

Torrento® X Series Filters Featuring FlowPlane™ Linear Filtration Technology

*Best-in-class, ultraclean filtration
of process chemistries with
superior contaminant control
and flow rate performance*

Torrento® X series filters deliver best-in-class contamination control performance with the addition of the 2 nm retention rating. Utilizing the latest membrane and cleanliness technologies, Torrento X series traditional radial filters improve flow rate performance, filter cleanliness, and contamination control with low on-wafer defect levels to meet the most critical demands of aggressive acid, base, and cleaning applications. The non-dewetting membrane ensures higher flow rate performance for the specified retention rating to achieve yield-enabling particle protection in sub-22 nm nodes. With the addition of our new UCM-5 advanced clean, the Torrento X series 2 nm filter enables you to minimize startup time while reaching a lower baseline and maximizing tool uptime.

Leading-Edge Linear Filtration Technology

FlowPlane™ linear filtration technology sets the standard for best-in-class contamination control performance and high-efficiency filtration performance in sub-22 nm nodes. Incorporating the most advanced membranes in the industry and a revolutionary linear design, FlowPlane technology maximizes flow rate performance and enables the fastest filter startup times. The compact footprint can be installed in either a vertical or horizontal orientation, and is ideal for space-constrained, point-of-dispense installations, providing the last line of protection against defect-causing contaminants.



Clockwise from top left: FlowPlane linear technology filter, Chem-Line™ I disposable filter, Cartridge filter, Chem-Line II disposable filter

APPLICATIONS

- Sub-22 nm device nodes fabs for 300 mm tools
- Single wafer and batch tools for advanced nodes
- Critical FEOL, MEOL, and BEOL processes
- Critical chemical manufacturing and delivery systems

FEATURES & BENEFITS

	FLOWPLANE LINEAR FILTRATION TECHNOLOGY	TORRENTO X TRADITIONAL RADIAL FILTERS
Flexible filter installation designs	<p>Maximized flow rate with advanced linear design</p> <p>Fastest startup times enabling reduced downtime</p> <p>Can be installed in either a vertical or horizontal orientation</p>	<p>Optimized flow rate performance with new ATG configuration</p> <p>Faster startup times enabling reduced downtime</p>
Advanced membrane technologies	<p>Compact design enables point-of-dispense filtration to reduce on-wafer defects and improve yield in aggressive acid, base, and cleaning applications</p>	<p>Nondewetting membrane enables field-proven contamination control with consistently high yields at smaller geometries</p>
Ultra cleanliness	<p>UCM-10: Standard with FlowPlane technology for maximum filter cleanliness</p>	<p>UCM-16: Standard with all Torrento X series filters</p> <p>UCM-10: Standard with 2 nm and 7 nm filters, optional with 10 nm filters</p> <p>X-UCM: Standard with 10 nm filters</p>
Aqueous-based chemical compatibility	<p>Recommended for ambient and elevated temperatures including H₂SO₄, H₃PO₄, HNO₃, HCl, NH₄OH, H₂O₂, SC₂, and various strips</p>	

Torrento X Series 7 nm Filter with FlowPlane Linear Technology

SPECIFICATIONS

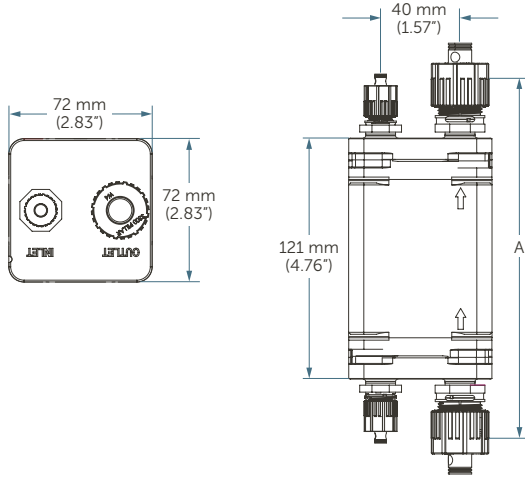
Materials	Membrane	Prewet, nondewetting PTFE
	Supports, shell	PFA
Retention rating	7 nm	
Surface area	4"	0.6 m ² (6.46 ft ²)
	6"	0.9 m ² (9.69 ft ²)
Maximum operating conditions	Maximum operating pressure: 0.59 MPa (5.9 bar; 86 psi) @ 25°C (77°F) 0.19 MPa (1.9 bar; 28 psi) @ 150°C (302°F) Maximum forward differential pressure: 0.39 MPa (3.9 bar; 57 psid) @ 25°C (77°F) Maximum reverse pressure: 0.29 MPa (2.9 bar; 42 psi) @ 25°C (77°F) Maximum operating temperature: 150°C (302°F)	
Metallic extractables	UCM-10 clean	Testing conducted for 23 metals
Other extractables	UCM-10 clean	TOC*, Cl, NVR, F

All FlowPlane technology product configurations are PFOA-free.

*Internal specifications only.

DIMENSIONS

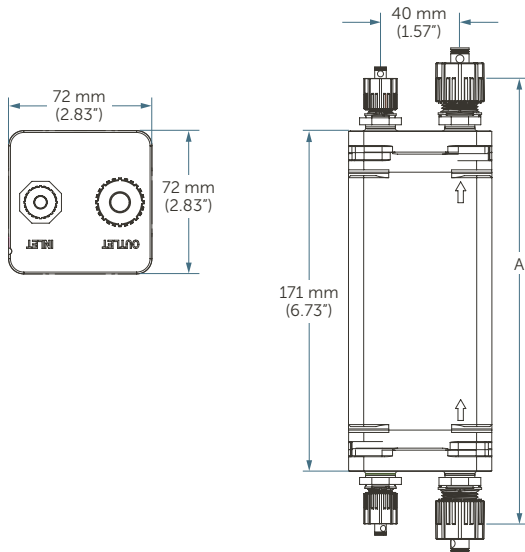
FlowPlane 4" Linear Filtration Technology



Nominal dimensions for FlowPlane 4" technology

Fitting types	Inlet/ outlet	Vent/ drain	A
Super 300 Type Pillar®	3/8"	1/4"	167 mm (6.57")
Super 300 Type Pillar	1/2"	1/4"	172 mm (6.77")

