



# AIR CHILLER SYSTEM & CHILLER PANEL



## Accessory for ARES-G2 and RSA-G2 Getting Started Guide

Revision N Issued December 2022

## Notice

The material contained in this manual, and in the 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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159 Lukens Drive  
New Castle, DE 19720

# 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.

**MISE EN GARDE:** 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 the United States and Canada**

CAN/CSA-C22.2 No. 61010-1-12 (R2017) Third Edition + U1;U2 Safety requirements for electrical equipment for measurement, control, and laboratory use - Part 1: General requirements.

### **For the European Economic Area**

61010-1:2012, Third Edition + R:15Jul2015 Safety requirements for electrical equipment for measurement, control, and laboratory use - Part 1: General requirements.

### **For the United Kingdom**

Electrical Equipment (Safety) Regulations 2016

EN 61326-1:2013 Electrical Equipment for measurement, control, and laboratory use - EMC requirements - Part 1: General Requirements Class A.

### **Other**

IEC 61010-1: 2010, Third Edition Safety requirements for electrical equipment for measurement, control, and laboratory use - Part 1: General requirements; Corrigendum 1 2011, Corrigendum 2 2013; Issued: 2011/05/11

EN 61010-1: 2010 Safety requirements for electrical equipment for measurement, control, and laboratory use - Part 1: General requirements; Issued: 2010/10/01

UL 61010-1 Issued: 2012/05/11 Ed: 3 Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use - Part 1: General Requirements

## *Electromagnetic Compatibility Standards*

### **For the United Kingdom**

Electromagnetic Compatibility Regulations 2016

EN 61326-1:2013 Electrical Equipment for measurement, control, and laboratory use - EMC requirements - Part 1: General Requirements Class A.

### **Emissions**

EN-61326-1-2013: Electrical equipment for measurement, control, and laboratory use. EMC Requirements.

### **Immunity**

EN-61326-1-2013: Electrical equipment for measurement, control, and laboratory use. EMC Requirements.

## Supplier's Declaration of Conformity

47 CFR § 2.1077 Compliance Information

### Unique Identifier:

ACS-2 Air Chiller System (220–230 VAC/60 Hz): **405001.901**

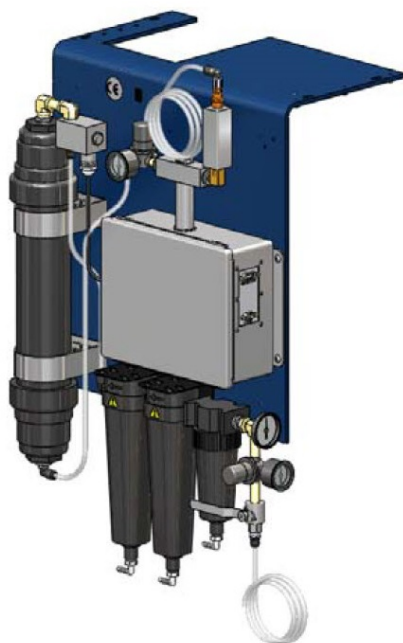
ACS-2 Air Chiller System (220–230 VAC/50 Hz): **405001.902**

ACS-3 Air Chiller System (220–230 VAC/60 Hz): **405000.901**

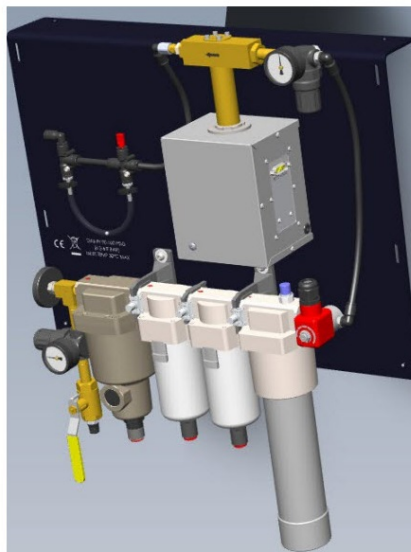
ACS-3 Air Chiller System (220–230 VAC/50 Hz): **405000.902**

ARES-G2, RSA-G2, & DMA FCO Air Chiller Panel for use with ACS-2 and ACS-3 Air Chiller Systems:  
**404041.901**

**PARKER MODEL**



**SMC MODEL**



**Figure 1** Left: Parker model (discontinued). Right: SMC model (current).

**NOTE:** SMC model introduced May 2020. Parker model discontinued May 2020.

### Responsible Party:

TA Instruments  
159 Lukens Drive  
New Castle, DE 19720  
302-427-4000  
[www.tainstruments.com](http://www.tainstruments.com)

### FCC Compliance Statement:

This device complies with Part 15 of the FCC rules. Operation is subject to the following two conditions:  
(1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

## Safety

**WARNING:** The operator of this instrument is advised that if the equipment is used in a manner not specified in this manual, the protection provided by the equipment may be impaired.

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

**WARNING:** Use gloves when touching parts that have become frosted during use. **MAY CAUSE FROSTBITE.**


**AVERTISSEMENT:** Utiliser des gants pour toucher les parties qui sont devenus givrés pendant l'utilisation. Peut causer des gelures.

**WARNING:** Do not turn on the ACS unless the transfer hose has been connected to the ARES-G2/RSA-G2 Rheometer temperature control system.

**AVERTISSEMENT:** N'allumez pas l'ACS à moins que le tuyau de transfert n'ait été raccordé au système de contrôle de la température du rhéomètre ARES-G2 / RSA-G2.

## Instrument Symbols

The following labels are displayed on the ACS for your protection:

Symbol	Explanation
	<p>This symbol indicates that you should read this Getting Started Guide for important safety information. This guide contains important warnings and cautions related to the installation, operation, and safety of the ACS.</p> <p>Ce symbole indique que vous devez lire entièrement ce guide de démarrage pour obtenir d'importantes informations relatives à sécurité. Ce guide contient d'importants avertissements et mises en garde relatifs à l'installation, à l'utilisation et à la sécurité du système ACS.</p>

Please heed the warning labels and take the necessary precautions when dealing with those parts of the instrument. The *Air Chiller System (ACS) and Chiller Panel Getting Started Guide for ARES-G2/RSA-G2* contains cautions and warnings that must be followed for your own safety.

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# Chapter 1:

## Introducing the Air Chiller System

### Overview

#### Air Chiller

The ACS is a unique multi-stage Air Chiller System for sub-ambient temperature control and general cooling of the ARES-G2/ RSA-G2 with Forced Convection Oven. The ACS units feature CFC-free durable compressors, small footprint, and uninterrupted operation for specified temperature ranges—eliminating the recurring cost and safety concerns associated with handling and use of liquid nitrogen. The Air Chiller Systems requires an air supply at pressure of 6.9 bar (100 psi), flow rate of 200 SLPM (Standard Liters Per Minute), and pressure dew point of at least -40°C (-40°F) or better, and appropriate instrument-specific Chiller Panel. Note that the dew point is to be measured at 6.9 bar.

