

# Thermo Scientific F1-ClipTip Pipette

The Thermo Scientific F1-ClipTip pipette features interlocking technology to ensure secure tip attachment. F1-ClipTip® pipettes work exclusively with Thermo Scientific ClipTip pipette tips, providing a unique tip interface that locks the tip in place, and ensures a complete seal with minimal tip application and ejection forces.



Breakthrough ClipTip Technology



Finger rest rotates 120°



### Feel the Assurance.

Achieve newfound confidence knowing that once attached, your tips are locked firmly in place and will not fall off. Users have full tip control throughout pipetting, as pipette tips will only release when ejected, regardless of application pressure.

### Unstoppable Productivity, Outstanding Ease-of-use.

Eliminate the frustration of banging tips on your pipette with the exclusive interlock design that ensures each tip is 'clipped' securely on the F1-ClipTip until, and only until, it is released with a light touch. Combined with the light design and low plunger forces, the F1-ClipTip pipette dramatically reduces the risk of Repetitive Strain Injury (RSI).

### A Secure Seal for Every Sample.

The unique interlock design ensures the pipette and tip form a complete seal to secure the sample volume in each tip for enhanced accuracy and precision.

### Patented Super Blow-Out.

With a 150% increased air boost through each tip fitting, efficiently deliver micro-sample volume while preventing capillary action.\*

### Adjustable Finger Rest.

Adjusts up to 120° for the most ergonomic and comfortable pipetting position. This feature is optimal for individual pipetting preferences of both right- and left-handed users.

### Volume Lock Adjustment.

The user-friendly locking mechanism securely locks the volume into place to avoid volume drift during pipetting. Simply lift the plunger up to set volume and press down to lock in place with minimum effort.

### Industry-leading lifetime warranty.

With convenient online registration.\*\*








\*Available in 50 ul models and lower volumes.

\*\*Validity may vary by country

# Thermo Scientific F1-ClipTip Pipette

<b>Handle Material</b>	ABS+PC (acrylonitrilebutadienestyrene/polycarbonate); Antimicrobial silver (Ag ions) additive (FDA approved) for additional cross-contamination prevention		
<b>Piston Material</b>	PEI (polyetherimide) and Stainless Steel (low volumes)		
<b>Tip Cone</b>	PVDF (polyvinylidenefluoride); Autoclavable		
<b>Tip Fitting</b>	Stainless Steel; O-ring material FVM (fluorosilicone rubber); Autoclavable		
<b>Weight (g)</b>	Single Channel: 68-69	8-Channel: 169-177	12-Channel: 202-228









## F1-ClipTip Variable Volume Single Channel

Item No.	Description	Color Key	Range	Increment	Volume	Inaccuracy $\mu\text{l}$	%	Imprecision s.d.* $\mu\text{l}$	cv%	Compatible ClipTip
4641170	F1-ClipTip 1-10 $\mu\text{l}$		1-10 $\mu\text{l}$	0.02 $\mu\text{l}$	10	$\pm 0,100$	$\pm 1,00$	0,050	0,50	ClipTip 20
					5	$\pm 0,75$	$\pm 1,50$	0,040	0,80	
					1	$\pm 0,25$	$\pm 2,50$	0,020	2,00	
4641180	F1-ClipTip 2-20 $\mu\text{l}$		2-20 $\mu\text{l}$	0.02 $\mu\text{l}$	20	$\pm 0,20$	$\pm 1,00$	0,08	0,40	ClipTip 20
					10	$\pm 0,15$	$\pm 1,50$	0,06	0,60	
					2	$\pm 0,06$	$\pm 3,00$	0,05	2,50	
4641190	F1-ClipTip 5-50 $\mu\text{l}$		5-50 $\mu\text{l}$	0.1 $\mu\text{l}$	50	$\pm 0,30$	$\pm 0,60$	0,15	0,30	ClipTip 50
					25	$\pm 0,25$	$\pm 1,00$	0,13	0,50	
					5	$\pm 0,15$	$\pm 3,00$	0,13	2,50	
4641200	F1-ClipTip 10-100 $\mu\text{l}$		10-100 $\mu\text{l}$	0.2 $\mu\text{l}$	100	$\pm 0,80$	$\pm 0,80$	0,20	0,20	ClipTip 200
					50	$\pm 0,60$	$\pm 1,20$	0,20	0,40	
					10	$\pm 0,30$	$\pm 3,00$	0,10	1,00	
4641210	F1-ClipTip 20-200 $\mu\text{l}$		20-200 $\mu\text{l}$	0.2 $\mu\text{l}$	200	$\pm 1,20$	$\pm 0,60$	0,40	0,20	ClipTip 200
					100	$\pm 1,00$	$\pm 1,00$	0,40	0,40	
					20	$\pm 0,36$	$\pm 1,80$	0,14	0,70	
4641220	F1-ClipTip 30-300 $\mu\text{l}$		30-300 $\mu\text{l}$	1 $\mu\text{l}$	300	$\pm 1,80$	$\pm 0,60$	0,60	0,20	ClipTip 300
					150	$\pm 1,50$	$\pm 1,00$	0,60	0,40	
					30	$\pm 0,45$	$\pm 1,50$	0,18	0,60	
4641230	F1-ClipTip 100-1000 $\mu\text{l}$		100-1000 $\mu\text{l}$	1 $\mu\text{l}$	1000	$\pm 6,00$	$\pm 0,60$	2,00	0,20	ClipTip 1000
					500	$\pm 4,00$	$\pm 0,80$	1,50	0,30	
					100	$\pm 1,00$	$\pm 1,00$	0,60	0,60	

