28 psi) @ 95°C (203°F)
	Maximum reverse pressure	0.34 MPa (3.5 bar; 50 psi) @ 25°C (77°F)	0.29 MPa (2.9 bar; 42 psi) @ 25°C (77°F)
	Maximum operating temperature	180°C (356°F)	95°C (203°F)
Metallic extractables	Standard	Testing conducted for 12 metals	
	UCM	Testing conducted for 16 metals	
Particle shedding cleanliness		<15 particles/10 mL ≥0.2 µm @ 5 L/min DI water flow	<10 particles/10 mL ≥0.2 µm @ 5 L/min DI water flow

* Per 10" cartridge equivalent

Toronto AT Series Cartridge Filters

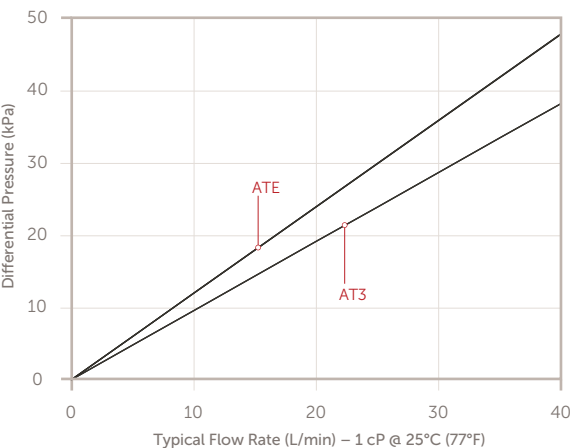
DIMENSIONS



Length	A (Overall)	B (Control)	C (Shoulder)
10"	244.0 mm (9.61")	227.0 mm (8.94")	225.0 mm (8.86")
20"	471.0 mm (18.54")	454.0 mm (17.87")	452.0 mm (17.80")

PERFORMANCE

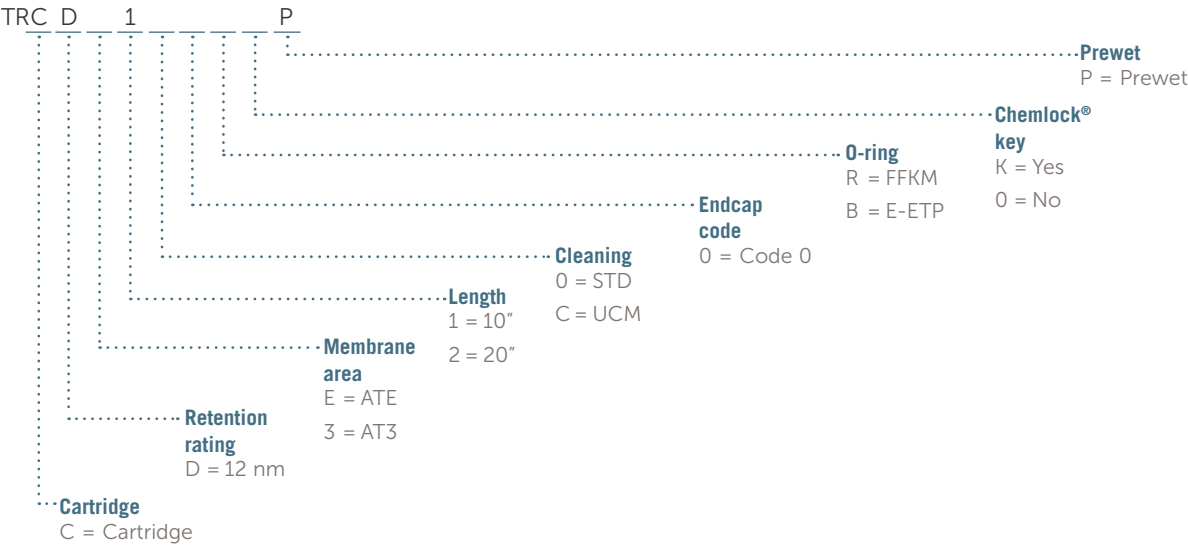
Toronto 12 nm 10" Cartridge Filter



ORDERING INFORMATION

This information serves as a guide. Please contact your local representative to confirm part numbers.