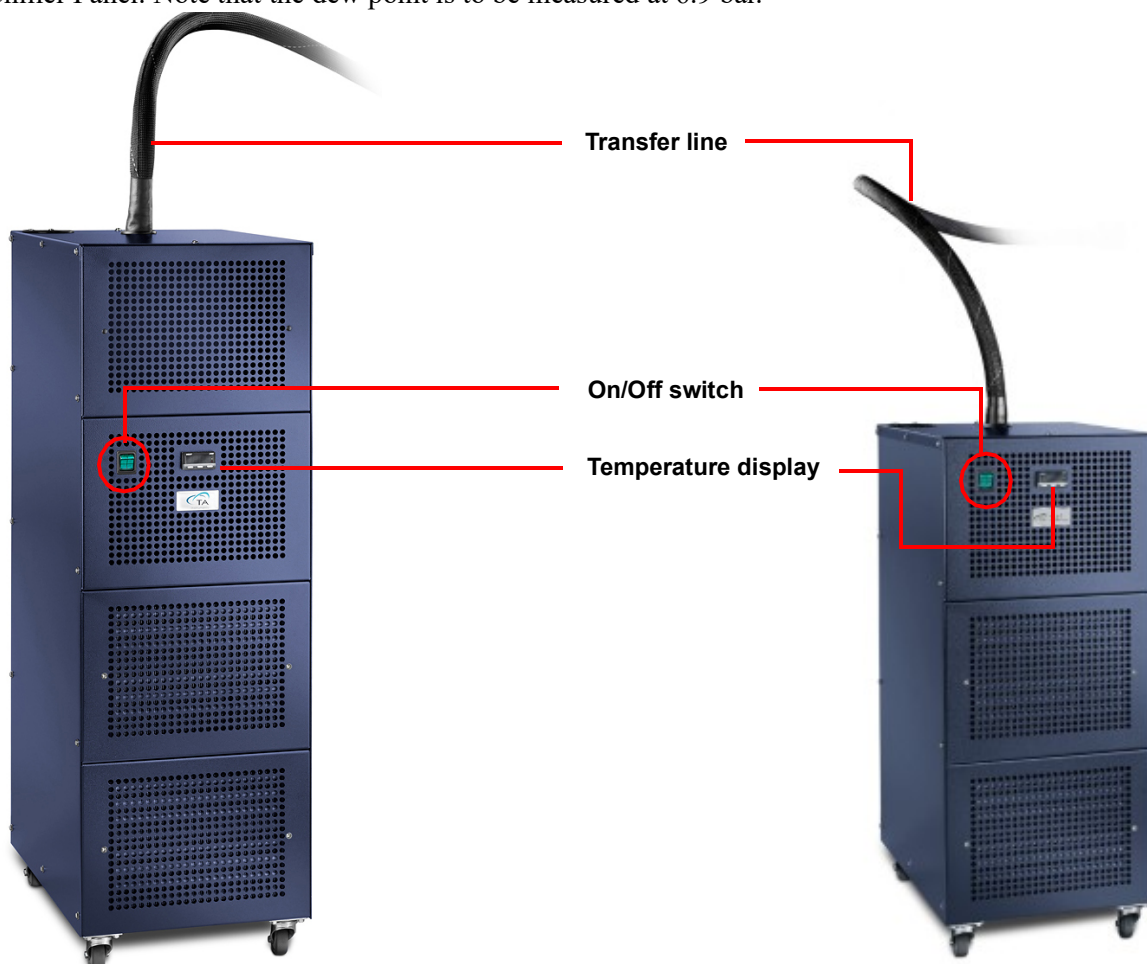


Figure 2 Left: ACS-3. Right: ACS-2

## Internal Timer

The ACS contains an internal timer that keeps the purge gas solenoid valve closed until the system is fully ready. When the ACS is powered on, each Chiller stage energizes in sequence. The timer circuit begins counting after the final stage powers on. Once the final stage powers on, the timer counts approximately 30 minutes before it allows the ACS purge gas solenoid valve to open. Therefore, it will take approximately 60 minutes from when the ACS is powered on until it is ready to operate, and for cold gas to flow.

If the unit is used on a recurring daily basis, the ACS can be plugged into a power outlet that has a timer set to turn the instrument on one hour before the system is to be used.

## Transfer Line

The ACS has a vacuum-insulated delivery line that carries the refrigerant to the evaporator and back. This flexible delivery line is made of corrugated stainless steel tubing.

**CAUTION: Although this line is strong, it can be damaged to the point of rupture if it is repeatedly bent too sharply or twisted forcibly. This line must remain gas-tight in order to contain the refrigerant charge in the unit. The delivery line is brittle when cold. It should not be moved, bent, or disconnected when cold.**

**MISE EN GARDE: Bien que cette ligne est fort, il peut être endommagé au point de rupture si elle est plié trop fortement ou tordu. Cette ligne doit rester étanche aux gaz afin de contenir la charge de fluide frigorigène dans l'unité. La ligne de livraison est fragile à froid. Il ne devrait pas être déplacé, plié, ou déconnecté à froid.**



**Figure 3** Transfer line.

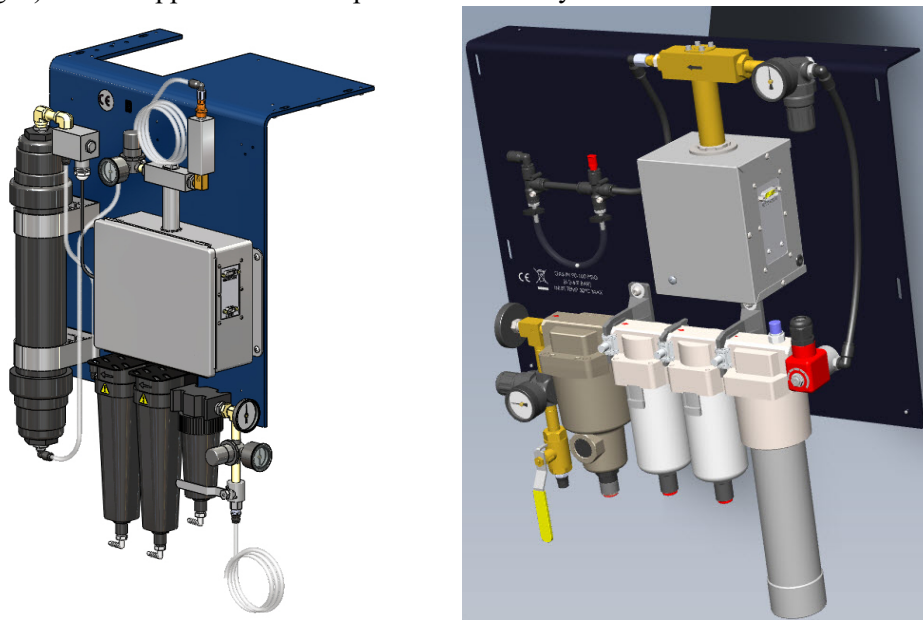
## Continuous Operation

The length of time the ACS can be left running will depend on the dew point of the gas supply. The minimum temperature of the internal evaporators is maintained at  $-130^{\circ}\text{C}$  on the ACS-3 and  $-90^{\circ}\text{C}$  for the ACS-2. As a result, any supply with a dew point higher than this will eventually result in frost build up, reduced gas flow, and reduced performance. If the ACS is operated for extended periods under such conditions, frost accumulation may also lead to completely occluded gas transfer lines, stopping air flow and cooling. Compressors may also shut down with increased frosting, which will lead to significantly reduced cooling capacity and temperature control. If the supply has a pressure dew point lower than  $-130^{\circ}\text{C}$  (ACS-3) or  $-90^{\circ}\text{C}$  (ACS-2), the ACS can be operated indefinitely without interruption. When used in accordance to this guide and under normal operating conditions, the ACS should stay frost-free and be adequate for most applications during one day of testing.

It is recommended that the unit be shut down for drying on a daily schedule. Some users may find that longer times are permissible between drying intervals. To keep the ACS frost-free, you should leave the gas flowing through the unit after it has been powered off. See [Shutting Down the ACS](#) for more information. Extended operation without load is detrimental to the system. For this reason, it is also advised that the ACS be shut down overnight, or during other extended periods in which it will not be used actively.

## Chiller Panel

The Chiller Panel is mounted to either side of the ACS. Each instrument temperature control system requires its own specific Chiller Panel to interface to the ACS. The Chiller Panel assembly contains all of the pneumatic and electronic components needed to filter, regulate, and control the compressed gas (air or nitrogen) that is supplied to the temperature control systems.



**Figure 4** ARES-G2/RSA-G2 FCO Chiller Panel.

**Left:** Parker model (discontinued). **Right:** SMC model.

## Accessory Specifications

The tables below detail the ACS Accessory technical specifications.

**Table 1: ACS Accessory Characteristics**

Specifications	ACS-2	ACS-3
<b>Dimensions of Air Chiller (H x W x D):</b> Without Chiller Panel With Chiller Panel	88.5 cm (35 in) x 37 cm (14.5 in) x 56 cm (22 in) 88.5 cm (35 in) x 52 cm (20.5 in) x 56 cm (22 in)	112 cm (44 in) x 37 cm (14.5 in) x 56 cm (22 in) 112 cm (44 in) x 52 cm (20.5 in) x 56 cm (22 in)
<b>Weight of Air Chiller</b> Without Chiller Panel With Chiller Panel	96 kg (211 lbs) 112 kg (247 lbs)	121 kg (267 lbs) 137 kg (302 lbs)
<b>Dimensions of Chiller Panel</b>	<b>Parker Model (Discontinued)</b> Height: 86.4 cm (34 in) Width: 48.3 cm (19 in) Depth: 38.1 cm (15 in)	<b>SMC Model</b> Height: 68.6 cm (27 in) Width: 54.6 cm (21.5 in) Depth: 20.3 cm (8.0 in)
<b>Weight of Chiller Panel</b>	<b>Parker Model (Discontinued)</b> 15.8 kg (35 lbs)	<b>SMC Model</b> 8.2 kg (18 lbs)
<b>Refrigerants</b>	1st Stage: R404A 2nd Stage: as indicated* R290 & R508B OR R290 & R170  Each in varying amounts and substantially less than 500g each.	1st Stage: R404A 2nd Stage: as indicated* R290 & R508B OR R290 & R170 3rd Stage: R290 & R14  Each in varying amounts and substantially less than 500g each.