FlowPlane 6" Linear Filtration Technology

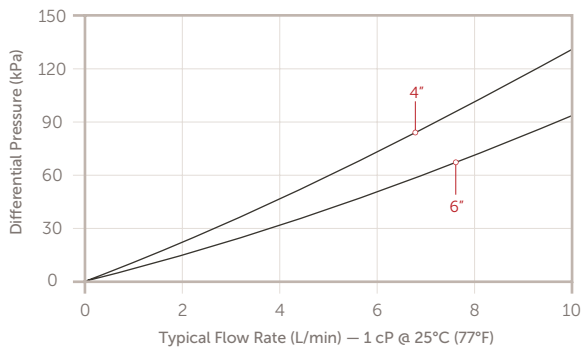


Nominal dimensions for FlowPlane 6" technology

Fitting types	Inlet/ outlet	Vent/ drain	A
Super 300 Type Pillar	3/8"	1/4"	217 mm (8.54")
Super 300 Type Pillar	1/2"	1/4"	222 mm (8.74")

PERFORMANCE DATA

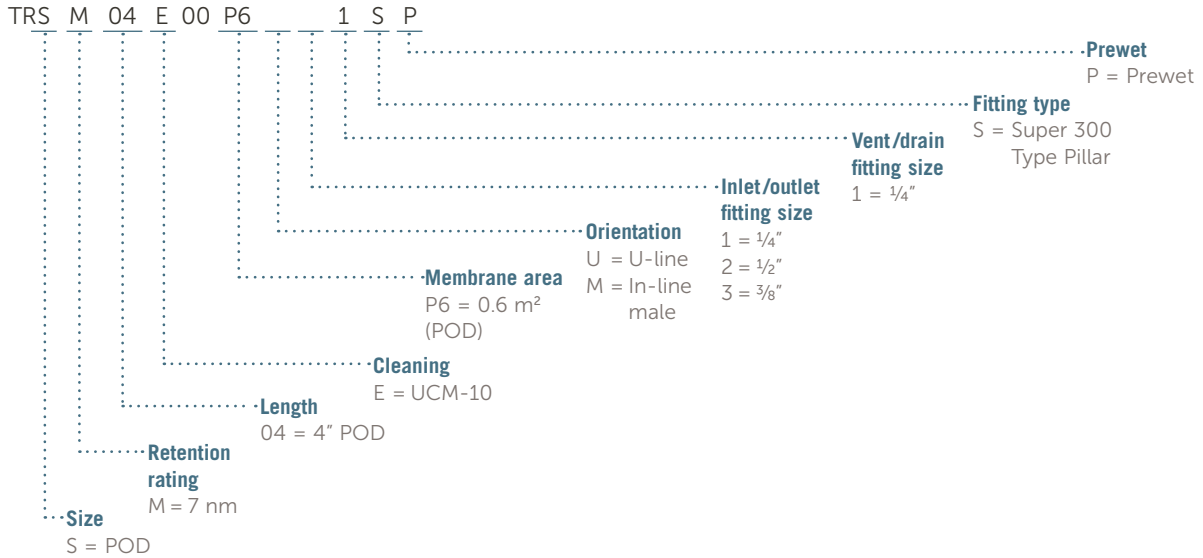
Torrento X 7 nm Filter with FlowPlane Linear Technology