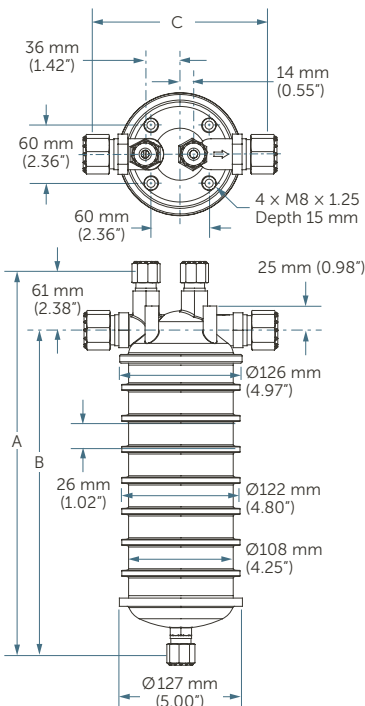
Torrento AT Series Cartridge Filters: part number



Torrento AT Series Chem-Line™ I and Chem-Line II Disposable Filters

DIMENSIONS

Chem-Line I T-Line Disposable Filter
with Standard Vent
T02H



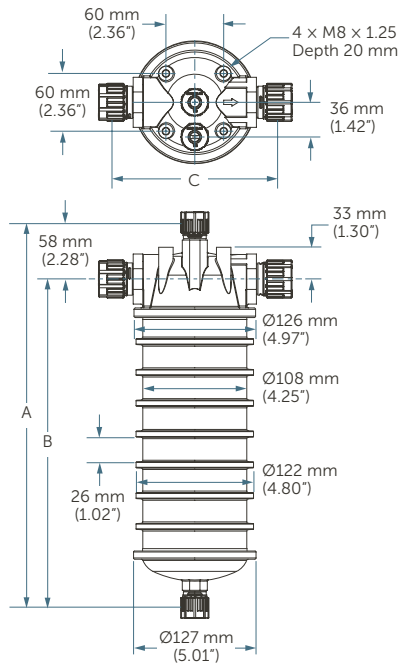
Nominal dimensions for Chem-Line I disposable filter with standard vent – T-line

Disposable type	Configuration	A (overall height)	B (height: bottom fitting to centerline inlet fitting)	C (inlet to outlet)
T02H: ¾" inlet/outlet, ½" vent/drain, Super Type Pillar fittings	10"	396 mm (15.58")	335 mm (13.19")	180 mm (7.09")

Chem-Line I Disposable Filters with Rotated Vent

*This drawing represents the Chem-Line I disposable filters with rotated vent.
Refer to the accompanying table for specific dimensional information.*

Chem-Line I T-Line Disposable Filter with Rotated Vent 902S, 942S



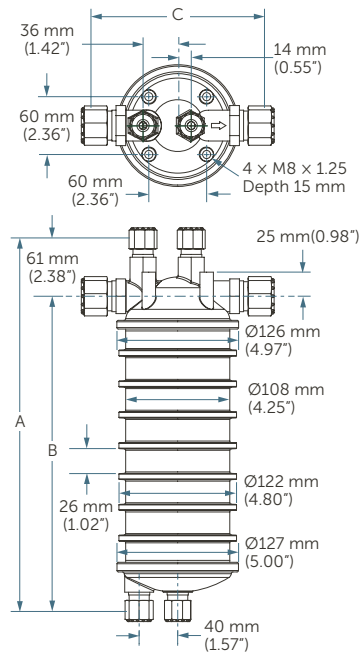
Nominal dimensions for Chem-Line I disposable filter with rotated vent – T-line

Disposable type	Configuration	A (overall height)	B (height: bottom fitting to centerline inlet fitting)	C (inlet to outlet)
902S: ¾" inlet/outlet, ½" vent/drain, Super 300 Type Pillar fittings	10"	399 mm (15.70")	341 mm (13.43")	172 mm (6.77")
942S: 1" inlet/outlet, ½" vent/drain, Super 300 Type Pillar fittings	10"	399 mm (15.70")	341 mm (13.43")	182 mm (7.17")

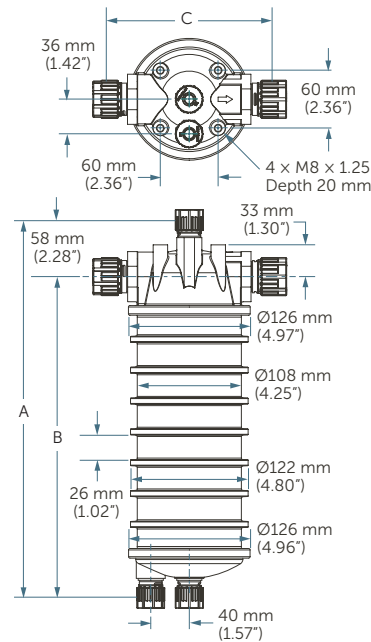
Chem-Line I Disposable Filters with Core Vent and Core Vent (Rotated)

These drawings represent the Chem-Line I disposable filters with core vent and core vent (rotated). Refer to the tables for specific dimensional information.