\*Specific refrigerant components are indicated on the serial number tag attached to each instrument.

**Table 2: Accessory Cooling Gas Requirements for ACS-2 and ACS-3**

<b>Gas</b>	Air or nitrogen
<b>Pressure</b>	6.9 bar (100 psi)
<b>Flow Rate</b>	200 SLPM
<b>Temperature</b>	20–30°C
<b>Dew Point</b>	-40°C (-40°F) pressure dew point. NOTE: Dew point is specified at operating pressure. Supplying dryer air at a lower dew point will extend continuous operation.

**Table 3: Accessory Operating Environmental Conditions for ACS-2 and ACS-3**

<b>Ambient air</b>	<p>21°C–24°C = Ideal</p> <p>NOTE: The ACS generates a significant quantity of heat when running. These operating temperatures must be maintained during system operation.</p> <p>Heat Generation:  ACS-2 50 Hz: 1450 W  ACS-2 60 Hz: 1450 W  ACS-3 50 Hz: 1750 W  ACS-3 60 Hz: 1600 W  *Refer to the serial number plate on the rear of the unit.</p>
<b>Operating altitude</b>	2000 meters maximum
<b>Relative humidity</b>	5% to 80% RH from 15°C to 30°C
<b>IP Rating</b>	The degree of protection for this instrument according to EN 60529 is IP20.

**Table 4: Accessory Power Requirements for ACS-2 and ACS-3**

<b>Electrical</b>	<b>Part Number</b>	<b>Voltage Frequency</b>	<b>Current</b>
*Refer to the serial number plate on the rear of the unit	405000.901	240V	60 Hz 9A
	405000.902	220-230V	50 Hz 11A
	405001.901	240V	60 Hz 8A
	405001.902	220-230V	50 Hz 9.1A

**Table 5: Accessory Performance Specifications**

<b>Specification</b>	<b>ACS-2</b>	<b>ACS-3</b>
<b>Lowest temperature<sup>1</sup></b>	-55°C <sup>1</sup>	-100°C <sup>1</sup>
<b>Cooling rate:</b>	see below <sup>2</sup>	see below <sup>2</sup>

1.Lowest temperatures specified are achievable under ideal operating conditions. Actual temperature limits will vary with ambient and compressed air temperatures and testing conditions.

2. Ramp Rate: The maximum sustainable ramp rate will depend on a number of factors particularly the start and end temperature. To determine the maximum sustainable heating/cooling rate, perform the following test and analysis:

- a. Equilibrate to start temperature. Perform a time sweep or peak hold test with the temperature set (if possible) to a few degrees in excess of the end temperature. Set the time much longer than you expect; the test can be aborted when the temperature has reached a stable value.
- b. Plot a graph of temperature vs. time (min) and take the derivative. Inspect the derivative curve over your temperature range of interest. The maximum sustainable rate will be the lowest value on the derivative curve.

# Chapter 2:

## Installing the Air Chiller System

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### *Unpacking/Repacking the ACS*

Unpacking and installation of the Air Chiller System is typically performed by a TA Instruments Service Representative. Retain all of the shipping hardware and boxes from the accessory in the event you wish to repack and ship your accessory. Refer to the TA Instruments document *Unpacking the Air Chiller System* for further instructions.

### *Preparing the Accessory*

Before shipment, the ACS is inspected so that it is ready for operation upon proper installation. Installation involves the following procedures:

- [Inspecting the System](#) for shipping damage and missing parts
- [Choosing a Location](#)
- [Adjusting the Anti-Tilt Bar Feet](#)

**CAUTION:** To avoid mistakes, read this entire chapter before you begin installation.

**MISE EN GARDE:** Pour éviter de commettre des erreurs, lisez tout le chapitre avant de commencer l'installation.

## Inspecting the System

When you receive the ACS Accessory, look over the accessory and shipping container carefully for signs of shipping damage, and check the parts received against the enclosed shipping list.

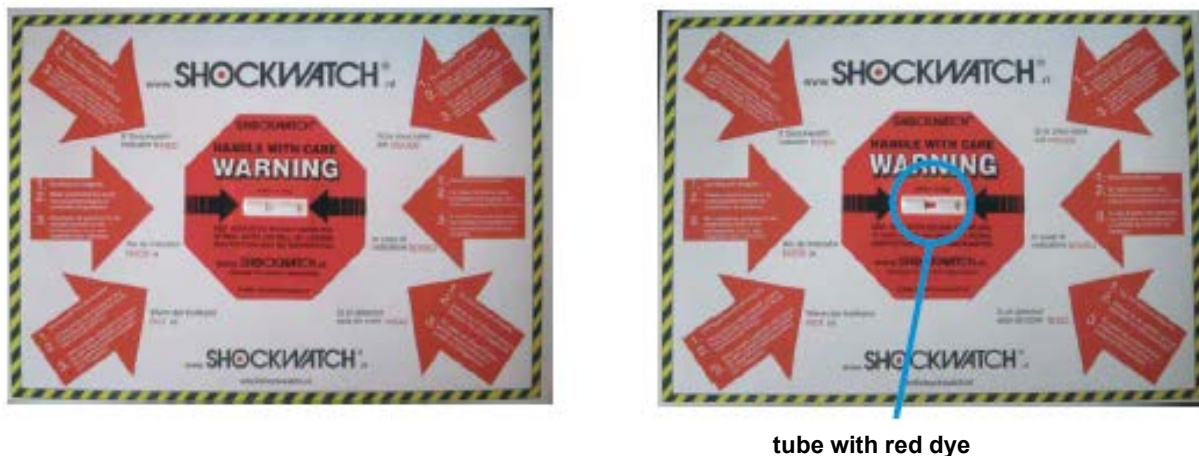
- If the accessory is damaged, notify the carrier and TA Instruments immediately.
- If the accessory is intact but parts are missing, contact TA Instruments.

Take note of the tilt sensor that is affixed to two sides of the packing container. The tilt sensor turns red if the container tips onto its side or is upended. The tilt sensor will not activate under normal handling conditions or aircraft take-offs. Shipments that arrive with the indicator ball bearing in a different position from the companion label should inspect the product for possible damage and contact TA Instruments.



**Figure 5** TiltWatch tilt sensor: Red not visible indicates normal handling (left); Red visible indicates potential mishandling (right).

Inspect the ShockWatch device. ShockWatch devices contain a tube filled with red liquid held in suspension. When the device is subjected to an impact exceeding a specified G-level, the shock disrupts the surface tension of the liquid, releasing the highly visible red dye into the length of the tube — creating a permanent and immediate indication of mishandling. Normal movement or roadshock won't affect the device. Once activated, the device cannot be reset. Shipments that arrive with the tube filled with red liquid should be inspected for possible damage to the product and TA Instruments should be contacted.



**Figure 6** Shockwatch impact sensor: Red dye not visible indicates normal movement (left); Red dye visible indicates potential mishandling (right).

## Choosing a Location

Choose a location for the accessory using the following guidelines. The ACS Accessory should be:

### *In*

- A temperature-controlled area. Temperatures should be in the range specified in [Table 3](#)
- A clean environment
- An area with ample working and ventilation space. 20 cm (8 in) clearance is required at the front and back of the ACS unit to provide adequate ventilation.

### *On*

- A level floor surface capable of safely supporting the weight of the system

### *Near*

- Your ARES-G2 or RSA-G2

### *Away from*

- Dusty environments
- Exposure to direct sunlight
- Poorly ventilated areas

## Adjusting the Anti-Tilt Bar Feet

Adjust the anti-tilt bar feet until they touch the floor. Slide the 17 mm nut on the bottom of each foot to the top of the foot, and then tighten the nut using a 17 mm wrench or an adjustable wrench.



**Figure 7** Adjust the feet on the anti-tilt bar.



**Figure 8** Anti-tilt bar installed.

## *Installing the Chiller Panel – SMC Model*

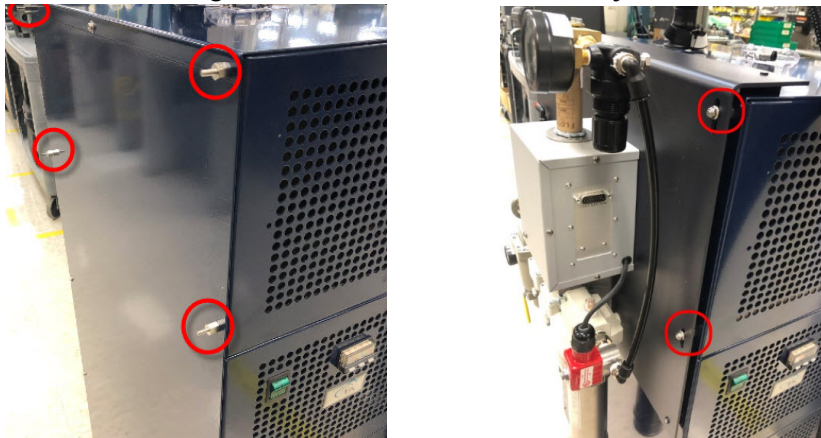
**NOTE:** For your convenience, the chiller panel can be installed on either side of the Air Chiller.