## F1-ClipTip Fixed Volume Single Channel

Item No.	Description	Volume	Inaccuracy $\mu\text{l}$	%	Imprecision s.d.* $\mu\text{l}$	cv%	Compatible ClipTip
4651170	F1-ClipTip 1 $\mu\text{l}$ fix vol	1 $\mu\text{l}$	$\pm 0,040$	$\pm 4,00$	0,040	4,00	ClipTip 20
4651180	F1-ClipTip 5 $\mu\text{l}$ fix vol	5 $\mu\text{l}$	$\pm 0,070$	$\pm 1,40$	0,070	1,40	ClipTip 20
4651190	F1-ClipTip 10 $\mu\text{l}$ fix vol	10 $\mu\text{l}$	$\pm 0,090$	$\pm 0,90$	0,080	0,80	ClipTip 20
4651200	F1-ClipTip 20 $\mu\text{l}$ fix vol	20 $\mu\text{l}$	$\pm 0,14$	$\pm 0,70$	0,10	0,50	ClipTip 20
4651210	F1-ClipTip 25 $\mu\text{l}$ fix vol	25 $\mu\text{l}$	$\pm 0,15$	$\pm 0,60$	0,12	0,50	ClipTip 50
4651220	F1-ClipTip 50 $\mu\text{l}$ fix vol	50 $\mu\text{l}$	$\pm 0,30$	$\pm 0,60$	0,20	0,40	ClipTip 50
4651230	F1-ClipTip 100 $\mu\text{l}$ fix vol	100 $\mu\text{l}$	$\pm 0,40$	$\pm 0,40$	0,30	0,30	ClipTip 200
4651240	F1-ClipTip 200 $\mu\text{l}$ fix vol	200 $\mu\text{l}$	$\pm 0,80$	$\pm 0,40$	0,60	0,30	ClipTip 200
4651250	F1-ClipTip 250 $\mu\text{l}$ fix vol	250 $\mu\text{l}$	$\pm 1,0$	$\pm 0,40$	0,75	0,30	ClipTip 300
4651260	F1-ClipTip 500 $\mu\text{l}$ fix vol	500 $\mu\text{l}$	$\pm 1,5$	$\pm 0,30$	1,50	0,30	ClipTip 1000
4651270	F1-ClipTip 1000 $\mu\text{l}$ fix vol	1000 $\mu\text{l}$	$\pm 3,0$	$\pm 0,30$	3,00	0,30	ClipTip 1000

## F1-ClipTip Variable Volume Multichannel

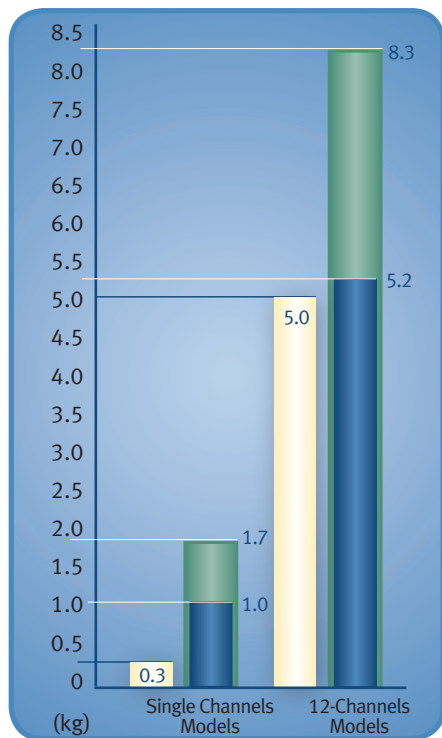
Item No.	Description	Color Key	Range	Increment	Volume	Inaccuracy $\mu\text{l}$	%	Imprecision s.d.* $\mu\text{l}$	cv%	Compatible ClipTip
4661110	F1-ClipTip 8-ch 1-10 $\mu\text{l}$		1.0-10 $\mu\text{l}$	0.02 $\mu\text{l}$	10	$\pm 0,240$	$\pm 2,40$	$\pm 0,160$	$\pm 1,60$	ClipTip 20
					5	$\pm 0,200$	$\pm 4,00$	$\pm 0,150$	$\pm 3,00$	
					1	$\pm 0,120$	$\pm 12,00$	$\pm 0,080$	$\pm 8,00$	
4661120	F1-ClipTip 8-ch 5-50 $\mu\text{l}$		5-50 $\mu\text{l}$	0.1 $\mu\text{l}$	50	$\pm 0,75$	$\pm 1,50$	$\pm 0,35$	$\pm 0,70$	ClipTip 50
					25	$\pm 0,625$	$\pm 2,50$	$\pm 0,30$	$\pm 1,20$	
					5	$\pm 0,25$	$\pm 5,00$	$\pm 0,10$	$\pm 2,00$	
4661130	F1-ClipTip 8-ch 10-100 $\mu\text{l}$		10-100 $\mu\text{l}$	0.2 $\mu\text{l}$	100	$\pm 1,30$	$\pm 1,30$	$\pm 0,50$	$\pm 0,50$	ClipTip 200
					50	$\pm 1,25$	$\pm 2,50$	$\pm 0,60$	$\pm 1,20$	
					10	$\pm 0,50$	$\pm 5,00$	$\pm 0,20$	$\pm 2,00$	
4661140	F1-ClipTip 8-ch 30-300 $\mu\text{l}$		30-300 $\mu\text{l}$	1 $\mu\text{l}$	300	$\pm 3,00$	$\pm 1,00$	$\pm 0,90$	$\pm 0,30$	ClipTip 300
					150	$\pm 2,25$	$\pm 1,50$	$\pm 0,75$	$\pm 0,50$	
					30	$\pm 1,50$	$\pm 5,00$	$\pm 0,60$	$\pm 2,00$	
4661150	F1-ClipTip 12-ch 1-10 $\mu\text{l}$		1.0-10 $\mu\text{l}$	0.02 $\mu\text{l}$	10	$\pm 0,240$	$\pm 2,40$	$\pm 0,160$	$\pm 1,60$	ClipTip 20
					5	$\pm 0,200$	$\pm 4,00$	$\pm 0,150$	$\pm 3,00$	
					1	$\pm 0,120$	$\pm 12,00$	$\pm 0,080$	$\pm 8,00$	
4661160	F1-ClipTip 12-ch 5-50 $\mu\text{l}$		5-50 $\mu\text{l}$	0.1 $\mu\text{l}$	50	$\pm 0,75$	$\pm 1,50$	$\pm 0,35$	$\pm 0,70$	ClipTip 50
					25	$\pm 0,625$	$\pm 2,50$	$\pm 0,30$	$\pm 1,20$	
					5	$\pm 0,25$	$\pm 5,00$	$\pm 0,10$	$\pm 2,00$	
4661170	F1-ClipTip 12-ch 10-100 $\mu\text{l}$		10-100 $\mu\text{l}$	0.2 $\mu\text{l}$	100	$\pm 1,30$	$\pm 1,30$	$\pm 0,50$	$\pm 0,50$	ClipTip 200
					50	$\pm 1,25$	$\pm 2,50$	$\pm 0,60$	$\pm 1,20$	
					10	$\pm 0,50$	$\pm 5,00$	$\pm 0,20$	$\pm 2,00$	
4661180	F1-ClipTip 12-ch 30-300 $\mu\text{l}$		30-300 $\mu\text{l}$	1 $\mu\text{l}$	300	$\pm 3,00$	$\pm 1,00$	$\pm 0,90$	$\pm 0,30$	ClipTip 300
					150	$\pm 2,25$	$\pm 1,50$	$\pm 0,75$	$\pm 0,50$	
					30	$\pm 1,50$	$\pm 5,00$	$\pm 0,60$	$\pm 2,00$	