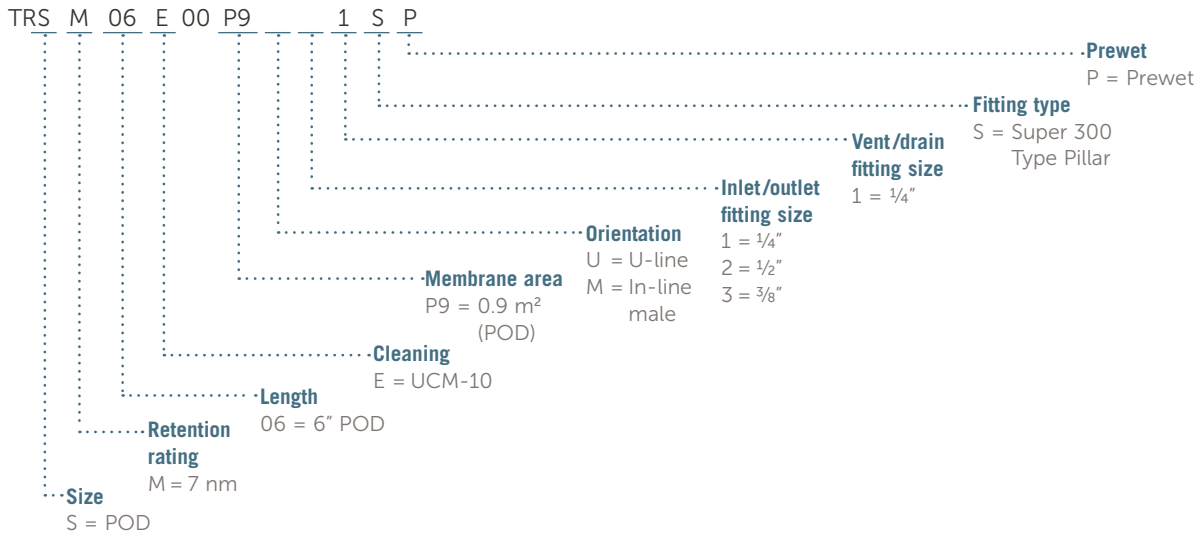
ORDERING INFORMATION

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

Torrento X Series FlowPlane 4" Filters: part number



Torrento X Series FlowPlane 6" Filters: part number



Toronto X Series Chem-Line Disposable Filters

SPECIFICATIONS

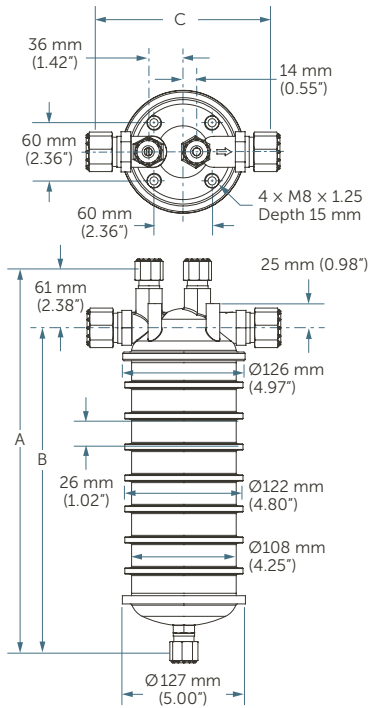
Materials	Membrane	Prewet, nondewetting PTFE		
	Supports, shell	PFA		
Retention rating	2 nm	7 nm	10 nm	
Membrane area	ATE: 2 m ² (21 ft ²)	ATF: 2.4 m ² (25.8 ft ²)	ATE: 2 m ² (21 ft ²)	
	AT3: 3 m ² (32 ft ²)	ATG: 3.1 m ² (33.4 ft ²)	AT3: 3 m ² (32 ft ²)	
Metallic extractables	UCM-10: Testing conducted for 23 metals	UCM-16: Testing conducted for 16 metals	UCM/UCM-16: Testing conducted for 16 metals	
	UCM-7: Testing conducted for 29 metals	UCM-10: Testing conducted for 23 metals	X-UCM: Testing conducted for 23 metals	
	UCM-5: Testing conducted for 29 metals			
Other extractables	UCM-10: TOC*, Cl, F, NVR	UCM-16: TOC, Cl, NVR	UCM: TOC, Cl	
	UCM-7: TOC*, Cl, NVR	UCM-10: TOC*, Cl, F, NVR	UCM-16: TOC, Cl, NVR	
	UCM-5: TOC*, Cl, NVR		X-UCM: TOC, Cl, F	
Maximum operating conditions	<p>Maximum operating pressure: 0.58 MPa (5.8 bar; 84.1 psid) @ 25°C (77°F) 0.097 MPa (0.97 bar; 14.1 psid) @ 200°C (392°F)</p> <p>Maximum forward differential pressure: 0.44 MPa (4.4 bar; 63.8 psid) @ 25°C (77°F) 0.05 MPa (0.5 bar; 7.3 psid) @ 200°C (392°F)</p> <p>Maximum reverse pressure: 0.35 MPa (3.5 bar; 50.8 psi) @ 25°C (77°F)</p> <p>Maximum operating temperature: 200°C (392°F)</p>			

All Toronto X series filter product configurations are PFOA-free.

*Internal specifications only.

DIMENSIONS

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



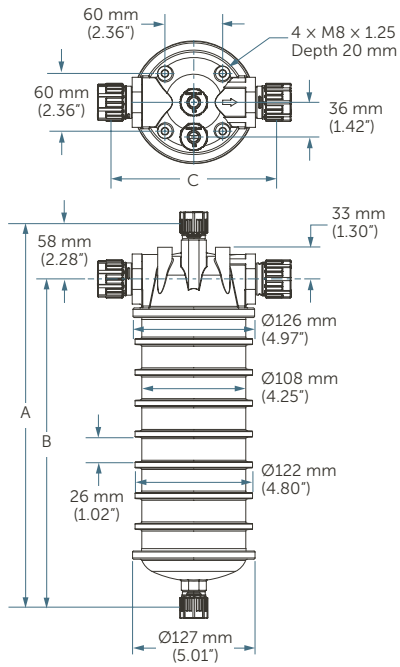
Nominal dimensions for Chem-Line I disposable filter with standard vent – T-line

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



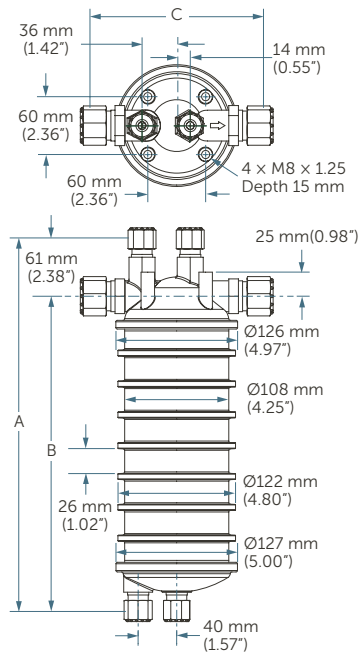
Nominal dimensions for Chem-Line I disposable filter with rotated vent – T-line

Disposable type	Configuration	A (overall height)	B (height: bottom fitting to centerline inlet fitting)	C (inlet to outlet)
902S: 3/4" inlet/outlet, 1/2" vent/drain, Super 300 Type Pillar fittings	10"	399 mm (15.70")	341 mm (13.43")	172 mm (6.77")
942S: 1" inlet/outlet, 1/2" vent/drain, Super 300 Type Pillar fittings	10"	399 mm (15.70")	341 mm (13.43")	182 mm (7.17")

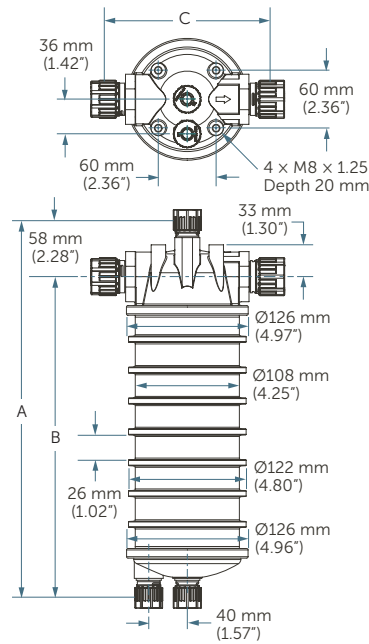
Chem-Line I Disposable Filters with Core Vent and Core Vent (Rotated)

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")

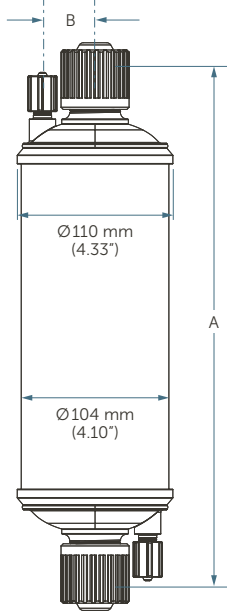
Nominal dimensions for Chem-Line I disposable filter with core vent (rotated) – T-line

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"	—	—	—	×

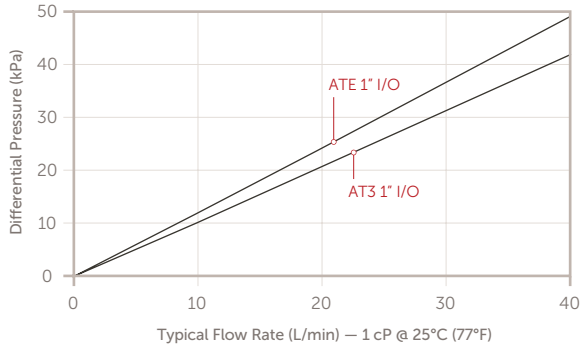
Nominal dimensions for Chem-Line II disposable filter