- 1 Unscrew and remove the four (4) Air Chiller side panel screws.



**Figure 9** ACS side panel screws.

- 2 Replace the screws with the four (4) provided standoffs and tighten the standoffs using a 10 mm wrench, nut driver, or adjustable wrench.
- 3 Align the slots on the panel with the standoffs and secure the panel with four (4) locknuts. Tighten the locknuts using a 7 mm wrench, nut driver, or adjustable wrench.

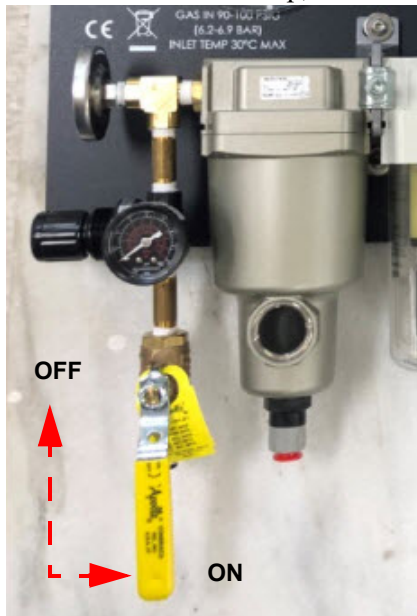


**Figure 10** Left: Standoffs. Right: Panel secured to ACS.

**WARNING:** The Chiller Panel may be too heavy for one person to install safely.

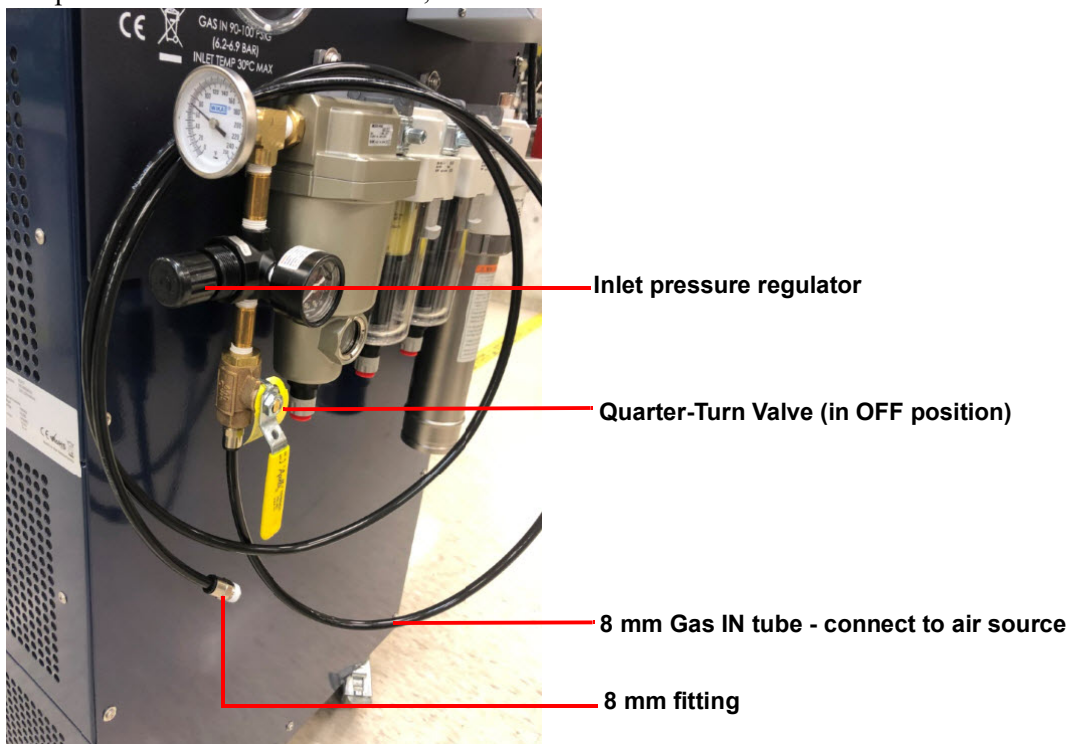
**AVERTISSEMENT:** Le panneau de refroidissement peut être trop lourd pour une personne à installer en toute sécurité.

**NOTE:** For the next step, ensure the quarter-turn valve is in the **OFF** position before proceeding.



**Figure 11** Quarter-turn valve in the **OFF** position.

- 4 Connect the 8 mm Gas **IN** tube from the Chiller Panel to the air source. An additional 8 mm fitting is provided with the Chiller Panel, if needed.



**Figure 12**

## *Installing the Chiller Panel – Parker Model (Discontinued)*

- 1 Unscrew and remove the two (2) standoffs located on top of the Air Chiller.

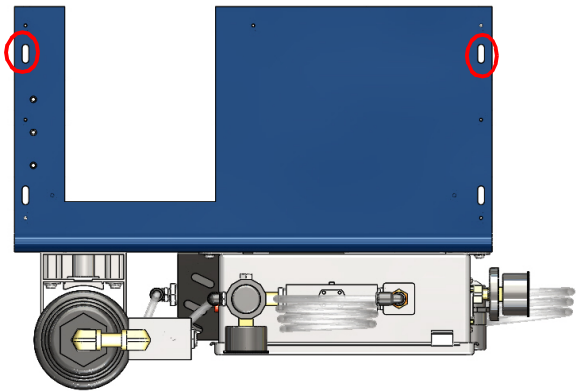


**Figure 13** Standoff.

- 2 Place the Chiller Panel on top of the Chiller, aligning the slots on the panel with the standoff holes.

**WARNING: The Chiller Panel is too heavy for one person to install safely.**

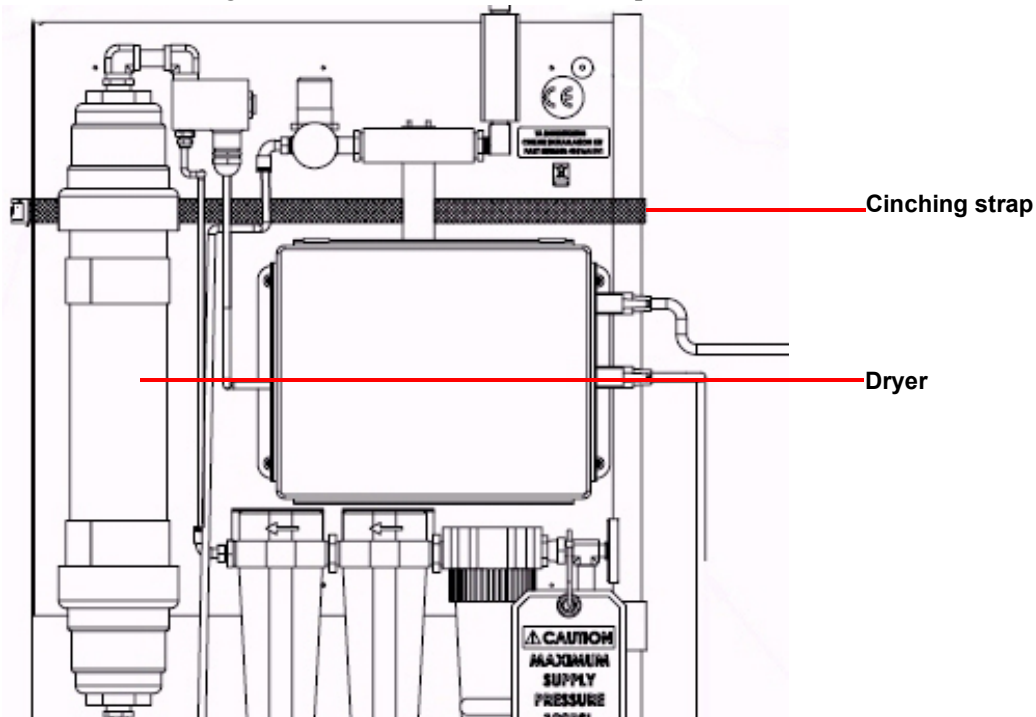
**AVERTISSEMENT: Le panneau de refroidissement est trop lourd pour une personne à installer en toute sécurité.**



**Figure 14** Attach the Chiller Panel to the top of the ACS using the two standoffs.

- 3 Replace the standoffs so that the Chiller Panel is secured to the Air Chiller.