# F1-ClipTip Good Laboratory Pipetting Kits Kits

Item No.	Description	Kit Includes
4701140	F1-ClipTip GLP Kit 1	F1-ClipTip 1-10 µl single channel, F1-ClipTip 10-100 µl single channel, F1-ClipTip 100-1000 µl single channel, F-Series Stand, ClipTip 20 rack, ClipTip 200 rack, ClipTip 1000 rack, 25 ml reservoir, 25 ml divided reservoir, 100 ml divided reservoir
4701150	F1-ClipTip GLP Kit 2	F1-ClipTip 2-20 µl single channel, F1-ClipTip 20-200 µl single channel F1-ClipTip 100-1000 µl single channel, F1-ClipTip 30-300 µl 8-channel F-Series Stand, ClipTip 20 rack, ClipTip 200 rack, ClipTip 300 rack ClipTip 1000 rack, 25 ml reservoir, 25 ml divided reservoir, 100 ml divided reservoir

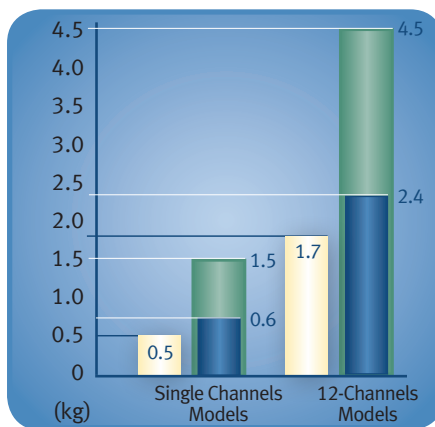
## Attachment Forces

F1-ClipTip Pipettes vs. Other Pipettes



## Ejection Forces

F1-ClipTip Pipettes vs. Other Pipettes



■ F1-ClipTip pipettes  
■ Manufacturer B pipettes  
■ Manufacturer C pipettes

\* Includes 20-200 µl and 30-300 µl models. Forces gathered followed the same protocol. Manufacturer recommended tips were used with each pipette.

[thermoscientific.com/cliptip](http://thermoscientific.com/cliptip)

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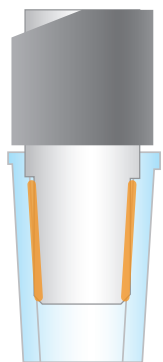
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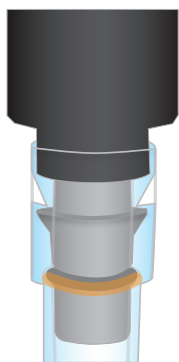
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# Thermo Scientific ClipTip Pipette Tips

Thermo Scientific ClipTip pipette tips provide a unique locking tip interface that allows stable, straight mounting on Thermo Scientific F1-ClipTip pipettes. ClipTip® pipette tips feature “clips” that lock tips in place. Simply touch the F1-ClipTip pipette to the ClipTip for a secure seal. The ClipTip pipette tip will only release when ejected using minimal application pressure.



Friction base sealing systems rely on the varying force by individual users.



F1-ClipTip interlock technology that locks tips into place for a complete seal every time.

## Absolute tip attachment.

The ClipTip pipette tips lock into place to create a complete seal until released. Users have full tip control throughout pipetting, as pipette tips will only release when ejected, regardless of application pressure.

## Superior ergonomics.

Simply touch the Thermo Scientific F1-ClipTip pipette to the ClipTip to lock in place.

## Immediate traceability.

Each tip insert has ink-jetted lot and volume information. The convenient color key makes it easy to match the color of the F1-ClipTip pipette plunger cap with the corresponding ClipTip pipette tip rack insert.

## Superior Contamination Control.

The interlocking tip design prevents sample contamination caused from loose, leaking tips that can fall off. Filter tips prevent carry over contamination protecting both the pipette and the sample.

## Low Retention.

Innovative technology creates a hydrophobic inner pipette tip surface to minimize liquid retention, and enable maximum sample recovery. This low retention technology is completely inert and increases accuracy and precision.

## Proven Quality.

Certified free of RNase, DNase, DNA, ATP and Endotoxin.

## Environmental responsibility.

The ClipTip pipette tip reload system incorporates re-usable hinged racks with plastic reload sleeves which which reduces waste by an average of 35%.

## Versatile Tip Range.

Choose from five sizes: 20 µl, 50 µl, 200 µl, 300 µl and 1000 µl.

