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UL Adapter

Assembly & Operating Instructions

No. M/91-080-H0702

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The UL Adapter is a kit consisting of a spindle, a sample tube, mounting channel, water jacket, coupling nut, extension link and six end caps. It is available in two versions: (1) with type 304 s/s wetted parts as pictured in Figure 1; (2) with 316 s/s wetted parts as pictured in Figure 2. All versions are shipped with the water jacket (ULA-40Y) mounted on the sample tube.

The type 304 s/s* UL Adapter may be used as an "open tube" or "closed tube" system. In the "open tube" method, the water jacket (ULA-40Y) must be removed, allowing measurement in a beaker or other suitable vessel. In the "closed tube" method, the sample is poured into the sample tube. The closed tube may be temperature controlled with the use of the water jacket.

The 316 s/s** UL Adapter is available only in the "closed tube" system. The closed tube system may be temperature controlled with the use of the water jacket or the sample tube may be immersed into a temperature bath.

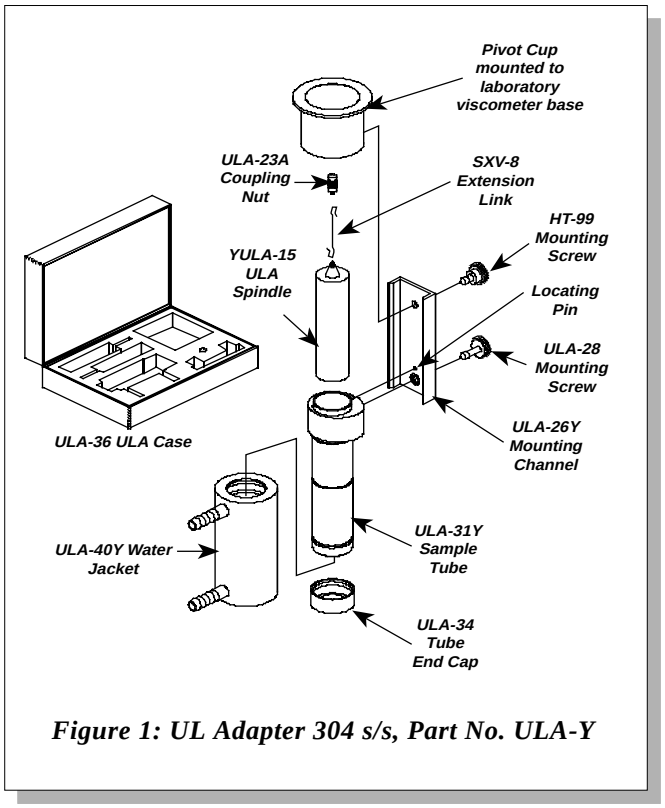

Figure 1: UL Adapter 304 s/s, Part No. ULA-Y

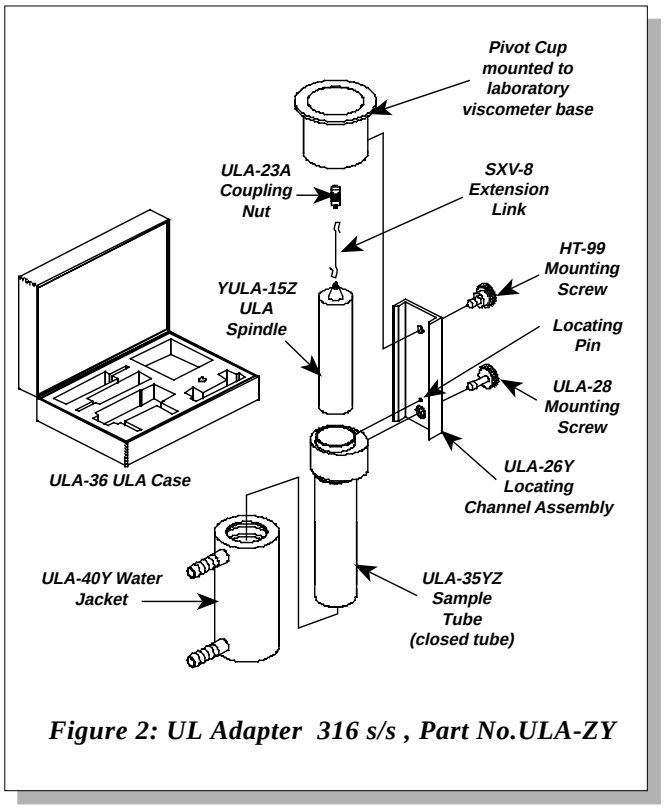

Figure 2: UL Adapter 316 s/s , Part No.ULA-ZY

**304 s/s denotes wetted parts are 304 stainless steel suitable for most general purpose applications.*

***316 s/s denotes wetted parts are 316 stainless steel for use with corrosive acidic applications.*

Assembly & Operation

1. Attach the mounting channel to the viscometer by threading the upper mounting screw into the viscometer pivot cup. Do not overtighten. The end of the mounting channel with the pin must be at the bottom, as shown in Figure 1 and 2**.**