- 4 Fit the cinching wrap around the Chiller. Thread the strap under the dryer and pressure line tubing as shown in the figure below. Make sure that the strap is not twisted and that it lies flat against the panel.



**Figure 15** Cinching strap.

- 5 Insert the loose end of the strap into the opening on the underside of the buckle by holding the clamp open and feeding the strap through. See the figure below. Pull the cinching strap taut to secure the Chiller Panel.



Insert the loose end of the strap here, through the bottom of the device, and pull the strap tight to secure.

**Figure 16** Cinching strap buckle.

- 6 Connect the 8 mm Gas **IN** tube from the Chiller Panel to the air source. An additional 8 mm fitting is provided with the Chiller Panel, if needed. Ensure that the Quarter-Turn Valve is in the **OFF** position.

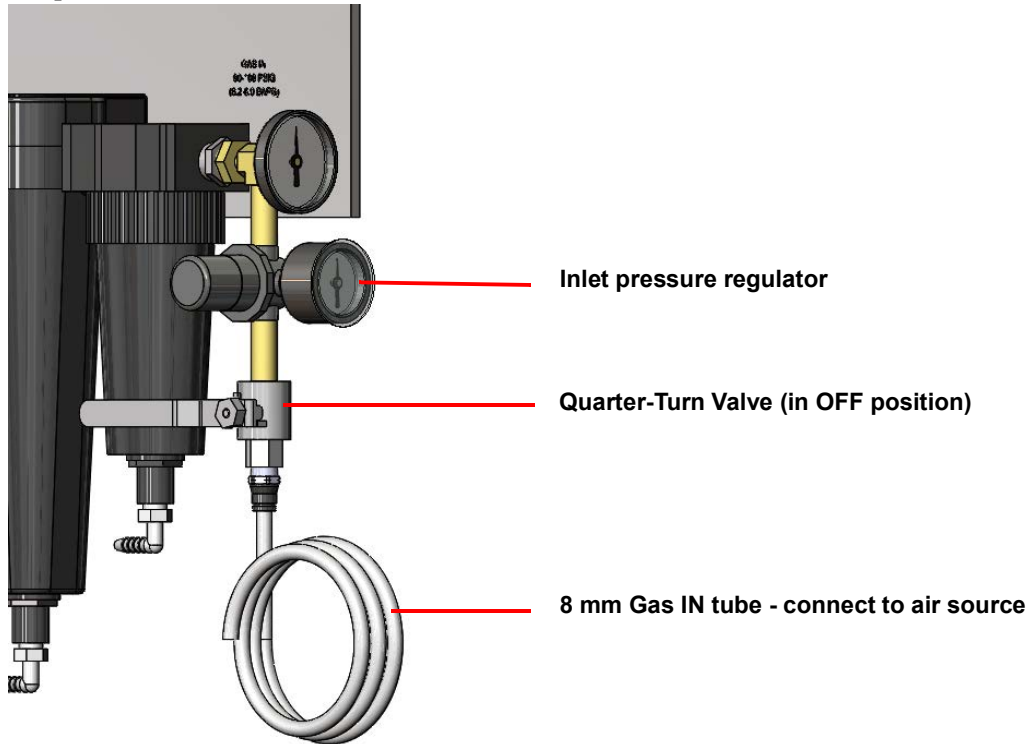


Figure 17

## Connecting the Air Chiller System

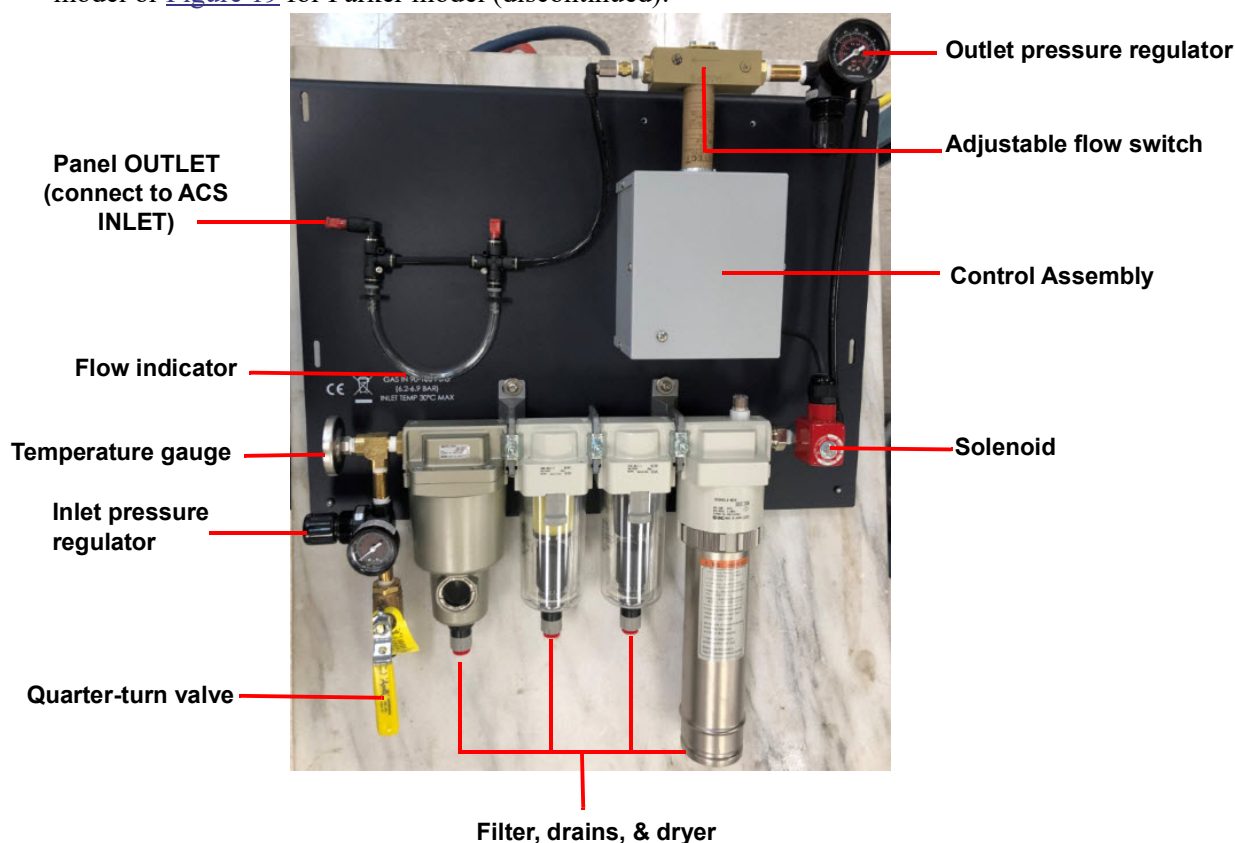
To connect the ACS, access the rear panel of the ARES-G2/RSA-G2 and follow the instructions below:

**NOTE:** The FCO must already be installed on the ARES-G2/RSA-G2.

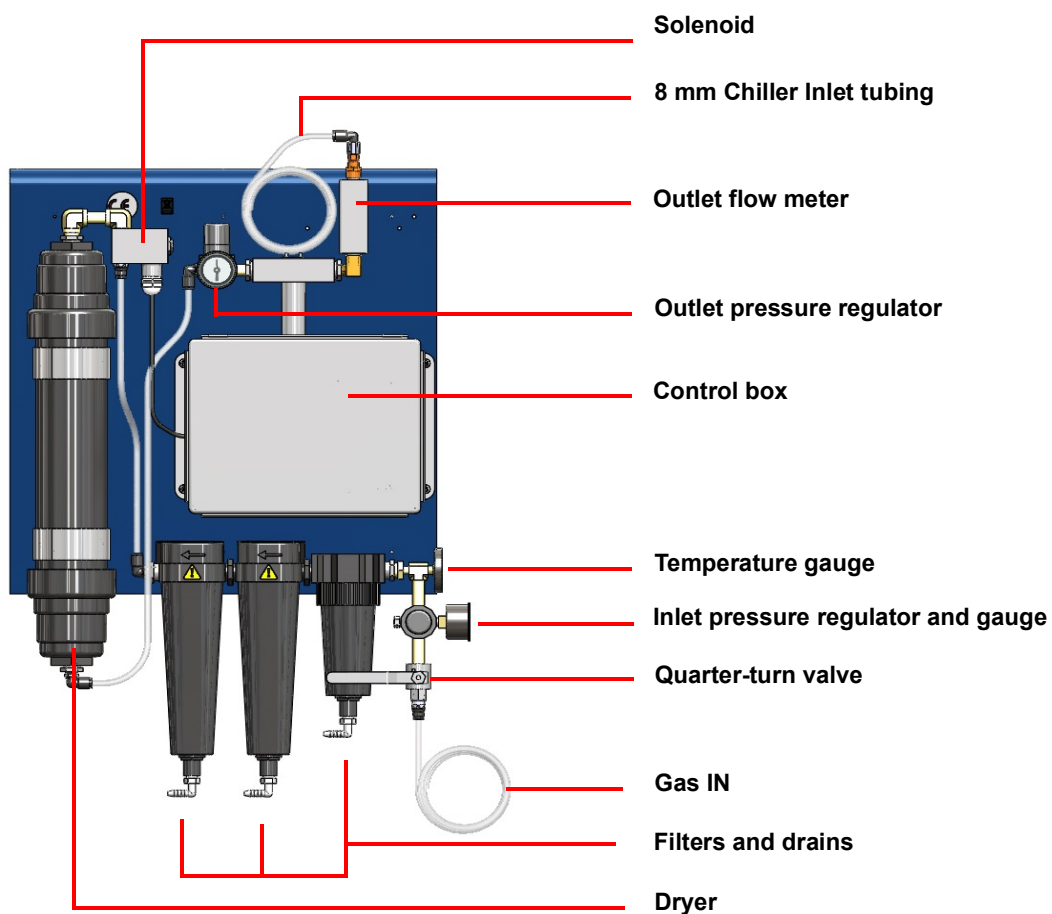
**WARNING:** The FCO should be fitted to the right side of the rheometer so that the connection point for the ACS transfer hose is at the bottom of the FCO. This is to ensure that when any frosting melts, it doesn't enter the body of the FCO or the rheometer electronics.

**AVERTISSEMENT:** Le FCO doit être installé sur le côté droit du rhéomètre de sorte que le point de connexion pour le tube de transfert de l'ACS soit dans le bas du FCO. Il s'agit de s'assurer que, si un glaçon de givre fond, il ne pénètre pas dans le corps du FCO ou dans l'électronique du rhéomètre.

- 1 Place the Air Chiller with attached Chiller Panel next to the ARES-G2/RSA-G2. See [Figure 18](#) for SMC model or [Figure 19](#) for Parker model (discontinued).



**Figure 18** FCO Chiller Panel, SMC model.



**Figure 19** FCO Chiller Panel, Parker model (discontinued).

- 2 Connect 8 mm tubing from 90° tubing quick connect fitting on top of the flow indicator to the air **INLET** port on the back of the ACS unit. See [Figure 20](#) for SMC model or [Figure 21](#) for Parker model (discontinued).



**Figure 20** Flow indicator (left). Air INLET port (right) – SMC model.



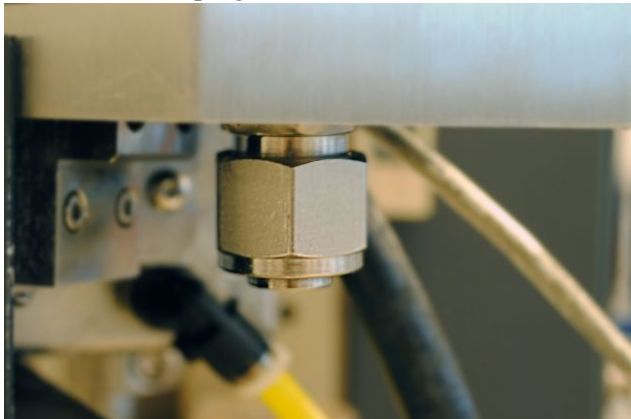
**Figure 21** Flow indicator (left). Air INLET port (right) – Parker model (discontinued).

Verify that the gas supply meets the requirements listed in [Table 2](#).

**NOTE for Parker model only (discontinued):** The correct flow of gas is set at the factory and no adjustment of the flow meter or pressure regulator is necessary. The pressure regulator is preset for 60 psi; the flow at 60 psi is approximately 90 scfh when the Chiller is actively running.

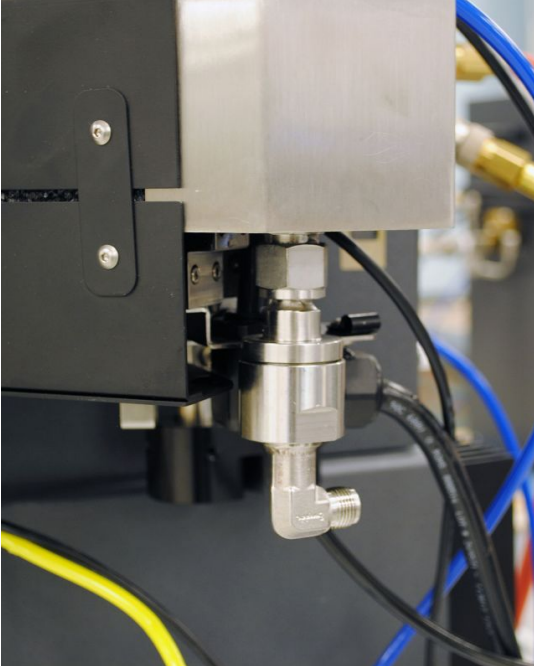
### 3 Install the transfer line:

- a Remove the plug from beneath the FCO; this is where the swivel joint is installed.



**Figure 22** Plug to be removed.

**b** Install the swivel joint onto the FCO.

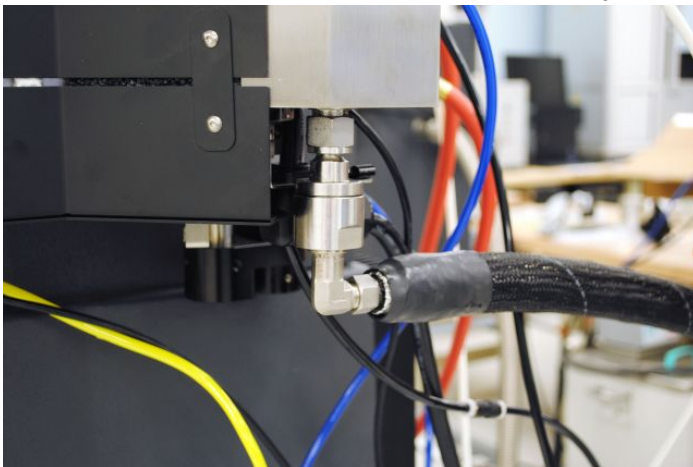


**Figure 23** Swivel joint installed.

**WARNING:** The FCO should be fitted to the right side of the rheometer so that the connection point for the ACS transfer hose is at the bottom of the FCO. This is to ensure that when any frosting melts, it doesn't enter the body of the FCO or the rheometer electronics.

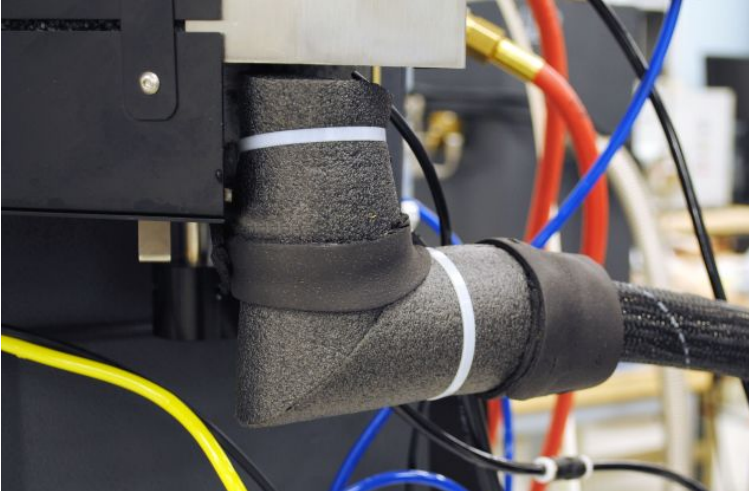
**AVERTISSEMENT:** Le FCO doit être installé sur le côté droit du rhéomètre de sorte que le point de connexion pour le tube de transfert de l'ACS soit dans le bas du FCO. Il s'agit de s'assurer que, si un glaçon de givre fond, il ne pénètre pas dans le corps du FCO ou dans l'électronique du rhéomètre.

**c** Connect the Chiller transfer hose to the swivel joint.



**Figure 24** Transfer hose installed on swivel joint.

- d Fit insulation over the exposed FCO connection to minimize heat gains and frosting.