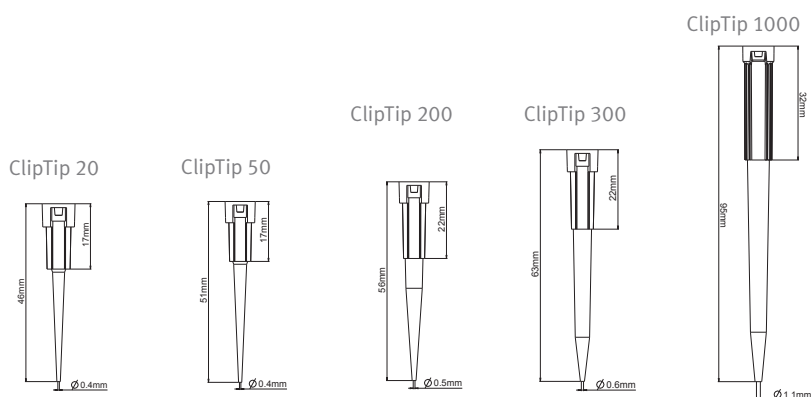


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# Thermo Scientific ClipTip Pipette Tips

Item No.	Description	Color Key	Volume Range	Packaging	Compatible F1-ClipTip Pipettes
94-410-210	ClipTip 20	<span style="color: red;">●</span>	1-20 µl	Racked, 96 tips/rack, 10 racks/pack	F1-ClipTip 1-10 µl, Fixed 1-20µl, 8-ch 1-10 µl and 12-ch 1-10 µl
94-410-213	ClipTip 20	<span style="color: red;">●</span>	1-20 µl	Racked, Sterile, 96 tips/rack, 10 racks/pack	F1-ClipTip 1-10 µl, Fixed 1-20µl, 8-ch 1-10 µl and 12-ch 1-10 µl
94-410-217	ClipTip 20	<span style="color: red;">●</span>	1-20 µl	Reload Stacks, 96 tips/insert, 10 inserts	F1-ClipTip 1-10 µl, Fixed 1-20µl, 8-ch 1-10 µl and 12-ch 1-10 µl
94-410-218	ClipTip 20	<span style="color: red;">●</span>	1-20 µl	Reload Stacks, Sterile, 96 tips/insert, 10 inserts/pack	F1-ClipTip 1-10 µl, Fixed 1-20µl, 8-ch 1-10 µl and 12-ch 1-10 µl
94-420-213	ClipTip 20	<span style="color: red;">●</span>	1-20 µl	Racked, Filtered, Sterile, 96 tips/rack, 10 racks/pack	F1-ClipTip 1-10 µl, Fixed 1-20µl, 8-ch 1-10 µl and 12-ch 1-10 µl
94-420-218	ClipTip 20	<span style="color: red;">●</span>	1-20 µl	Reload, Filtered, Sterile, 96 tips/insert, 10 inserts/pack	F1-ClipTip 1-10 µl, Fixed 1-20µl, 8-ch 1-10 µl and 12-ch 1-10 µl
94-410-250	ClipTip 50	<span style="color: purple;">●</span>	5-50 µl	Racked, 96 tips/rack, 10 racks/pack	F1-ClipTip 5-50 µl, Fixed 25 µl and 50 µl, 8-ch 5-50 µl and 12-ch 5-50 µl
94-410-253	ClipTip 50	<span style="color: purple;">●</span>	5-50 µl	Racked, Sterile, 96 tips/rack, 10 racks/pack	F1-ClipTip 5-50 µl, Fixed 25 µl and 50 µl, 8-ch 5-50 µl and 12-ch 5-50 µl
94-410-257	ClipTip 50	<span style="color: purple;">●</span>	5-50 µl	Reload Stacks, 96 tips/insert, 10 inserts	F1-ClipTip 5-50 µl, Fixed 25 µl and 50 µl, 8-ch 5-50 µl and 12-ch 5-50 µl
94-410-258	ClipTip 50	<span style="color: purple;">●</span>	5-50 µl	Reload Stacks, Sterile, 96 tips/insert, 10 inserts	F1-ClipTip 5-50 µl, Fixed 25 µl and 50 µl, 8-ch 5-50 µl and 12-ch 5-50 µl
94-420-253	ClipTip 50	<span style="color: purple;">●</span>	5-50 µl	Racked, Filtered, Sterile, 96 tips/rack, 10 racks/pack	F1-ClipTip 5-50 µl, Fixed 25 µl and 50 µl, 8-ch 5-50 µl and 12-ch 5-50 µl
94-420-258	ClipTip 50	<span style="color: purple;">●</span>	5-50 µl	Reload, Filtered, Sterile, 96 tips/insert, 10 inserts/pack	F1-ClipTip 5-50 µl, Fixed 25 µl and 50 µl, 8-ch 5-50 µl and 12-ch 5-50 µl
94-410-310	ClipTip 200	<span style="color: yellow;">●</span>	10-200 µl	Racked, 96 tips/rack, 10 racks/pack	F1-ClipTip 10-100 µl, 20-200 µl, Fixed 100µl and 200 µl, 8-ch 10-100 µl and 12-ch 10-100 µl
94-410-313	ClipTip 200	<span style="color: yellow;">●</span>	10-200 µl	Racked, Sterile, 96 tips/rack, 10 racks/pack	F1-ClipTip 10-100 µl, 20-200 µl, Fixed 100µl and 200 µl, 8-ch 10-100 µl and 12-ch 10-100 µl
94-410-317	ClipTip 200	<span style="color: yellow;">●</span>	10-200 µl	Reload Stacks, 96 tips/insert, 10 inserts	F1-ClipTip 10-100 µl, 20-200 µl, Fixed 100µl and 200 µl, 8-ch 10-100 µl and 12-ch 10-100 µl
94-410-318	ClipTip 200	<span style="color: yellow;">●</span>	10-200 µl	Reload Stacks, Sterile, 96 tips/insert, 10 inserts	F1-ClipTip 10-100 µl, 20-200 µl, Fixed 100µl and 200 µl, 8-ch 10-100 µl and 12-ch 10-100 µl
94-420-313	ClipTip 200	<span style="color: yellow;">●</span>	10-200 µl	Racked, Filtered, Sterile, 96 tips/rack, 10 racks/pack	F1-ClipTip 10-100 µl, 20-200 µl, Fixed 100µl and 200 µl, 8-ch 10-100 µl and 12-ch 10-100 µl
94-420-318	ClipTip 200	<span style="color: yellow;">●</span>	10-200 µl	Reload, Filtered, Sterile, 96 tips/insert, 10 inserts/pack	F1-ClipTip 10-100 µl, 20-200 µl, Fixed 100µl and 200 µl, 8-ch 10-100 µl and 12-ch 10-100 µl
94-410-510	ClipTip 300	<span style="color: orange;">●</span>	30-300 µl	Racked, 96 tips/rack, 10 racks/pack	F1-ClipTip 30-300 µl, Fixed 250 µl, 8-ch 30-300 µl and 12-ch 30-300 µl
94-410-513	ClipTip 300	<span style="color: orange;">●</span>	30-300 µl	Racked, Sterile, 96 tips/rack, 10 racks/pack	F1-ClipTip 30-300 µl, Fixed 250 µl, 8-ch 30-300 µl and 12-ch 30-300 µl
94-410-517	ClipTip 300	<span style="color: orange;">●</span>	30-300 µl	Reload Stacks, 96 tips/insert, 10 inserts	F1-ClipTip 30-300 µl, Fixed 250 µl, 8-ch 30-300 µl and 12-ch 30-300 µl
94-410-518	ClipTip 300	<span style="color: orange;">●</span>	30-300 µl	Reload Stacks, sterile, 96 tips/insert, 10 inserts	F1-ClipTip 30-300 µl, Fixed 250 µl, 8-ch 30-300 µl and 12-ch 30-300 µl
94-420-513	ClipTip 300	<span style="color: orange;">●</span>	30-300 µl	Racked, Filtered, Sterile, 96 tips/rack, 10 racks/pack	F1-ClipTip 30-300 µl, Fixed 250 µl, 8-ch 30-300 µl and 12-ch 30-300 µl
94-420-518	ClipTip 300	<span style="color: orange;">●</span>	30-300 µl	Reload, Filtered, Sterile, 96 tips/insert, 10 inserts/pack	F1-ClipTip 30-300 µl, Fixed 250 µl, 8-ch 30-300 µl and 12-ch 30-300 µl
94-410-710	ClipTip 1000	<span style="color: blue;">●</span>	100-1000 µl	Racked, 96 tips/rack, 8 racks/pack	F1-ClipTip 100-1000 µl, Fixed 500 µl and Fixed 1000 µl
94-410-713	ClipTip 1000	<span style="color: blue;">●</span>	100-1000 µl	Racked, Sterile, 96 tips/rack, 8 racks/pack	F1-ClipTip 100-1000 µl, Fixed 500 µl and Fixed 1000 µl
94-410-717	ClipTip 1000	<span style="color: blue;">●</span>	100-1000 µl	Reload Stacks, 96 tips/insert, 8 inserts	F1-ClipTip 100-1000 µl, Fixed 500 µl and Fixed 1000 µl
94-410-718	ClipTip 1000	<span style="color: blue;">●</span>	100-1000 µl	Reload Stacks, sterile, 96 tips/insert, 8 inserts	F1-ClipTip 100-1000 µl, Fixed 500 µl and Fixed 1000 µl
94-420-713	ClipTip 1000	<span style="color: blue;">●</span>	100-1000 µl	Racked, Filtered, Sterile, 96 tips/rack, 8 racks/pack	F1-ClipTip 100-1000 µl, Fixed 500 µl and Fixed 1000 µl
94-420-718	ClipTip 1000	<span style="color: blue;">●</span>	100-1000 µl	Reload, Filtered, Sterile, 96 tips/insert, 8 inserts/pack	F1-ClipTip 100-1000 µl, Fixed 500 µl and Fixed 1000 µl
94-410-219	Empty Rack, Small	<span style="color: red;">●</span> <span style="color: purple;">●</span>	N/A	10 racks, no tips/inserts	
94-410-519	Empty Rack, Medium	<span style="color: yellow;">●</span> <span style="color: orange;">●</span>	N/A	10 racks, no tips/inserts	
94-410-819	Empty Rack, Large	<span style="color: blue;">●</span>	N/A	10 racks, no tips/inserts	

