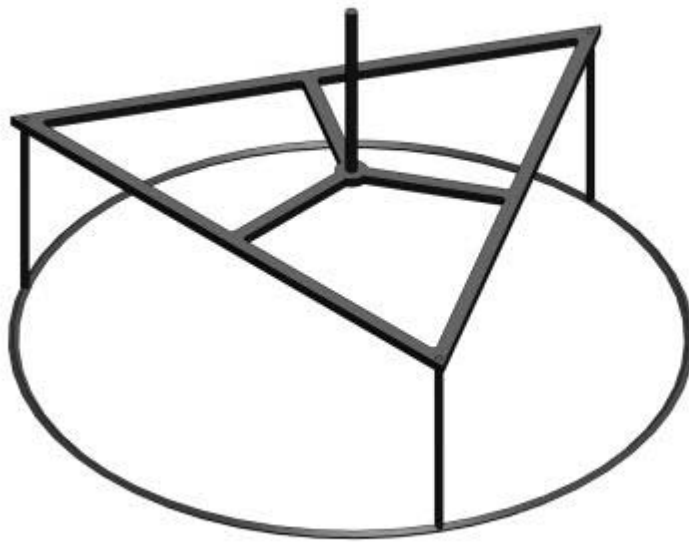


ARES-G2

Interfacial Double Wall Ring Accessory



Getting Started Guide



Notice

The material contained in this manual, and in the online help for the software used to support this instrument, is believed adequate for the intended use of the instrument. If the instrument or procedures are used for purposes other than those specified herein, confirmation of their suitability must be obtained from TA Instruments. Otherwise, TA Instruments does not guarantee any results and assumes no obligation or liability. TA Instruments also reserves the right to revise this document and to make changes without notice.

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Introduction

Important: TA Instruments Manual Supplement

Please click the [TA Manual Supplement](#) link to access the following important information supplemental to this Getting Started Guide:

- TA Instruments Trademarks
- TA Instruments Patents
- Other Trademarks
- TA Instruments End-User License Agreement
- TA Instruments Offices

Notes, Cautions, and Warnings

This manual uses NOTES, CAUTIONS, and WARNINGS to emphasize important and critical instructions. In the body of the manual these may be found in the shaded box on the outside of the page.

NOTE: A NOTE highlights important information about equipment or procedures.

CAUTION: A CAUTION emphasizes a procedure that may damage equipment or cause loss of data if not followed correctly.

UNE MISE EN GARDE met l'accent sur une procédure susceptible d'endommager l'équipement ou de causer la perte des données si elle n'est pas correctement suivie.



A WARNING indicates a procedure that may be hazardous to the operator or to the environment if not followed correctly.

Un AVERTISSEMENT indique une procédure qui peut être dangereuse pour l'opérateur ou l'environnement si elle n'est pas correctement suivie.

Regulatory Compliance

Safety Standards

For Canada

CAN/CSA-C22.2 No. 61010-1 Safety requirements for electrical equipment for measurement, control, and laboratory use, Part 1: General Requirements.

CAN/CSA-C22.2 No. 61010-2-010 Particular requirements for laboratory equipment for the heating of materials.

For European Economic Area

(In accordance with Council Directive 2006/95/EC of 12 December 2006 on the harmonization of the laws of Member States relating to electrical equipment designed for use within certain voltage limits.)

EN 61010-1:2001 Safety requirements for electrical equipment for measurement, control, and laboratory use, Part 1: General Requirements + Amendments.

EN 61010-2-010:2003 Particular requirements for laboratory equipment for the heating of materials + Amendments.

For United States

UL61010-1:2004 Electrical Equipment for Laboratory Use; Part 1: General Requirements.

Electromagnetic Compatibility Standards

For Australia and New Zealand

AS/NZS CISPR11:2004 Limits and methods of measurement of electronic disturbance characteristics of industrial, scientific and medical (ISM) radio frequency equipment.

For Canada

ICES-001 Issue 4 June 2006 Interference-Causing Equipment Standard: Industrial, Scientific, and Medical Radio Frequency Generators.

For the European Economic Area

(In accordance with Council Directive 2004/108/EC of 15 December 2004 on the approximation of the laws of the Member States relating to electromagnetic compatibility.)