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
		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")	—	—

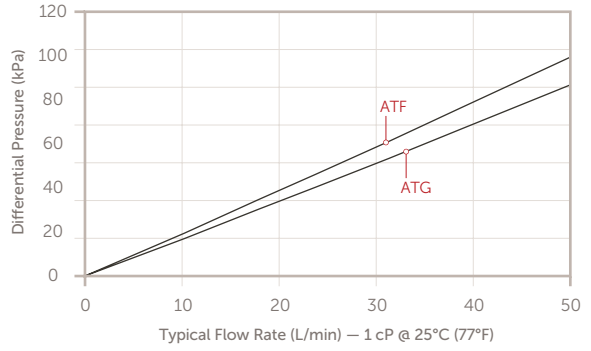
A = Overall height B = Centerline fitting length

PERFORMANCE DATA

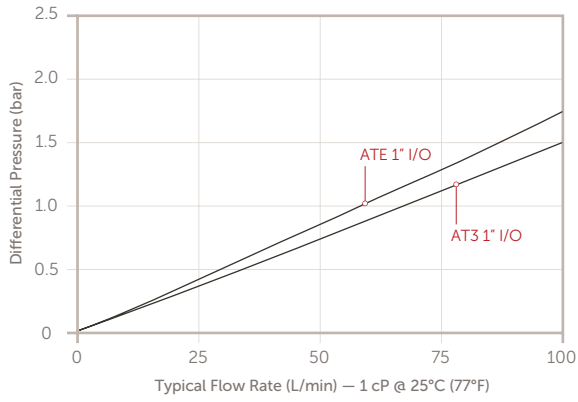
Torrento X Series ATE/AT3 2 nm
10" Chem-Line Disposable Filters



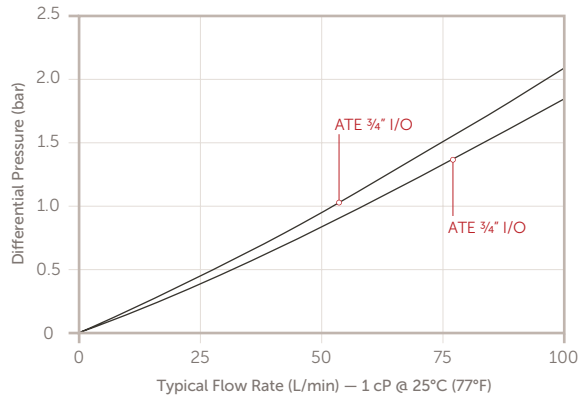
Torrento X Series ATF/ATG 7 nm
10" Chem-Line Disposable Filters



Torrento X Series ATE/AT3 10 nm
10" Chem-Line 1" Disposable Filters



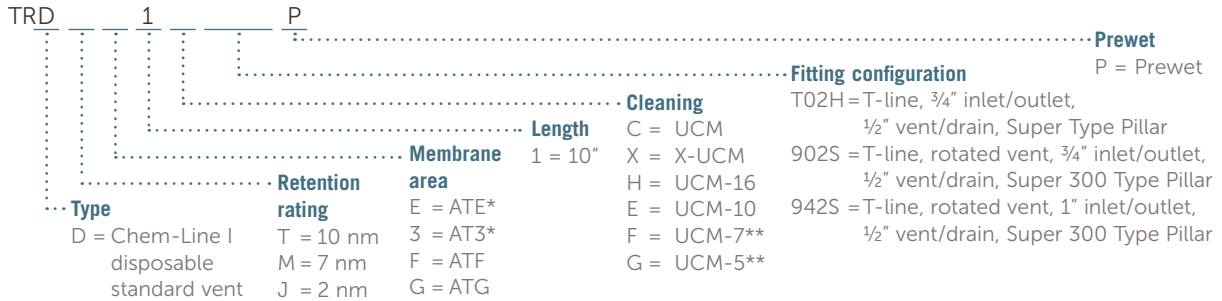
Torrento X Series ATE/AT3 10 nm
10" Chem-Line 3/4" Disposable Filters



ORDERING INFORMATION

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

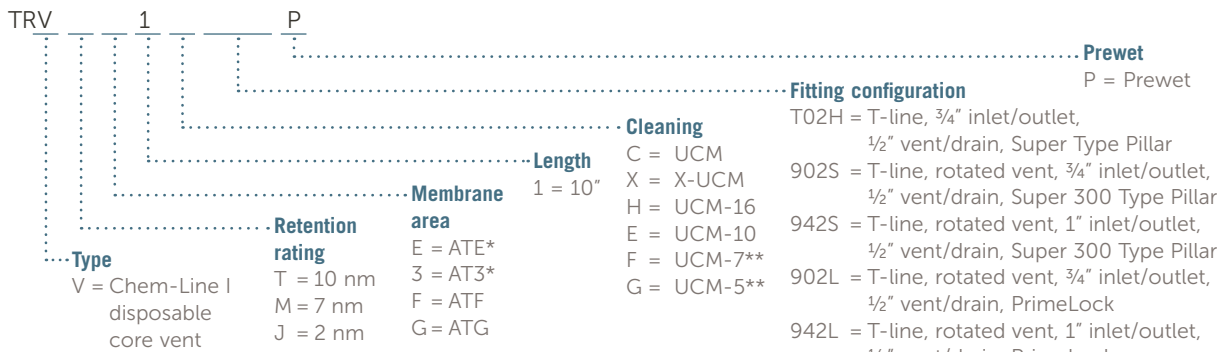
Torrento X Series Chem-Line I Disposable Filters Standard Vent: part number