Item No.	Overall Tip Length	Tip Shoulder (Proximal)	Inner Orifice Diameter (Distal)
ClipTip 20	46 mm	17 mm	0.4 mm
ClipTip 50	51 mm	17 mm	0.4 mm
ClipTip 200	56 mm	22 mm	0.5 mm
ClipTip 300	63 mm	22 mm	0.6 mm
ClipTip 1000	95 mm	32 mm	1.1 mm



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**Germany national toll free** 08001-536 376  
**Germany international** +49 6184 90 6940  
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**Asia:**  
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# Thermo Scientific ClipTip Technology – Part 1

## Transform Your Daily Pipetting

Sami Koivisto, Technology Manager, Liquid Transfer, Thermo Fisher Scientific, Vantaa, Finland.  
Suvi Berghäll, Product Manager, Pipetting Systems, Thermo Fisher Scientific, Vantaa, Finland.

### Key Words

- **Tip Fitting** – is the part of the pipette shaft that positions, connects and seals the pipette to the tip.
- **Conical Tip Fitting** – the system by which a cone shaped pipette fitting utilizes friction to attach to a compatible cone shape tip fitting.
- **Cylindrical Tip Fitting** – the system by which a cylindrical shaped pipette fitting utilizes friction to attach to a compatible cylindrical shape tip fitting.
- **Interlock Technology** – the system by which a pipette fitting opens clips on tip fitting and locks the tip into place forming an airtight seal with the sealing ring.

### Introduction

In liquid handling, it is a challenge to ensure a quality seal in daily pipetting. The ideal solution is for the pipette and tip to form a system that increases confidence in reproducibility, reduces forces required to attach and detach the system, and secures the best possible accuracy and precision. With the introduction of innovative technologies, Thermo Scientific continues to improve pipetting efficiencies.