**Figure 25** Insulated FCO connection.

**NOTE:** External frosting only occurs when cold gas is flowing. If very lengthy experiments are being run, consider melting water that could become an issue once the test has been completed. A conditioning End of Test step setting the temperature to ambient and the FCO Gas Source to **Enable air** or **Enable gas** is good practice for minimizing external frosting.

- e Fit insulation (as needed) over the ACS transfer line. Secure the insulation with foam tape and cable ties.



**Figure 26** Insulated transfer line.

- 4 Confirm that the jumper cable is plugged into the **EVENT CONTROL** port on the back of the Chiller.



**Figure 27** Jumper cable.

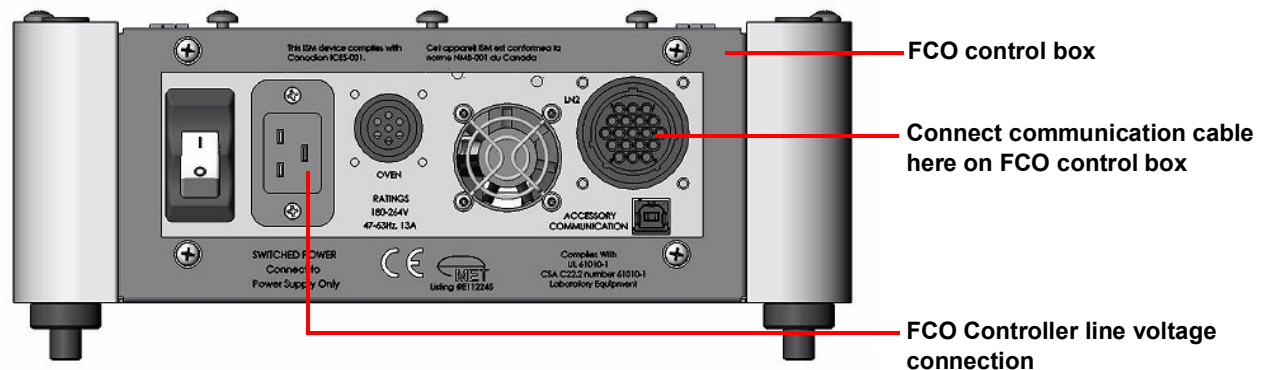
- 5 Make sure the FCO control box is powered off, and then connect the communication cable from the Chiller Panel to the FCO control box. Turn the FCO control box on.



**SMC Model**



**Parker Model (Discontinued)**



**Figure 28** Connecting the communication cable.

- 6 Insert the power cable into the power port on the back of the Chiller. Plug the cord into a wall outlet rated for the Chiller.

**WARNING:** It is always important to keep the end of the transfer line horizontal. Do not allow the end of the transfer line to droop or hang downward, especially while the Chiller is running or when the transfer line is cold. This could allow coolant to clog the capillary tube, damaging the system. If it is suspected the capillary tube may be clogged due to mishandling, follow the instructions for Shutting Down the ACS found on page 32 of this document. The line may then be supported vertically for several hours to allow coolant to redistribute throughout the system.

**AVERTISSEMENT:** Il est toujours important de garder la fin de la ligne horizontale de transfert. Ne laissez pas la fin de la ligne de transfert à se faner ou accrocher vers le bas, en particulier alors que le refroidisseur est en cours d'exécution ou lorsque la ligne de transfert est froide. Cela pourrait permettre à du liquide de refroidissement à obstruer le tube capillaire, d'endommager le système. Si l'on soupçonne le tube capillaire peut être obstrué en raison de la mauvaise gestion, suivez les instructions pour arrêter l'ACS trouvé à la page 32 de ce document. La ligne peut alors être pris en charge à la verticale pendant plusieurs heures pour permettre réfrigérant de redistribuer throughout le système.

## Setting Up the ACS Accessory using TRIOS

For use with the FCO, select **Chiller** in the TRIOS Environmental Control panel. Refer to Online Help.

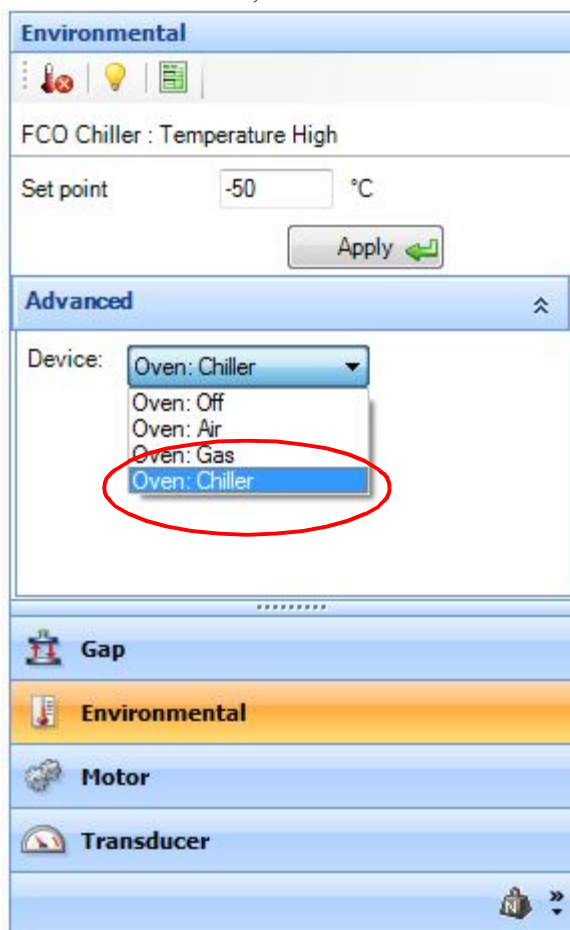


Figure 29 TRIOS Environmental Control panel.

# Chapter 3:

## Use and Maintenance

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### *Using the Air Chiller System Accessory*

All of your ACS Accessory experiments will follow the same general outline. In some cases, not all of these steps will be performed. The majority of these steps are performed using the instrument control software. See the instrument control online help for instructions on performing these actions.

- Selecting and preparing the sample
- Creating or choosing a test procedure and entering experiment information through the TA Instruments instrument control software
- Loading the prepared sample
- Starting the experiment

### **Before You Begin**

Before using the ACS Accessory, ensure that the instrument is installed properly. Also make sure you have:

- Connected the ACS
- Powered on the instrument
- Specified the ACS in the instrument control software (see [Chapter 2](#))
- Become familiar with controller operations

## Starting the ACS

**NOTE:** Do not turn off the unit and immediately turn it back on. After the compressor has shut down, allow 45 minutes for the internal pressures to equalize before restarting the unit.

- 1 Turn the Quarter-Turn Valve to the **ON** position (parallel to the line).
- 2 Adjust the Inlet Pressure Regulator to 100 psi.
- 3 Adjust the Bypass valve flow: Open the valve by turning the manual knob on the back of the ACS to allow air flow to dry out the line. Noise level will increase with increased flow rate. Allow the dry gas to purge through the ACS for 10–15 minutes before powering on the ACS. This will ensure that the ACS internal tubing is free of moisture, which, if present, could freeze when the ACS is turned on.



**Figure 30** Bypass valve.

**NOTE:** This is only for drying the internal tubing of the ACS before and after use. The bypass purge will be turned off automatically when the ACS is powered on and will turn on automatically when the ACS is powered off. See [Shutting Down the ACS](#) for more information.

- 4 Turn the power switch on the front of the Air Chiller to the **On** position. Wait 60 minutes before operating the system. The built-in timer will not allow flow through the ACS until all the stages have started. See [Internal Timer](#) for more information.

**NOTE:** The correct flow of gas is set at the factory and no adjustment of the flow meter or pressure regulator is necessary. The pressure regulator is preset for 60 psi; the flow at 60 psi is approximately 90 scfm when the Chiller is actively running.

**NOTE:** Before turning the unit on for the first time, make sure the full length of the transfer hose has been above the top of the ACS unit for more than 24 hours.

**NOTE:** Run the ACS for 60 minutes before beginning your experiment. The built-in timer will not allow flow through the ACS until all the stages have started. See [Internal Timer](#) for more information.

**NOTE:** It is important to power off the ACS regularly and purge with dry gas for a period of time, typically over-night. This prevents build-up of frost inside the ACS, which can slowly degrade the performance of the Chiller or even stop operation entirely. It is recommended to power off the Chiller daily when

the ACS is used continually. Some users with exceptionally dry supply air will find that less frequent drying intervals are acceptable, possibly allowing up to a week to pass between drying cycles.