*2 nm and 10 nm only

**2 nm only

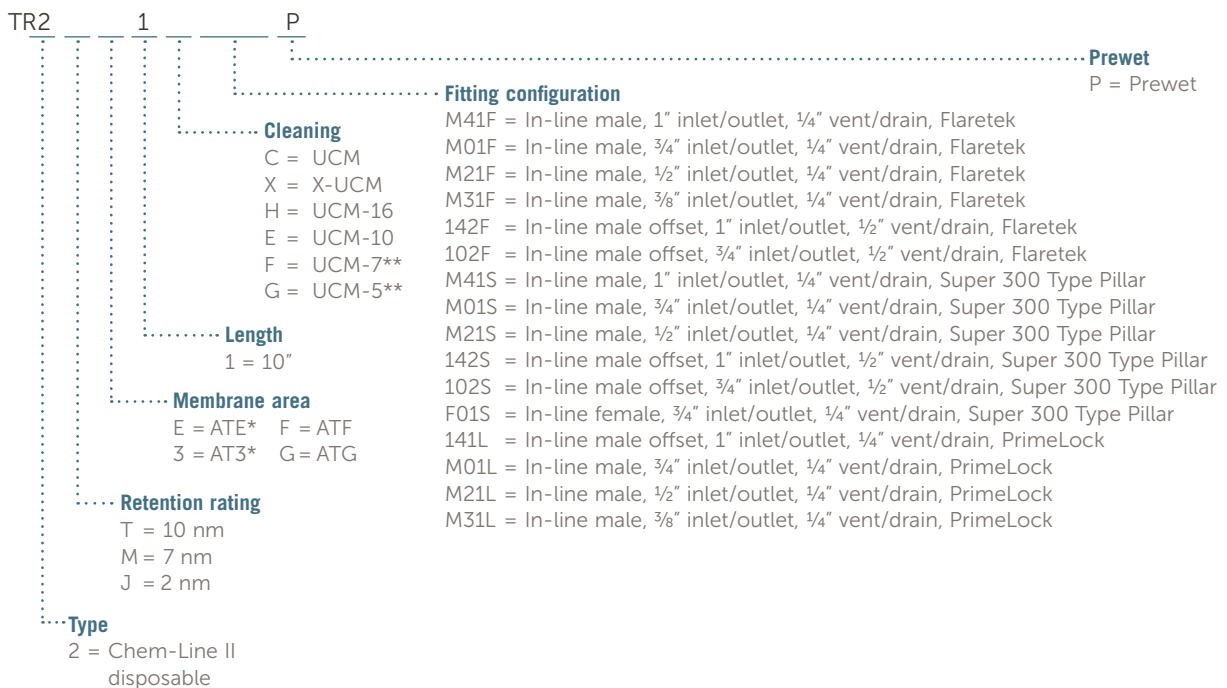
Torrento X Series Chem-Line I Disposable Filters Core Vent: part number



*2 nm and 10 nm only

**2 nm only

Torrento X Series Chem-Line II Disposable Filters: part number



*2 nm and 10 nm only

**2 nm only

Torrento X Series Cartridge Filters

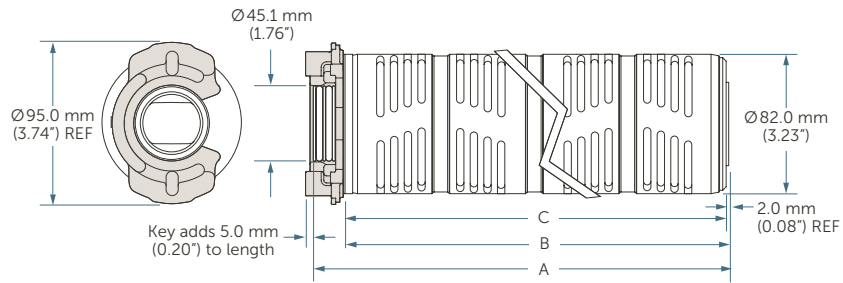
SPECIFICATIONS

Materials	Membrane	Prewet, nondewetting PTFE		
	Supports, shell	PFA		
	Cartridge O-ring options	E-FKM, E-ETP, Kalrez® (6376UP)		
Cartridge connections	Code 0 (2-222) O-rings			
Retention rating	2 nm	7 nm	10 nm	
Membrane area	ATE: 2 m ² (21 ft ²)	ATF: 2.4 m ² (25.8 ft ²)	ATE: 2 m ² (21 ft ²)	
	AT3: 3 m ² (32 ft ²)	ATG: 3.1 m ² (33.4 ft ²)	AT3: 3 m ² (32 ft ²)	
Metallic extractables	UCM-10: Testing conducted for 23 metals	UCM-16: Testing conducted for 16 metals	UCM/UCM-16: Testing conducted for 16 metals	
	UCM-7: Testing conducted for 29 metals	UCM-10: Testing conducted for 23 metals	X-UCM: Testing conducted for 23 metals	
	UCM-5: Testing conducted for 29 metals			
Other extractables	UCM-10: TOC*, Cl, F, NVR	UCM-16: TOC, Cl, NVR	UCM: TOC, Cl	
	UCM-7: TOC*, Cl, NVR	UCM-10: TOC*, Cl, F, NVR	UCM-16: TOC, Cl, NVR	
	UCM-5: TOC*, Cl, NVR		X-UCM: TOC, Cl, F	
Maximum operating conditions	Maximum operating pressure:			
	0.58 MPa (5.8 bar; 84.1 psid) @ 25°C (77°F)			
	0.097 MPa (0.97 bar; 14.1 psid) @ 200°C (392°F)			
	Maximum forward differential pressure:			
	0.44 MPa (4.4 bar; 63.8 psid) @ 25°C (77°F)			
	0.05 MPa (0.5 bar; 7.3 psid) @ 200°C (392°F)			
Maximum reverse pressure:				
0.35 MPa (3.5 bar; 50.8 psi) @ 25°C (77°F)				
Maximum operating temperature:				
200°C (392°F)				

Note: All Torrento X series filter product configurations are PFOA-free.

*Internal specifications only.