### Innovative ClipTip Technology

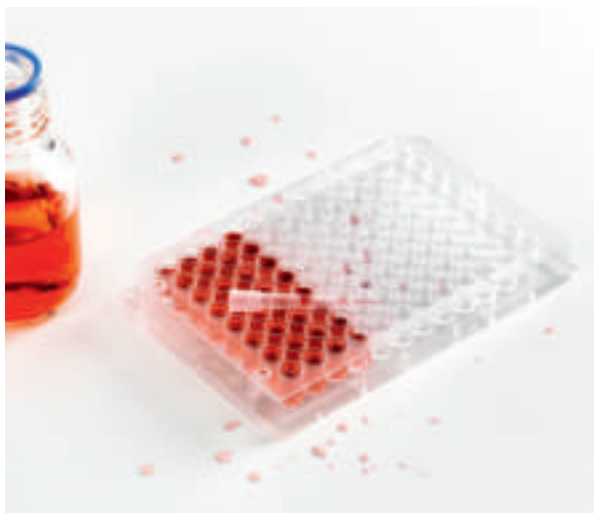
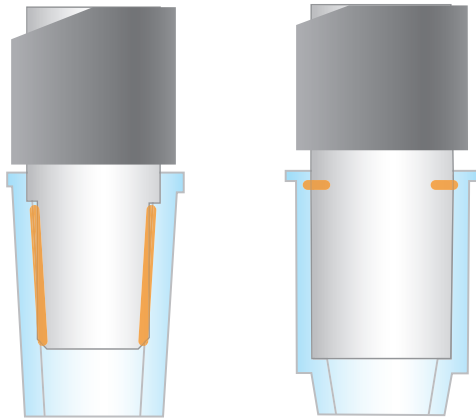
The Thermo Scientific® F1-ClipTip® interlock technology is based on flexible clips positioned evenly around the top of the tip. During attachment the unique tip fitting shape opens the clips, and the clips pass over the fitting flange and return to closed position. The clips lock the tip behind the flange creating a complete seal with the sealing ring (figure 1). In addition, the lock ensures the tip will not loosen, or fall off during pipetting or touch-off.

Tip ejection is achieved by opening the clips with the clip opener mechanism (figure 2). After the clips have opened, the ejection mechanism pushes the unlocked tip off from the tip fitting.



The F1-ClipTip system forms an airtight seal on every channel.

Friction Sealing System Diagram shows the sealing area highlighted in orange.



A fallen tip wastes precious sample, and your time.

### Friction sealing system

Pipettes with a friction seal system rely on a user's force to attach tips to the pipette, which varies from user to user. There are two types of friction based sealing systems; conical and cylindrical (figure 3). The sealing area is usually large and depending on the quality of the tip used, the conical tip fitting method requires relatively high attachment forces to achieve sufficient sealing. It is possible to use excessive force in attachment phase and therefore the tips may jam having a considerable affect on force required to eject the tips common contributing to repetitive strain injuries. Attaching the tips with the same force every time is challenging, which reduces the reliability of seal. Repeatedly forcing tips to properly attach wears the tip cone over time which leads to inconsistencies, inaccuracies and imprecision. Also, using an insufficient amount of force with friction sealing systems increases the risk of tips becoming loose, or even falling off.

ClipTip System Diagram shows how the clips lock the tip firmly in place.

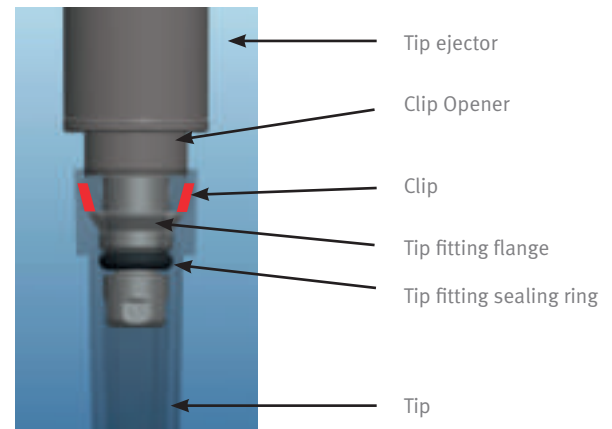


Figure 1: Clips closed behind the flange. The tip is sealed.

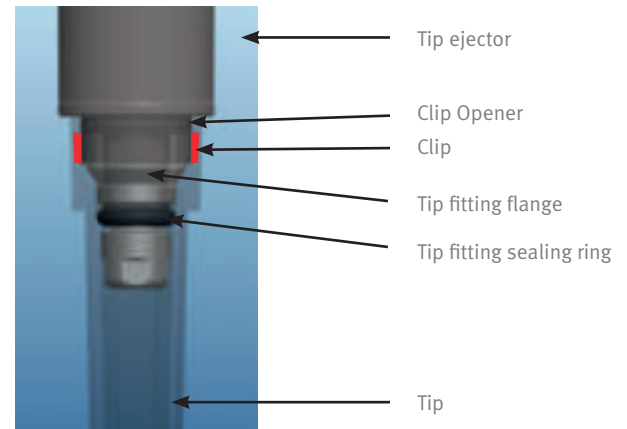


Figure 2: During tip ejection clips are opened and tip ejector pushes the tip off.

### Interlocking system

The interlocking tip attachment system provides an easy method to use correct attachment force for tips. Each time ClipTip pipette tips are on, they are sealed.

The seal will last for as long as the tips are attached to the pipette regardless of application or touch-off pressure (e.g. tip touching to container wall to wipe off outside droplets). Since the tips are locked with the clips they are always attached with the same force. Tip ejection of the ClipTip interlocking system requires less than 50% of the force required for conical tip fitting system. If a sufficient force level is not reached during attachment the ClipTip tips remain in the tip rack. This ensures that there is no risk for intermediately attached tips to fall off during use to waste valuable samples and time as is the case with other systems.

## ClipTip system - sealed in security

The Thermo Scientific ClipTip pipette tips form a complete and reliable seal with the tip fitting sealing ring in the F1-ClipTip pipette. The interlocking clips maintain the sealing force with the sealing ring.

The tip fitting is acid resistant AISI 316 steel, which is a commonly used material in appliances where corrosion resistance is needed (e.g. chemical and petrochemical industry). The material is both mechanically durable and chemically resistant. The probability of sample contamination by metal ions from the tip fitting during intended use is infinitesimal as there is no liquid contact to metal.