EN61326-1:2006 Electrical equipment for measurement, control, and laboratory use-EMC requirements-Part 1: General Requirements. Emissions: Meets Class A requirements per CISPR 11. Immunity: Per Table 1 - Basic immunity test requirements.

For the United States

CFR Title 47 Telecommunication Chapter I Federal Communications Commission, Part 15 Radio frequency devices (FCC regulation pertaining to radio frequency emissions).

Safety



WARNING: If this accessory is used in a manner not intended or specified in this manual, the protection provided by the accessory may be impaired.

AVERTISSEMENT: L'utilisateur de cet accessoire est prévenu qu'en cas d'utilisation contraire aux indications du manuel, la protection offerte par l'équipement peut être altérée.



There are several major areas of concern pertaining to personal safety when using the Partitioned Plate Accessory. Please refer to the sections below.

Required Equipment

While operating this accessory, you must wear eye protection that either meets or exceeds ANSI Z87.1 standards. Additionally, wear protective clothing that has been approved for protection against the materials under test and the test temperatures.

Accessory Symbols

The following label is displayed on the APS for your protection:

Symbol	Explanation
	<p>This symbol indicates that you should read this Getting Started Guide in its entirety. This guide contains important warnings and cautions related to the installation, operation, and safety of the accessory.</p> <p>Ce symbole indique que vous devez lire entièrement ce guide de démarrage. Ce guide contient d'importants avertissements et mises en garde relatifs à l'installation, à l'utilisation et à la sécurité de l'accessoire.</p>
	<p>This symbol indicates that a hot surface may be present. Take care not to touch this area or allow any material that may melt or burn come in contact with this hot surface.</p> <p>Ce symbole indique la présence possible d'une surface chaude. Prenez soin de ne pas toucher cette zone ou de laisser un matériau susceptible de fondre ou de brûler entrer en contact avec cette surface chaude.</p>

Please heed the warning labels and take the necessary precautions when dealing with these areas. The *ARES-G2 Interfacial Double Wall Ring Accessory Getting Started Guide* contains cautions and warnings that must be followed for your own safety.

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Chapter 1:

Introducing the Double Wall Ring (DWR)

Overview

The interfacial shear rheology of thin layers at liquid-liquid or liquid-gas interfaces has been a subject of increased interest for many years. The research has been motivated by the need to understand the effect of particles, surfactants, or proteins at these interfaces in a variety of industries such as food, biomedical, enhanced oil recovery, and so forth. Interfacial shear rheometry measures the mechanical strength or the shear viscosity of an interfacial layer i.e. the adsorbed monomolecular film at a liquid-liquid or liquid-gas interface. Typical interfacial viscosities for insoluble monomolecular films range from 10^{-5} to 10^{-2} Pa.s.m

Several devices to study the interfacial rheological properties and to be used in conjunction with rotational rheometers have been suggested [E. Shotton, K. Wibberley, B. Warburton, S.S. Davis and P.L. Finlay, *Rheologica Acta*, 10, 142-152, 1971]. The most common are the bi-cone and the disc. These devices are robust and relatively easy to use, but they have their limitations. The bi-cone and disc geometries can be used for viscous and elastic interfaces, but the sensitivity is limited because of the large area in contact with the bulk fluid relative with the perimeter in contact with the interface. But until recently, rheometers designed to measure the bulk properties of materials lacked the sensitivity to perform meaningful interfacial measurements. The new oscillating Double Wall Ring (DWR) system, for which the upper geometry is a platinum / iridium ring and the lower a trough with a circular channel, is best suited since the contact area of the ring with the bulk phase is minimized.

Description of the Double Wall Ring

The Interfacial Double Wall Ring measuring system measures the viscous and linear viscoelastic properties of the interface between liquid-liquid and liquid-air. It consists of a thin, square-edged ring and a Delrin[®] trough with a circular channel. The ring and support legs are constructed from a platinum/ iridium (Pt/Ir) alloy, for chemical inertness, ease of cleaning, and wettability. The ring support is made of stainless steel. It is important that the ring and trough are perfectly aligned (concentricity), and the trough positioned on the Peltier Plate accurately leveled.