Chem-Line I T-Line Disposable Filter with Core Vent T02H



Chem-Line I T-Line Disposable Filter with Core Vent (Rotated) 902S, 942S, 902L, 942L



Nominal dimensions for Chem-Line I disposable filter with core vent – T-line

Disposable type	Configuration	A (overall height)	B (height: bottom fitting to centerline inlet fitting)	C (inlet to outlet)
T02H: 3/4" inlet/outlet, 1/2" vent/drain, Super Type Pillar fittings	10"	388 mm (15.26")	327 mm (12.87")	180 mm (7.09")

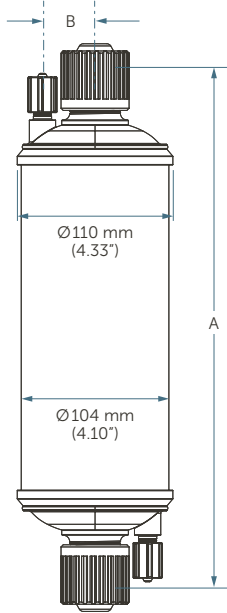
Nominal dimensions for Chem-Line I disposable filter with core vent (rotated) – T-line

Disposable type	Configuration	A (overall height)	B (height: bottom fitting to centerline inlet fitting)	C (inlet to outlet)
902S: 3/4" inlet/outlet, 1/2" vent/drain, Super 300 Type Pillar fittings	10"	391 mm (15.37")	333 mm (13.11")	172 mm (6.77")
942S: 1" inlet/outlet, 1/2" vent/drain, Super 300 Type Pillar fittings	10"	391 mm (15.37")	333 mm (13.11")	182 mm (7.17")
902L: 3/4" inlet/outlet, 1/2" vent/drain, PrimeLock® fittings	10"	424 mm (16.68")	349 mm (13.74")	215 mm (8.48")
942L: 1" inlet/outlet, 1/2" vent/drain, PrimeLock fittings	10"	424 mm (16.68")	349 mm (13.74")	243 mm (9.58")

Chem-Line II Disposable Filters

This drawing represents the Chem-Line II disposable filters. Refer to the accompanying tables for additional information. The first table cross-references the inlet/outlet (I/O) sizes with each fitting type, and the second table provides specific dimensional information.

Chem-Line II Disposable Filter Flaretek, Super 300 Type Pillar, PrimeLock



Inlet/outlet (I/O) sizes for Chem-Line II filter fitting types

Fitting types	Vent/ drain	Inlet/outlet			
		3/8"	1/2"	3/4"	1"
Flaretek	1/4"	×	×	×	×
Flaretek (offset)	1/2"	—	—	×	×
Super 300 Type Pillar	1/4"	—	×	×	×
Super 300 Type Pillar (offset)	1/2"	—	—	×	×
Super 300 Type Pillar (female)	1/4"	—	—	×	—
PrimeLock	1/4"	×	×	×	—
PrimeLock (offset)	1/4"	—	—	—	×