The sealing rings are FVM fluorosilicone (tip fitting sealing ring) and EPDM rubber (other sealing rings), which are commonly used sealing materials. Endurance testing of sealing rings showed that they seal the tip reliably after prolonged use. It is recommended to change the tip fitting sealing ring with regular maintenance of the pipette. Information about maintenance can be found from the F1-ClipTip Instructions for Use. With highly sensitive applications and aggressive chemicals the use of filter tips is recommended.

[thermoscientific.com/clipTip](http://thermoscientific.com/clipTip)

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# Thermo Scientific ClipTip Technology – Part 2

## Secure Seals for Every Channel

Irmgard Suominen, Senior Application Scientist, Thermo Fisher Scientific, Vantaa, Finland.  
Sami Koivisto, Technology Manager, Liquid Transfer, Thermo Fisher Scientific, Vantaa, Finland.  
Sui Berghäll, Product Manager, Pipetting Systems, Thermo Fisher Scientific, Vantaa, Finland

### Key Words

- **Tip Fitting** – is the lower part of the pipette that positions, connects and seals the tip to the pipette.
- **Interlock Technology** – utilizes a mechanical locking connection of the pipette and tip equipped with a light opening mechanism.
- **Friction based tip fitting system** – the system by which a cone or cylindrical shaped pipette fitting utilizes friction to attach to a compatible cone or cylindrical shape tip fitting.
- **Precision** – refers to the repeatability of pipetting. It is expressed as coefficient of variation (CV%), a relative value obtained from statistical standard deviation and the mean value of dispensed volumes.



### Introduction

The most common type of pipettes in the lab are air displacement pipettes. Its function is based on piston movement in a capillary. An airtight seal between the pipette and the tip is crucial for the pipette's functionality, and any compromise on the sealing affects pipetting performance. Traditionally air displacement pipettes have relied on friction between the pipette and the tip to form a seal. The sealing is depended on many factors including the tip attachment force used and might also be compromised through general use or when touching the vessel wall during pipetting. With the new Thermo Scientific® F1-ClipTip® Pipetting System the attachment of tips is accomplished with an interlock technology between pipette and tip.

### Breakthrough ClipTip Technology

ClipTip interlock technology utilizes flexible clips positioned evenly around the top of the tip. During attachment, the unique tip fitting shape opens the clips allowing it to pass over the fitting flange and return to closed position. The clips lock the tip behind the flange creating a complete seal with the sealing ring (figure 1). In addition, the lock ensures the tip will not loosen compromising the seal, or even potentially falling off during routine pipetting or touch-off.

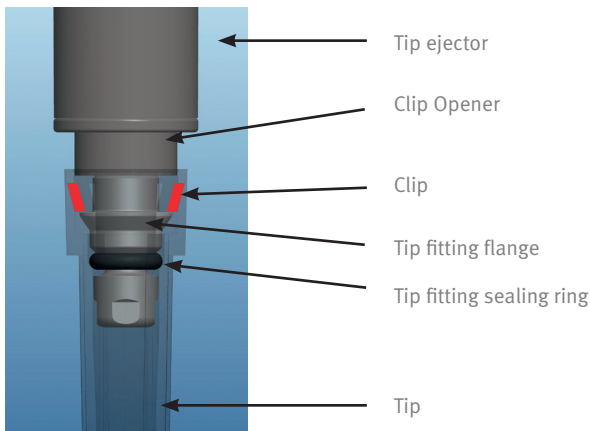


Figure 1: Clips closed behind the flange. The tip is sealed.

**In this technical note we demonstrate the benefits of the revolutionary ClipTip interlocking tip attachment technology by pipetting into 96-well plate as an example.**

### Test set-up

#### Test pipettes and tips:

- Thermo Scientific F1-ClipTip 12-channel pipette (30-300  $\mu$ l) with ClipTip 300.
- 300  $\mu$ l 12-channel pipettes from Manufacturers A and B with manufacturers' tips recommended for the particular pipette as well as generic tips. The pipettes had friction based tip sealing mechanisms.

#### Test method:

- Tip attachment was achieved with constant forces using machine to press the tested pipette downward against the tip rack box with a lever. The lever was equipped with a weight, which directed a constant downward force to the test pipette. This procedure simulated the tip attachment procedure with a known force. The used attachment weight forces were 3.8kg, 4.8kg and 6.3kg (37.3N, 47.1N and 61.8N respectively).

- After tip attachment 100  $\mu$ l of green dye solution was dispensed into 96-well microplates using the reverse pipetting technique. After each dispensing the tips were touched against the wall of the wells to wipe off possible droplets on the outside of the tip. It was recorded if tips fell off. After filling two microplates, 100  $\mu$ l was aspirated and the amount of liquid was measured gravimetrically. Precision values (CV%) were calculated for each attachment force used.

## Results

### 1. Tip attachment

Attachment force 3.8 kg was sufficient to attach tips to all pipettes tested. However, tips from Manufacturer B and generic tips fell off during pipetting when 8 rows of microplate had been dispensed. Figure 2 shows ClipTip tips (a) and Generic pipette tips (b) after filling two 96-well microplates. The ClipTip pipette tips did not fall off, and secured an equal liquid level in all 12 tips. The Generic tips had one tip fall off, and obtained uneven liquid levels in the remaining tips. In order to keep tips attached the force needed to be increased from 3.8 kg to 4.8 kg. The tips of manufacturer A stayed attached, but the variation between dispensed volumes of different channels was higher than with F1-ClipTip (Fig. 3). This variation could not be observed visually.