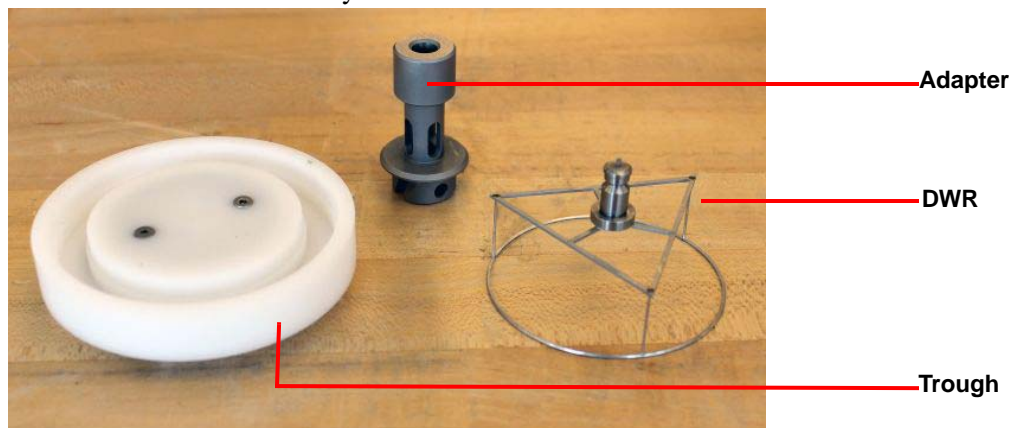


Figure 1 The DWR kit.

NOTE: Sub-phase contributions, i.e. drag forces applied through the contact surface of the ring with the bulk fluids (lower and top), are small due to the small contact area of the ring and typically can be neglected (unless interfacial viscosities below 1×10^{-5} Pa.s.m are measured).

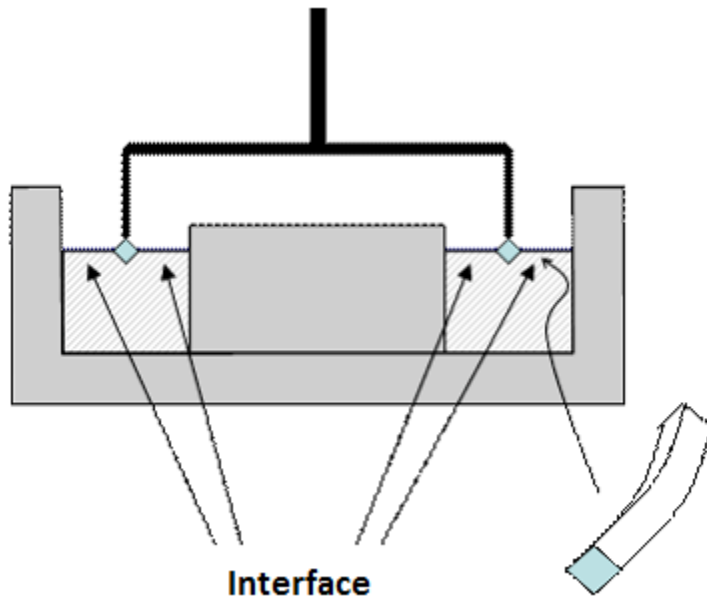


Figure 2 Cross-section view of the trough and the ring.

The square cross-section of the ring improves the ability to pin the interface. At the height of the sub-phase fluid level, a step at the inner and outer channel walls reduces the meniscus area of the fluid. On the ARES-G2, the trough is mounted onto the APS (Advanced Peltier System) and the DWR is attached to the torque and normal force transducer.

Chapter 2:

Installing the Interfacial Accessory

This chapter briefly describes the setup of the Interfacial Double Wall Ring on the ARES-G2.

Unpacking and Assembling the Double Wall Ring

The DWR is extremely delicate and easily damaged. Special care should be taken when removing it from, and returning it to, its packaging.

- 1 Open the cardboard package on a flat surface.



Figure 3 DWR accessory in packaging box.

- 2 Gently remove the DWR from the box while holding it by the coupling piece.



Figure 4 Remove the DWR.

- 3 Remove the geometry holder from the box, loosen the clamping screw and insert the DWR with the coupling piece into the holder.



Figure 5 Insert the ring carefully into the adapter.

- 4 When fully inserted, tighten the clamping screw.