Nominal dimensions for Chem-Line II disposable filter

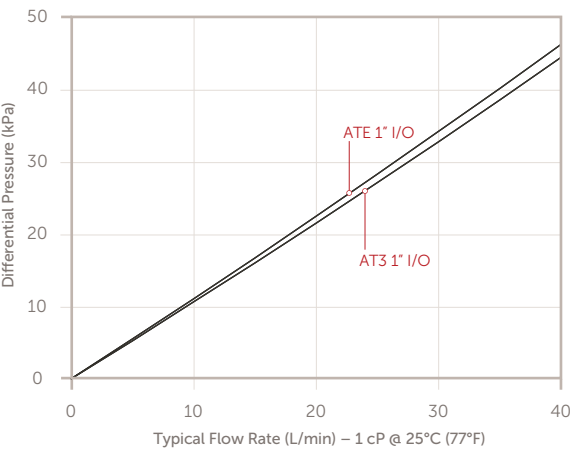
FITTINGS		FLARETEK FITTINGS		SUPER 300 TYPE PILLAR FITTINGS (FEMALE)		SUPER 300 TYPE PILLAR FITTINGS (MALE)		PRIMELOCK FITTINGS	
Inlet/ outlet	Vent/ drain	A	B	A	B	A	B	A	B
3/8"	1/4"	10"		10"		10"		10"	
3/8"	1/4"	343 mm (13.51")	37 mm (1.46")	—	—	—	—	356 mm (14.02")	37 mm (1.46")
1/2"	1/4"	356 mm (14.03")	37 mm (1.46")	—	—	341 mm (13.41")	37 mm (1.46")	361 mm (14.20")	37 mm (1.46")
3/4"	1/4"	359 mm (14.13")	37 mm (1.46")	358 mm (14.09")	37 mm (1.46")	350 mm (13.76")	37 mm (1.46")	373 mm (14.68")	37 mm (1.46")
3/4"	1/2"	363 mm (14.30")	41 mm (1.63")	—	—	349 mm (13.74")	41 mm (1.63")	—	—
1"	1/4"	368 mm (14.47")	37 mm (1.46")	—	—	383 mm (15.07")	37 mm (1.46")	388 mm (15.24")	41 mm (1.63")
1"	1/2"	376 mm (14.82")	41 mm (1.63")	—	—	380 mm (14.97")	41 mm (1.63")	—	—

A = Overall height B = Centerline fitting length

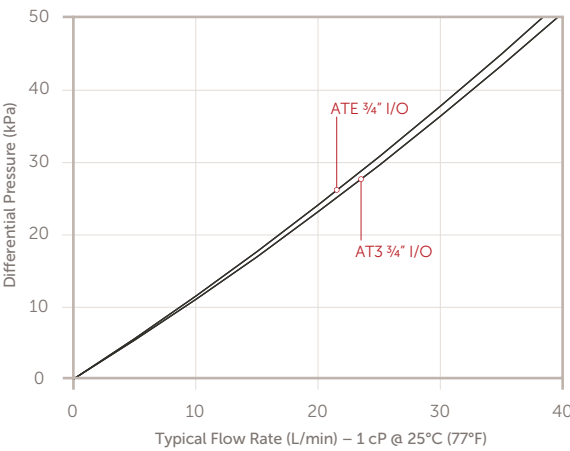
PERFORMANCE

Chem-Line I and Chem-Line II disposable filters

Torrento 12 nm 10" Chemline Disposable Filter with 1" Fittings



Torrento 12 nm 10" Chemline Disposable Filter with 3/4" Fittings



This information serves as a guide. Please contact your local representative to confirm part numbers.

TRD	D	1	P	Fitting configuration	-Prewet
				T02H = T-line, ¾" inlet/outlet, ½" vent/drain, Super Type Pillar	P = Prewet
Cleaning				0 = STD	
Length				C = UCM	
Membrane area				1 = 10"	
Retention rating				E = ATE	
Type				3 = AT3	
D = Chem-Line I disposable standard vent					
D = 12 nm					
902S = T-line, rotated vent, ¾" inlet/outlet, ½" vent/drain, Super 300 Type Pillar					
942S = T-line, rotated vent, 1" inlet/outlet, ½" vent/drain, Super 300 Type Pillar					

TRV	D	1	P	
				Prewet P = Prewet
				Fitting configuration
				T02H = T-line, 3/4" inlet/outlet, 1/2" vent/drain, Super Type Pillar
				902S = T-line, rotated vent, 3/4" inlet/outlet, 1/2" vent/drain, Super 300 Type Pillar
				942S = T-line, rotated vent, 1" inlet/outlet, 1/2" vent/drain, Super 300 Type Pillar
				902L = T-line, rotated vent, 3/4" inlet/outlet, 1/2" vent/drain, PrimeLock
				942L = T-line, rotated vent, 1" inlet/outlet, 1/2" vent/drain, PrimeLock
				Cleaning O = STD C = UCM
				Length 1 = 10"
				Membrane area E = ATE 3 = AT3
				Retention rating D = 12 nm
				Type V = Chem-Line I disposable core vent