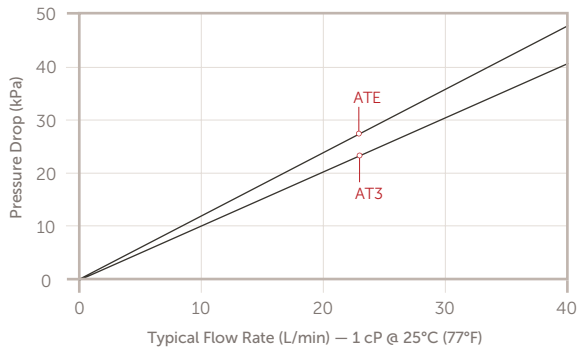
DIMENSIONS



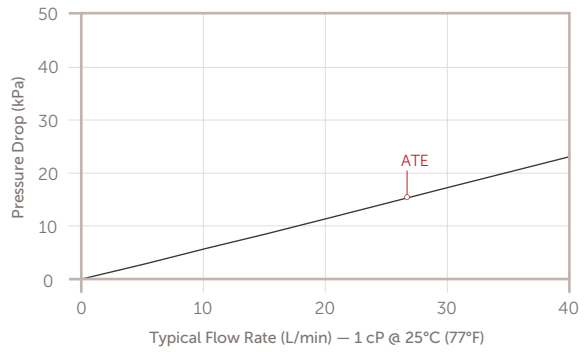
Length	A (overall)	B (control)	C (shoulder)
10"	244.0 mm (9.61")	227.0 mm (8.94")	225.0 mm (8.86")
20"	471.0 mm (18.54")	454.0 mm (17.87")	452.0 mm (17.80")
30"	699.5 mm (27.54")	682.0 mm (26.85")	681.0 mm (26.81")

PERFORMANCE DATA

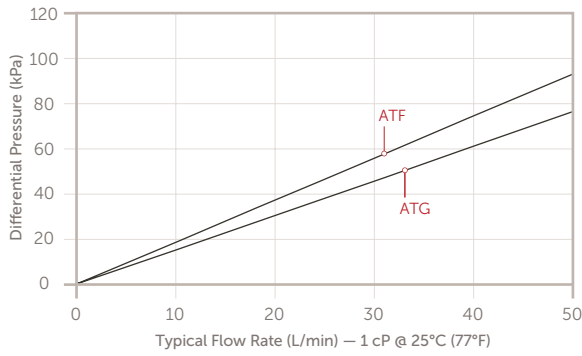
Torrento X Series ATE/AT3 2 nm
10" Cartridge Filters



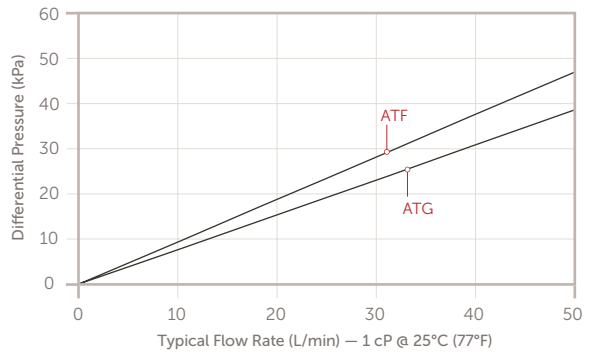
Torrento X Series ATE 2 nm
20" Cartridge Filter



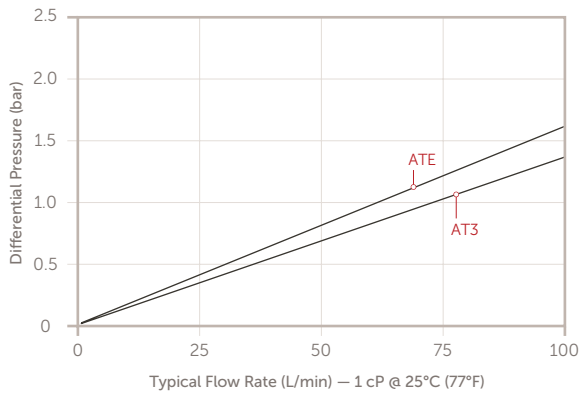
Torrento X Series ATF/ATG 7 nm
10" Cartridge Filters



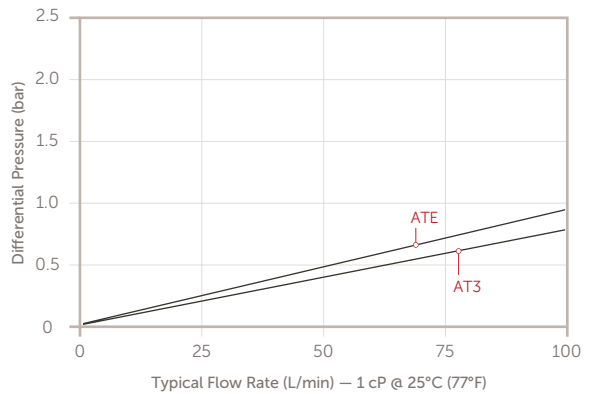
Torrento X Series ATF/ATG 7 nm
20" Cartridge Filters