**WARNING: It is always important to keep the end of the transfer line horizontal. Do not allow the end of the transfer line to droop or hang downward, especially while the Chiller is running or when the transfer line is cold. This could allow coolant to clog the capillary tube, damaging the system. If it is suspected the capillary tube may be clogged due to mishandling, follow the instructions for Shutting Down the ACS found on page 32 of this document. The line may then be supported vertically for several hours to allow coolant to redistribute throughout the system.**

**AVERTISSEMENT: AVERTISSEMENT: Il est toujours important de garder la fin de la ligne horizontale de transfert. Ne laissez pas la fin de la ligne de transfert à se faner ou accrocher vers le bas, en particulier alors que le refroidisseur est en cours d'exécution ou lorsque la ligne de transfert est froide. Cela pourrait permettre à du liquide de refroidissement à obstruer le tube capillaire, d'endommager le système. Si l'on soupçonne le tube capillaire peut être obstrué en raison de la mauvaise gestion, suivez les instructions pour arrêter l'ACS trouvé à la page 32 de ce document. La ligne peut alors être pris en charge à la verticale pendant plusieurs heures pour permettre réfrigérant de redistribuer throughout le système.**

## *Shutting Down the ACS*

- 1 Turn the power switch on the front of the Air Chiller to the **Off** position.

**NOTE:** It is important to power off the ACS regularly and purge with dry gas for a period of time, typically over-night. This prevents build-up of frost inside the ACS, which can slowly degrade the performance of the Chiller or even stop operation entirely. It is recommended to power off the Chiller daily when the ACS is used continually. Some users with exceptionally dry supply air will find that less frequent drying intervals are acceptable, possibly allowing up to a week to pass between drying cycles.

**NOTE:** The ACS is equipped with a normally open solenoid valve that purges the Chiller with dry gas when turned off. This is to help prevent frosting within the ACS while it is still cold. It is best to leave the purge gas on for a minimum of 2 hours (although overnight is preferred) to allow the ACS to come up to room temperature.

**NOTE:** Do not turn off the unit and immediately turn it back on. After the compressor has shut down, allow 45 minutes for the internal pressures to equalize before restarting the unit.

**CAUTION: Do not move the flexible line when it is cold, always warm the system to ambient (+20°C) before making any adjustments to the placement of the delivery line.**

**MISE EN GARDE: Ne pas déplacer la ligne flexible quand il fait froid, toujours réchauffer le système à la température ambiante (20°C) avant de faire des ajustements à la placement de la ligne de livraison.**

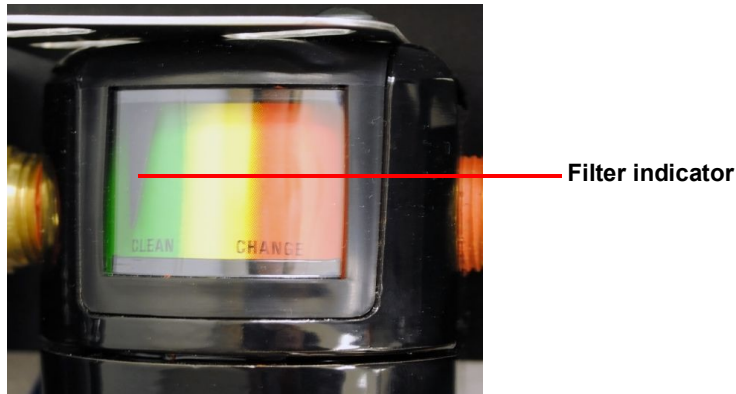
- 2 Enter a temperature of 10°C in the TRIOS software and leave the oven closed to ensure a flow of dry gas through the system until the unit warms to prevent internal frosting. Check the flow meter on the Chiller Panel to ensure there is flow through the system. The oven doors can be opened and the gas turned off when the measured temperature reaches ambient or later. It is recommended that the gas be left flowing, if possible, so that any built-up moisture can be forced out through the flexible line.

## Maintaining the Accessory

The primary maintenance procedures described in this section are the customer's responsibility. Any further maintenance should be performed by a representative of TA Instruments or other qualified service personnel.

### Changing the Filter Cartridges

The cartridges in each filter should be replaced every 12 months or when the pointer in the central filter is in the red CHANGE section- whichever occurs first.



**Figure 31** Filter indicator showing CLEAN (Parker Model shown).

**NOTE:** See page 35 for SMC Model filter cartridge replacement instructions.

### Cleaning the Accessory

To clean the ACS Accessory, wipe down the exterior of the Chiller with a damp, soft cloth.

**CAUTION:** Do not use harsh chemicals, abrasive cleansers, steel wool, or any rough materials to clean the cabinet, as you may scratch the surface and degrade its properties.

**MISE EN GARDE:** N'utilisez pas de produits chimiques agressifs, de nettoyeurs abrasifs, de la laine d'acier ou tout autre matériau rugueux pour nettoyer l'armoire [écran tactile], car vous pourriez égratigner sa surface et dégrader ses propriétés.

**NOTE:** It is important to power off the ACS regularly and purge with dry gas for a period of time, typically over-night. This prevents build-up of frost inside the ACS, which can slowly degrade the performance of the Chiller or even stop operation entirely. It is recommended to power off the Chiller daily when the ACS is used continually. Some users with exceptionally dry supply air will find that less frequent drying intervals are acceptable, possibly allowing up to a week to pass between drying cycles.

**NOTE:** Extended operation without load is detrimental to the system. For this reason, it is also advised that the ACS be shut down overnight, or during other extended periods in which it will not be used actively.

**NOTE:** Turn the unit off by using the On/Off switch, not the Event control. The Event control only turns off the airflow and will not allow the system to defrost.

## Troubleshooting

Issue	Reason	Action
Compressor shuts OFF and then turns itself back on in 3-4 minutes	Low voltage	Check the voltage on the unit while it is under-load. The voltage must be within 5% of the voltage listed on the serial tag on the back of the unit.
	High ambient temperature	Check room temperature and compare with the Ambient Air Requirement listed in Installation. Take steps to reduce this temperature if it is too high.
	Dirty or blocked condenser fins	Clean condenser
	Fan out of order	Check for operation of fan (you can feel the air being drawn across the condenser). If it isn't working, contact TA Instruments.
Compressor fails to restart after it has been shut off	High pressure/temperature in the refrigeration system	Wait 45 minutes and try starting the unit again.
Gradual loss of temperature	Frost build-up inside ACS	Power down the ACS (see <a href="#">page 32</a> ) and purge with dry gas overnight.
	Dirty or blocked condenser fins	Clean the condenser fins.
	High ambient temperature	Check room temperature and compare with the Ambient Air Requirement listed in installation. Take steps to reduce this temperature if it is too high.
	Loss of refrigerants	Call TA Instruments.

## Replacement Parts

**NOTE:** Disconnect air supply to chiller panels before servicing.

**Table 6: PARKER MODEL Chiller Panel Replacement Parts**

613.06190	Air Regulator Type R07
200750.001	Cinching strap 8 ft. long
578050.001	Tubing 8 mm OD x 6 mm ID
986301.901	Chiller Panel Filter Replacement Pack (BX filter, DX filter, Element filter)
404041.901	ARES-G2/RSA-G2 FCO Chiller Panel

**Table 7: SMC MODEL Chiller Panel Replacement Parts**

404041.901	ARES-G2/RSA-G2 FCO Chiller Panel
203929.901	SERVICE KIT SMC FILTERS ACS PANEL
203920.001	REPLACEMENT MEMBRANE FOR IDG-60 DRYER
404048.001	SMC FILTER & DRYER ASSEMBLY TESTED

**NOTE:** 203929.901 contains (3) replacement filter element cartridges (TA PNs 203921.001; 203922.001; 203923.001). To prevent damage to the filter element, replace elements every 2 years or when the pressure drop becomes 0.1 MPa, whichever comes first. Release the accumulated condensation inside air filter bowls periodically and before the accumulation reaches the maximum capacity. If accumulated condensation flows out to the outlet side, it can cause a malfunction.

Replacement instructions for 203921.001:

<https://www.smcworld.com/assets/manual/en-jp/files/AFx-OMR0020.pdf> (document page 19)

Replacement instructions for 203922.001:

<https://www.smcworld.com/assets/manual/en-jp/files/AFx-OMR0021.pdf> (document page 19)

Replacement instructions for 202923.001:

<https://www.smcworld.com/assets/manual/en-jp/files/AMX-OM-F005-C.pdf>

Replacement instructions for 203920.001:

<https://www.smcworld.com/assets/manual/en-jp/files/AMX-OM-Q014E.pdf>

**NOTE:** All parts included in the ARES-RSA G2 CHILLER PANEL accessory are also available as replacement parts. Contact TA service support hotline for assistance:

<https://www.tainstruments.com/support/service/service-support-hotline/>