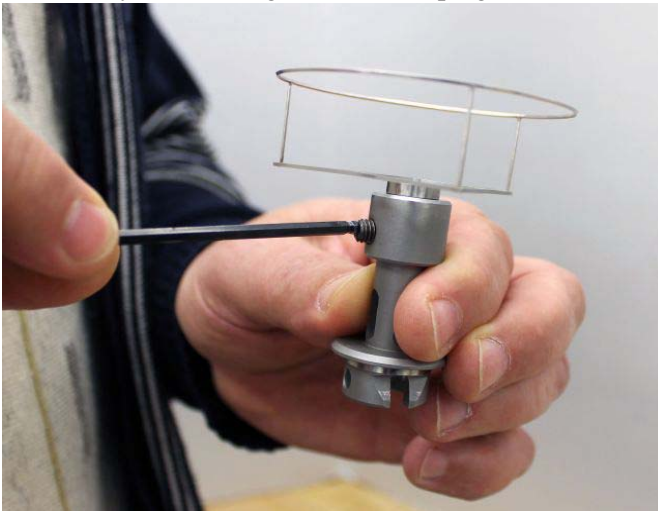


Figure 6 Tighten the hex screw to secure the ring in the adapter.

NOTE: Always park the DWR geometry with the adapter providing support from below; never rest the geometry on the ring in order to minimize the risk of damage.

Installing the DWR Accessory

Follow the instructions in this section to set up the DWR accessory on the ARES-G2.

CAUTION: Handle the DWR with care: it is delicate and can easily be deformed or broken.

MISE EN GARDE: Manipulez prudemment le DWR, il est délicat et peut facilement se déformer ou briser.

Installing the trough

The interfacial accessory for the ARES-G2 has been designed to be used in conjunction with the Advanced Peltier System (APS). Proceed as follows:

- 1 Install the Advanced Peltier System (APS) with the parallel plate configured for Bayonet Mounting Geometries. Refer to the *ARES-G2 Advanced Peltier System Getting Started Guide* for more information. Check the instrument level at the plate surface. Ensure that the top and side surfaces are clean before proceeding.
- 2 Clean the Delrin[®] trough as described in [“Cleaning the Trough”](#).
- 3 To install the trough, simply position it over the plate geometry with the bayonet mounting ring over the plate geometry. Use the needle-nose pliers to lock the bayonet mounting ring into place.



Figure 7 Installing the trough.

Installing the DWR

NOTE: The upper holder with the double wall ring attached is not designed to be used with an upper PRT

- 1 Hold the upper DWR geometry with the adapter shaft. Make sure there is no dirt, dust, or any debris at the adapter location surfaces.
- 2 While holding the geometry in place, hand-tighten the knob. Do not over-torque it. The retainers will move inward to hold the geometry in place.



Figure 8 Tighten the knob.

Zeroing the Gap

Refer to “The Interfacial DWR Accessory” in Online Help.

Chapter 3:

Operating and Maintaining the Accessory

Cleaning the Accessory

Cleaning the Ring

- 1 Remove the ring from the rheometer.
- 2 Rinse or soak the ring in an appropriate solvent.
- 3 Use a micro-jet gas burner to burn off any additional residue. Position the flame on a small section of the ring. Rotate the ring slowly. Make sure that the entire ring is treated in this way. Do not flame the support of the ring, as it is stainless steel. Do not heat above 800°C to avoid distortion of the ring.



WARNING: Do not attempt to flame the ring while it is mounted on the rheometer. This could cause serious damage and may be dangerous. Take care when flaming the ring. It can be held by the holder, but do not grasp it directly. Ensure that no flammable materials are nearby. Do not touch the ring or place it in contact with flammable materials until it has cooled down.

AVERTISSEMENT: N'essayez pas d'enflammer l'anneau lorsqu'il est monté sur le rhéomètre. Cela pourrait entraîner de graves dégâts et s'avérer dangereux. Soyez prudent au moment de l'inflammation de l'anneau. Vous pouvez le tenir par le support, mais ne le saisissez pas directement. Assurez-vous qu'il n'y a aucun matériau inflammable tout près. Ne touchez pas l'anneau et ne le mettez pas en contact avec des matériaux inflammables tant qu'il n'a pas refroidi.

Cleaning the Trough

Clean the trough using an appropriate cleaning agent. Then rinse it thoroughly with distilled water if using water as the subphase.

Replacement Parts

Table 1: ARES-G2 Double Wall Ring Replacement Parts

Part Number	Description
402825.901	Pt/Ir Geometry DWR Interfacial

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