2. Assemble the ULA spindle, SXV-8 extension link, and ULA-23A coupling nut. Thread the coupling nut onto the Viscometer coupling.

   CAUTION: LEFT-HAND THREAD ON VISCOMETER AND COUPLING NUT!

3. ***Open Tube Operation:***

   The water jacket (ULA-40Y) must be removed when the open tube is used. This allows measurement in a beaker or other container. The sample tube must be installed on the locating channel before immersion in sample fluid.

   Observe the immersion grooves located on the outside of the tube below the collar (Figure 3). The top groove is used with YULA-15 (#304 s/s) and YULA-15Z (#316 s/s) spindles. Be sure to immerse the tube to the proper groove in order to obtain the correct spindle immersion depth.

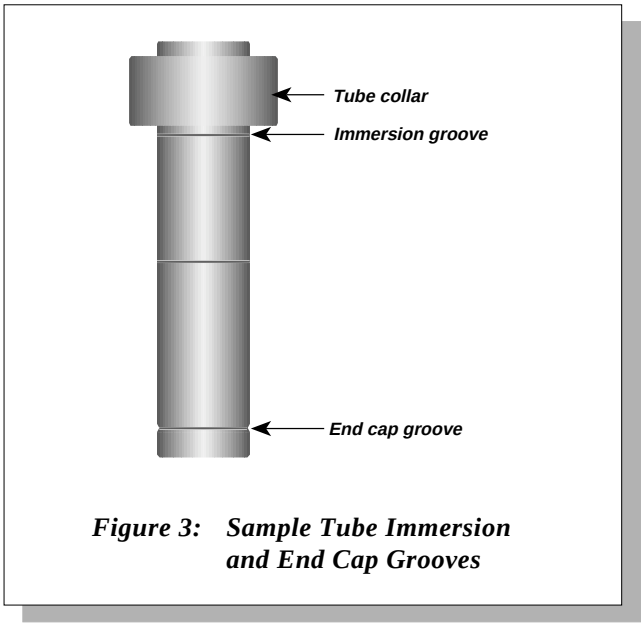

Figure 3: Sample Tube Immersion and End Cap Grooves

4. ***Closed Tube Operation with Water Jacket:***

   The UL Adapter may be used with the ULA-40Y water jacket and a circulating water bath by connecting the water jacket to the bath inlet and outlet ports (Figure 4). The tube end cap (ULA-34) is snapped over the end of the tube before the sample is added. Be sure that it is securely seated in the groove. Fill with 16 mL of sample fluid before installing on locating channel.

   CAUTION: (1) The spindle, tube, and cap (if used) should be clean before use. The cap material is low density polyethylene. Replace when damaged or loose.

   (2)When inserting the sample tube into the ULA-40Y Water Jacket, use *gentle force* to prevent damage to O-rings and collar on inside diameter of ULA-40Y Water Jacket.

5. The closed tube system with 316 s/s wetted parts may also be used without the ULA-40Y water jacket by immersing directly into the water bath.