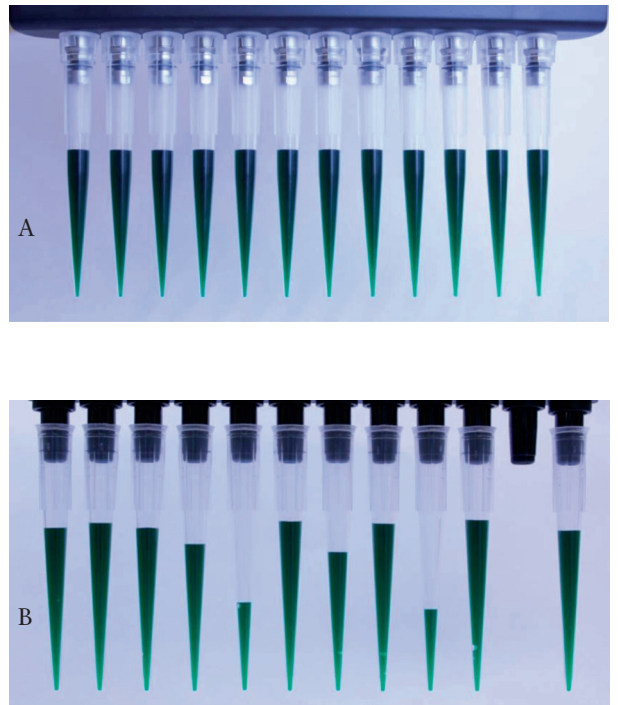


Figure 2. ClipTip tips (a) and Generic tips (b) after dispensing into two 96-well microplates. The tip attachment force used was 3.8 kg.

**Manufacturer A tips stayed attached, but the variation between dispensed volumes of different channels was higher when compared to the results of the F1-ClipTip system (Fig. 3).**

## 2. Precision

Precision value of manufacturer A was 68% higher than with F1-ClipTip system (Figure 4) after dispensing into two 96-well microplates. The figure shows that with F1-ClipTip the variation between channels was lower than with a pipette with a friction based tip fitting mechanism. With friction based mechanisms the precision varied with the tip attachment force used.

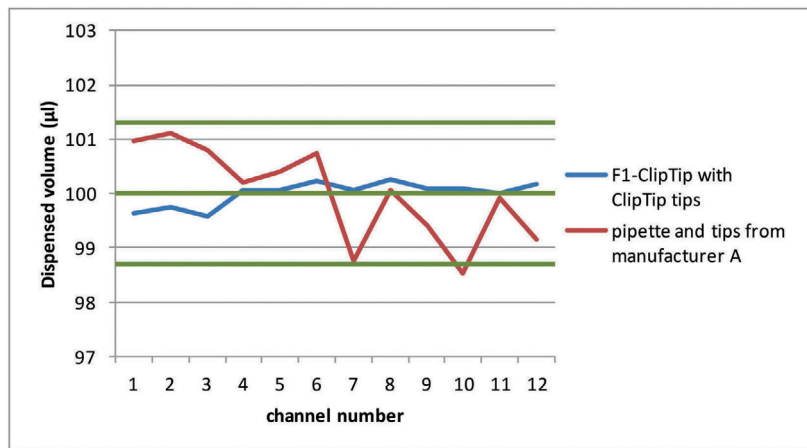


Figure 3. Dispensed volumes of F1-ClipTip 12-channel pipette and Manufacturer A's 12-channel pipette after dispensing into two 96-well microplates. The set volume was 100 µl and the tip attachment force used was 3.8 kg.

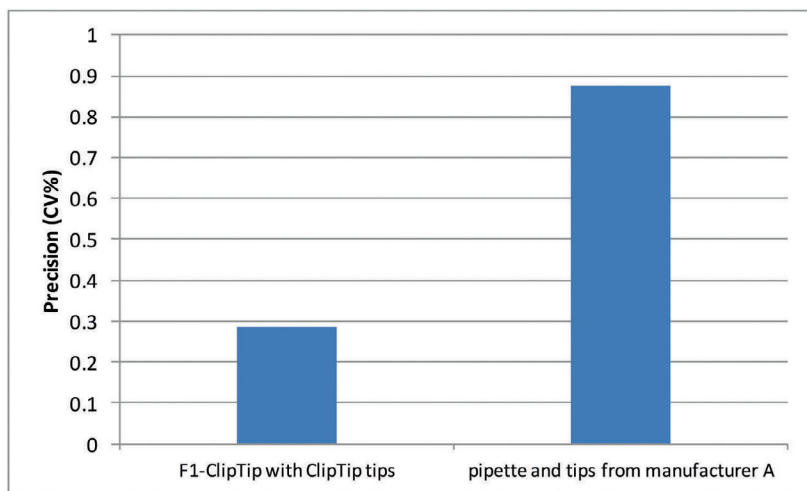


Figure 4. Precision values with 12-channel pipettes after dispensing into two 96-well microplates. The set volume was 100 µl and the tip attachment forces used were as 3.8 kg.

## Summary

An optimal pipette and tip system increases confidence in reproducibility, reduces forces required to attach and eject tips, and secures the best possible accuracy and precision. In microplate applications, demand for optimum pipetting performance, and comfort is even greater due to higher number of repetitions and samples.

Compared to Manufacturer A and B, the F1-ClipTip pipetting system demonstrates excellent precision and minimal variation between dispensed volumes of different channels. Results show that pipetting performance of the F1-ClipTip system is not affected by the tip attachment force used. All tips remained attached and variation between channels was minimal. In addition, tip attachment did not require banging or rocking.

With friction based tip attachment systems the seal between the tip and the tip cone is accomplished by friction between the pipette and tip. In this experiment impaired precision after dispensing and touching tips to the walls of a microplate was observed. This is likely due to loosening of the tips, which affects the seal. The sealing may be tight enough to avoid visible leakage, but not tight enough to give optimal pipetting results. In the worst case the tips fell off in the middle of pipetting. In a real research applications this would mean repeating the experiment. Loss of samples and/or reagent, as well as time wasted, have a large impact on daily research and can especially be seen with microplate applications. Dropped tips may also present a severe contamination risk particularly in clinical applications. With Manufacturer A and B more effort was needed to attach the tips firmly, and prevent tips getting loose or dropping off.

The complete seal between the sealing ring and the ClipTip tips guaranteed optimal pipetting performance as demonstrated by the excellent precision. The unique interlocking tip attachment mechanism ensured that the tips stayed firmly attached through the entire application. These innovative features make F1-ClipTip Pipetting System an excellent choice for microplate applications by saving valuable samples/reagents as well as time and resources while increasing confidence in pipetting results. In addition, the ergonomic benefits of this system reduce the risk of Repetitive Strain Injuries while pipetting.

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