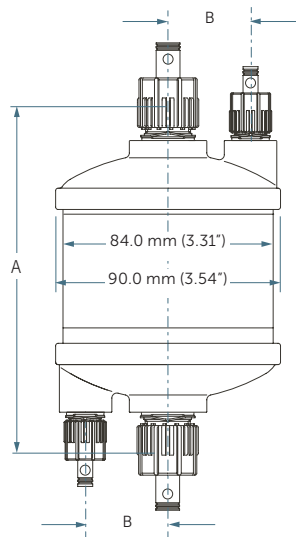
TR2	D	1	P	
				Prewet P = Prewet
				Fitting configuration
				M41F = In-line male, 1" inlet/outlet, 1/4" vent/drain, Flaretek
				M01F = In-line male, 3/4" inlet/outlet, 1/4" vent/drain, Flaretek
				M21F = In-line male, 1/2" inlet/outlet, 1/4" vent/drain, Flaretek
				M41S = In-line male, 1" inlet/outlet, 1/4" vent/drain, Super 300 Type Pillar
				M01S = In-line male, 3/4" inlet/outlet, 1/4" vent/drain, Super 300 Type Pillar
				142S = In-line male offset, 1" inlet/outlet, 1/2" vent/drain, Super 300 Type Pillar
				102S = In-line male offset, 3/4" inlet/outlet, 1/2" vent/drain, Super 300 Type Pillar
				Cleaning 0 = STD C = UCM
				Length 1 = 10"
				Membrane area E = ATE 3 = AT3
				Retention rating D = 12 nm
				Type 2 = Chem-Line II disposable

Torrento AT Series 1500 and 3000 Small Disposable Filters – UCM Clean

DIMENSIONS

These drawings represent the small disposable filters (1500/3000). Refer to the accompanying tables for specific dimensional information.

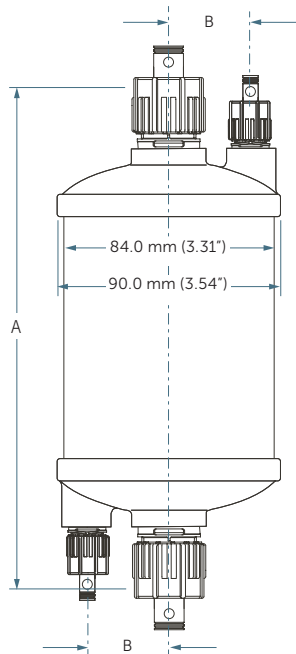
Torrento AT Series 1500 Small Disposable Filters



Nominal dimensions

FITTING TYPE	A	B
8 mm Super Type Pillar fitting	140.0 mm (5.50")	32.0 mm (1.26")
3/8" Flaretek compatible fitting	165.0 mm (6.50")	32.0 mm (1.26")
8 mm Super 300 Type Pillar fitting	135.0 mm (5.32")	31.0 mm (1.22")
3/8" Super 300 Type Pillar fitting	141.0 mm (5.55")	31.0 mm (1.22")