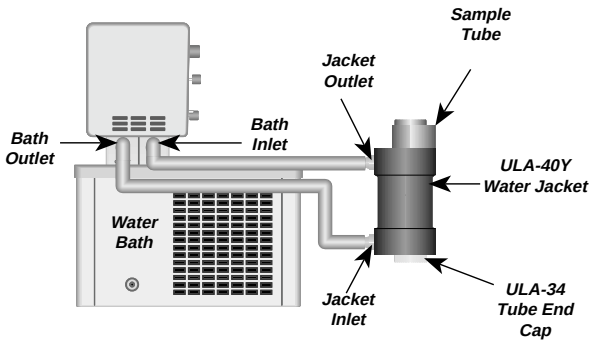

Figure 4: ULA-40Y water jacket connections

6. Add the sample to the chamber. Immerse the spindle into the chamber with the extension link and coupling nut attached, then thread the water jacket to the locating channel assembly. Once that is done, thread the coupling nut to the viscometer. This way the spindle is not hanging from the viscometer and it prevents a mess with the sample. You can hook the extension link to the lip of the chamber to prevent the spindle from dropping too far down.
7. Level the viscometer. General operating procedures for making viscosity measurements are described in the viscometer operating instruction manual.
8. UL Adapter spindle factors are shown on page 4. The factor is used to calculate viscosity when using Dial Reading or Model DV-I Viscometers. Model DV-I+/II/II+ Viscometers and DV-III/DV-III+ Rheometers calculate the viscosity value automatically when the "cP display mode" is selected. **The spindle entry code for the UL Adapter is *00*.**

Notes

- Maximum recommended viscosity for measurement with the UL Adapter is 2000 cP (mPa•s). If viscosity exceeds 2000 cP, the material being measured may be too viscous to immerse the spindle/tube, and damage to internal parts of the viscometer may result.
- For tubing and fluid recommendations, refer to the table below:

Fluid Temperature	Recommended Fluid	Recommended Tubing	Note
-10°C to 15°C	50/50 Ethylene Glycol/Water [1]	Fluran [R, 2]	**Do Not Use Gum Rubber Tubing With This Fluid**
15°C to 65°C	Water	Gum Rubber or Fluran [R]	
65°C to 100°C	Silicone Oil [3]	Fluran [R]	**Do Not Use Gum Rubber Tubing With This Fluid**

[R] Fluran is a Registered Trademark of Norton Co.
1. Use only laboratory grade ethylene glycol. Do not use automobile anti-freeze which contains materials that can damage the equipment.
2. Fluran tubing (5/16" ID) and clamps are offered in a kit, part # ULA-45A.
3. Do not use high viscosity oil. Recommended is 50 centipoise.

UL Adapter Factors

The factor is used to calculate viscosity in units of centipoise (cP) or milli Pascal seconds (mPa•s) when using Dial Reading or Model DV-I Viscometers. The Viscometer dial reading/display value x Factor = cP (mPa•s).

LV Models

Speed (RPM)	Shear Rate (sec^{-1})	Factor
60.0	73.38	0.1
30.0	36.69	0.2
12.0	14.68	0.5
6.0	7.34	1.0
3.0	3.67	2.0
1.5	1.83	4.0
0.6	0.73	10.0
0.3	0.37	20.0

RV-HA-HB Models

Speed (RPM)	Shear Rate (sec^{-1})	Factor		
		RV	HA	HB
100.0	122.30	0.64	1.28	5.12
50.0	61.15	1.28	2.56	10.24
20.0	24.46	3.20	6.40	25.60
10.0	12.23	6.40	12.80	
5.0	6.12	12.80	25.60	
4.0	4.89	16.00		
2.5	3.06	25.60		
2.0	2.45			
1.0	1.22			
0.5	0.61			

Shear Rate = RPM x 1.223

When an older dial reading viscometer is used, the viscometer Pivot Cup may need to be replaced with the current design. If your viscometer has a Type I or Type II pivot cup, the cup should be replaced with a Type III cup. Contact Brookfield or your Brookfield agent for information.

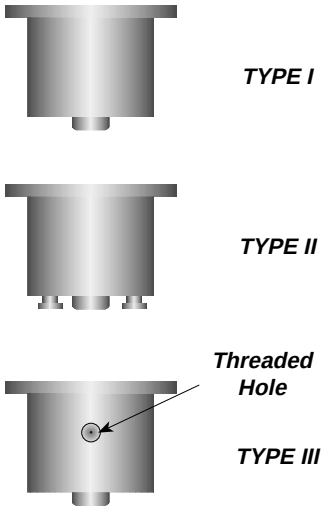

Figure 5: Pivot Cup Compatibility

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