Torrento X Series ATE/AT3 10 nm
10" Cartridge Filters

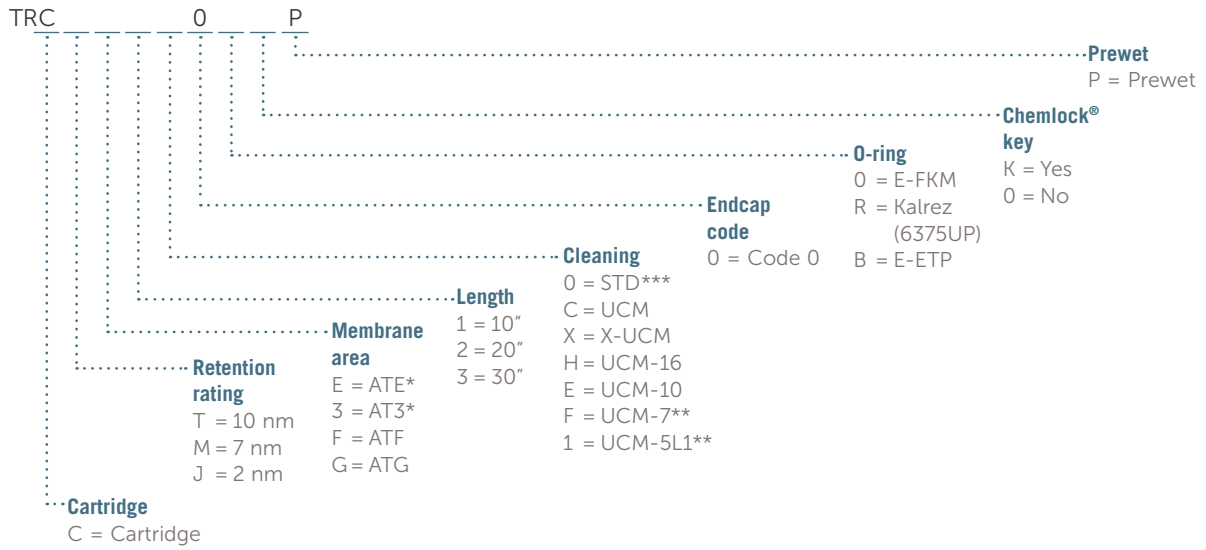


Torrento X Series ATE/AT3 10 nm
20" Cartridge Filters



ORDERING INFORMATION

Torrento X Series Cartridge Filters: part number



*2 nm and 10 nm only

**2 nm only

***30" only available in STD clean

Torrento K5 and Torrento X 2 nm Series 1500/3000 Disposable Filters

SPECIFICATIONS

	TORRENTO K5 SERIES SMALL 1500 DISPOSABLE FILTERS		TORRENTO K5 SERIES SMALL 3000 DISPOSABLE FILTERS
Materials	Membrane, supports, shell		PFA
Retention rating	5 nm, 2 nm		
Surface area	1500 type: 0.19 m ² (2.05 ft ²)		0.44 m ² (4.74 ft ²)
Maximum operating conditions	<p>Maximum operating pressure: 0.59 MPa (5.9 bar, 86 psi) @ 25°C (77°F) 0.19 MPa (1.9 bar, 28 psi) @ 95°C (203°F)</p> <p>Maximum forward differential pressure: 0.39 MPa (3.9 bar, 57 psi) @ 25°C (77°F)</p> <p>Maximum reverse pressure: 0.29 MPa (2.9 bar, 42 psi) @ 25°C (77°F)</p> <p>Maximum operating temperature: 95°C (203°F)</p>		
Metallic extractables	UCM-10 clean	Testing conducted for 23 metals	
	UCM-5 clean*	Testing conducted for 29 metals	
Other extractables	UCM-10 clean	TOC, CL, F, NVR	TOC, CL, F, NVR
	UCM-5 clean*	TOC, CL, F, NVR	TOC, CL, F, NVR

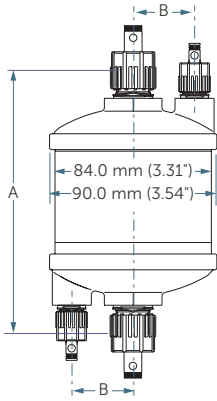
All Torrento K5 series filter product configurations are PFOA-free.

*UCM-5 clean only available on Torrento X 2 nm filters.

DIMENSIONS

Small Disposable Filters 1500/3000

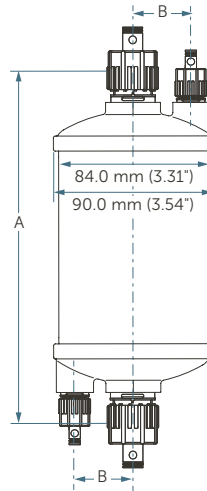
1500 Disposable Super 300 Type Pillar



Nominal dimensions – 1500

Fitting types	A	B
8 mm Super 300 Type Pillar	135 mm (5.32")	31 mm (1.22")
3/8" Super 300 Type Pillar	141 mm (5.55")	31 mm (1.22")

3000 Disposable Super 300 Type Pillar

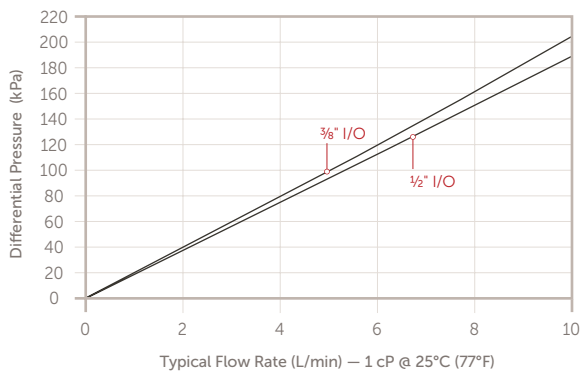


Nominal dimensions – 3000

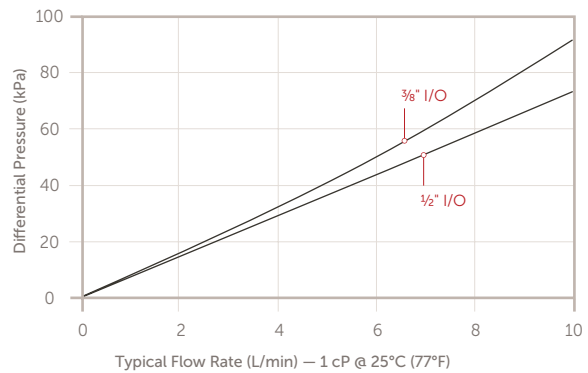
Fitting types	A	B
1/2" Super Type Pillar	204 mm (8.03")	32 mm (1.26")
8 mm Super 300 Type Pillar	189 mm (7.44")	31 mm (1.22")
3/8" Super 300 Type Pillar	194.0 mm (7.64")	31 mm (1.22")
1/2" Super 300 Type Pillar	199.0 mm (7.84")	31 mm (1.22")

PERFORMANCE DATA

Torrento K5 Series 5 nm 1500 Disposable Filters



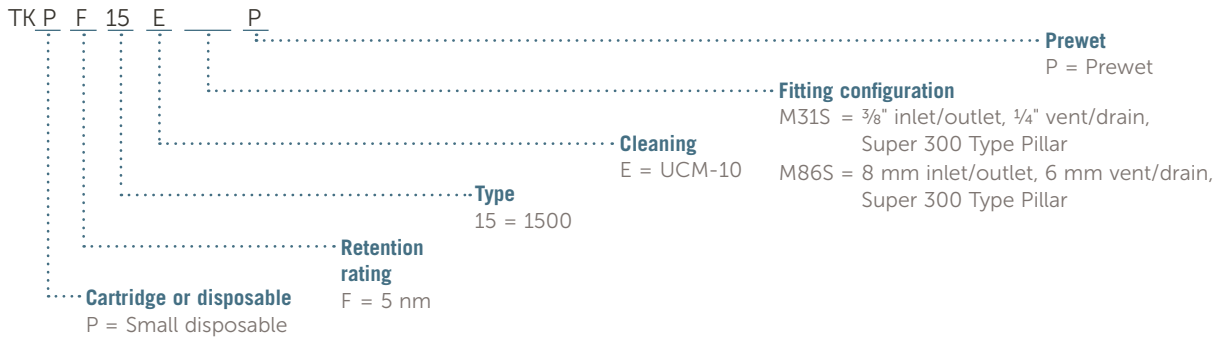
Torrento K5 Series 5 nm 3000 Disposable Filters