Torrento AT Series 3000 Small Disposable Filters

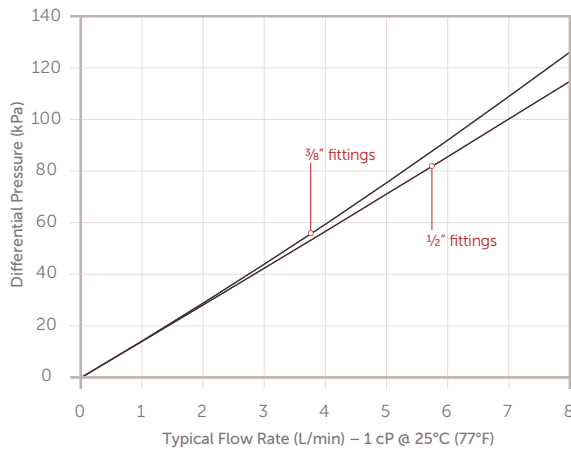


Nominal dimensions

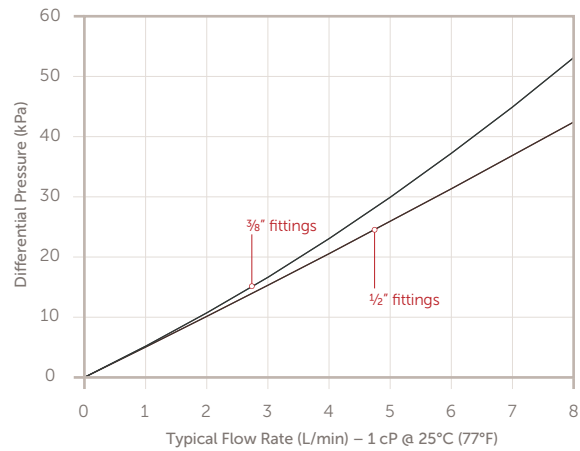
FITTING TYPE	A	B
8 mm Super Type Pillar fitting	194 mm (7.64")	32.0 mm (1.26")
1/2" Super Type Pillar fitting	204 mm (8.03")	32.0 mm (1.26")
3/8" Flaretek compatible fitting	220 mm (8.66")	32.0 mm (1.26")
8 mm Super 300 Type Pillar fitting	189 mm (7.44")	31.0 mm (1.22")
3/8" Super 300 Type Pillar fitting	194 mm (7.64")	31.0 mm (1.22")
1/2" Super 300 Type Pillar fitting	199 mm (7.84")	31.0 mm (1.22")

PERFORMANCE

Toronto 12 nm 1500 Disposable Filters



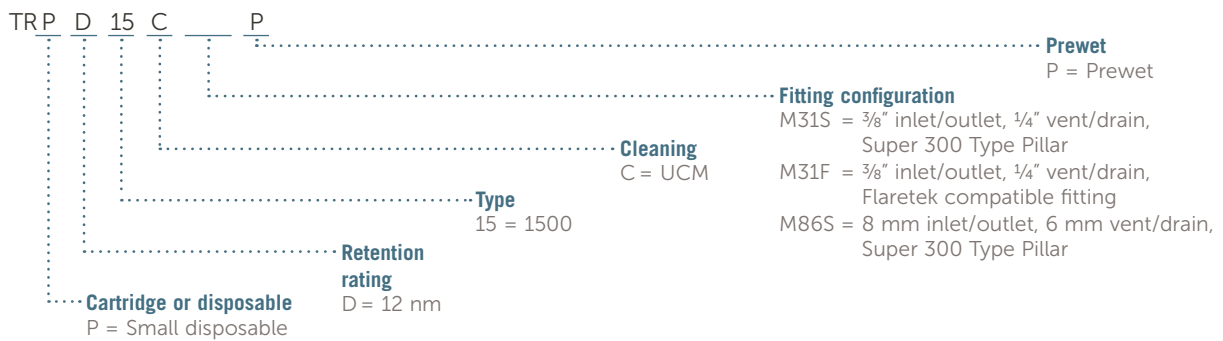
Toronto 12 nm 3000 Disposable Filters



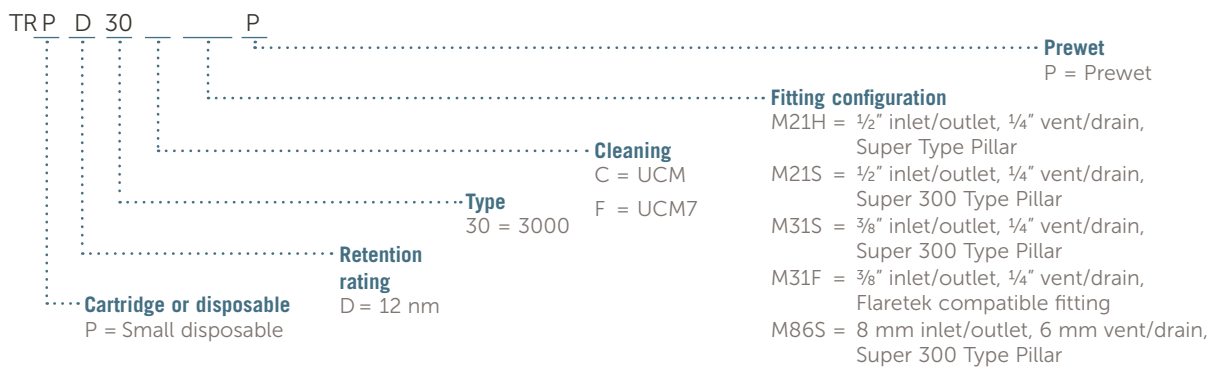
ORDERING INFORMATION

This information serves as a guide. Please contact your local representative to confirm part numbers.

Toronto AT Series 1500 Disposable Filters: part number



Toronto AT Series 3000 Disposable Filters: part number



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