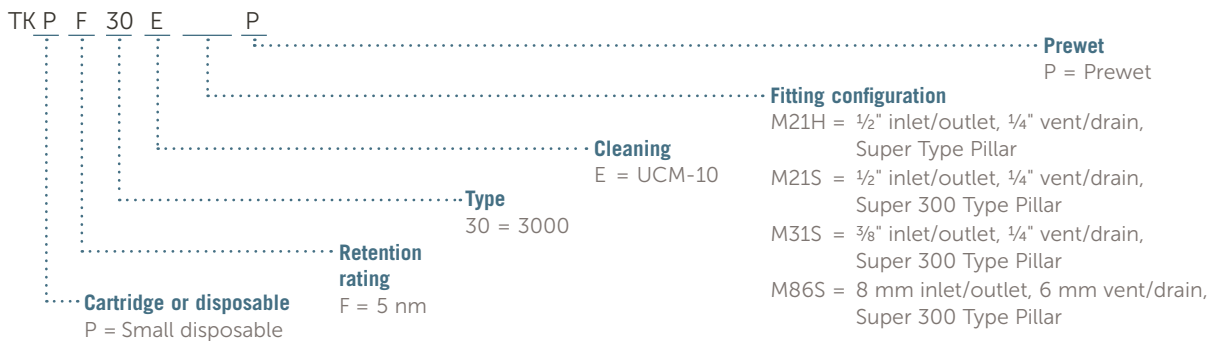
ORDERING INFORMATION

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

Torrento K5 Series 1500 Disposable Filters: part number

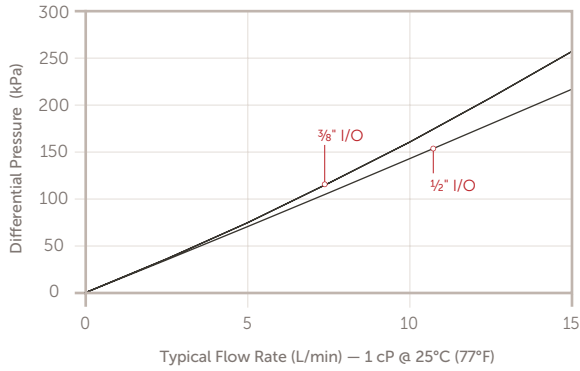


Torrento K5 Series 3000 Disposable Filters: part number

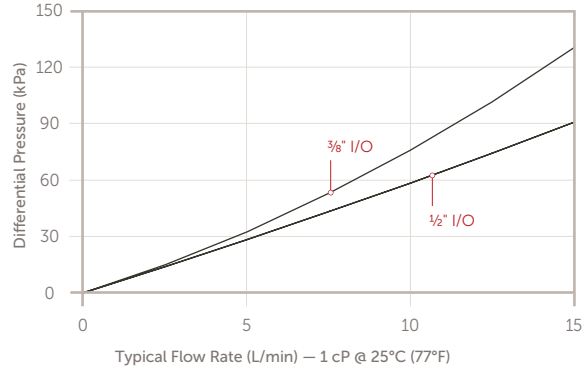


PERFORMANCE DATA

Torrento X Series 2 nm
1500 Disposable Filters



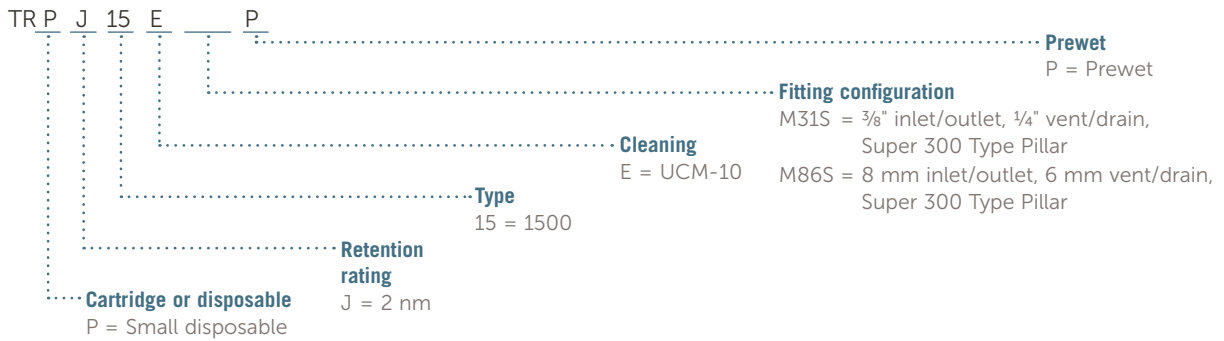
Torrento X Series 2 nm
3000 Disposable Filters



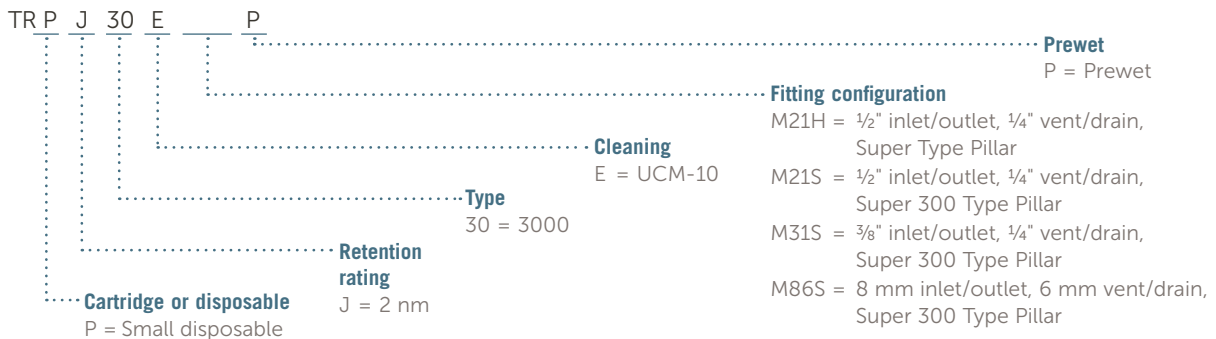
ORDERING INFORMATION

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

Torrento X 2 nm Series 1500 Disposable Filters: part number



Torrento X 2 nm Series 3000 Disposable Filters: part number



FOR MORE INFORMATION

Please call your Regional Customer Service Center today to learn what Entegris can do for you. Visit entegris.com and select the [Contact Us](#) link to find the customer service center nearest you.

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