



BLENDING GAS DELIVERY MODULE (GDM) for Discovery TGA and SDT



Getting Started Guide

Revision C

Issued August 2018

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
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- 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

For Canada

CAN/CSA-22.2 No. 61010.1-10 Safety requirements for electrical equipment for measurement, control, and laboratory use, Part 1: General Requirements.

For European Economic Area

EN61010-1: 2010 Safety requirements for electrical equipment for measurement, control, and laboratory use, Part I: General requirements.

For United States

UL61010-1 2012 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

EN61326-1: 2013 Electrical equipment for measurement, control, and laboratory use - EMC requirements - Part 1: General requirements, Table 1 - Basic immunity test requirements, Emission requirements for Group 1, Class A equipment.

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

This *Getting Started Guide* contains cautions and warnings that must be followed for your own 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.

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Chapter 1:

Introducing the Blending Gas Delivery Module

Overview

The Blending Gas Delivery Module (GDM) is an accessory for use with the TA Instruments Discovery TGA550 and 5500 or Discovery SDT650.



Figure 1 Blending GDM.

The Blending GDM allows for the blending of two gases to be used as the main sample purge for an experiment. Gases that may be blended include nitrogen, helium, argon, oxygen, air, carbon dioxide, carbon monoxide, and forming gas (a blend of 4% hydrogen with 96% nitrogen).

WARNING: Forming gas is a mixture of 4% hydrogen and 96% nitrogen. Do NOT use the Blending GDM to create this concentration. Only use cylinders pre-mixed by an outside gas company.

AVERTISSEMENT: former du gaz est un mélange de 4% d'hydrogène et 96% d'azote. N'UTILISEZ PAS le mélange GDM pour créer cette concentration. Utilisez uniquement des bouteilles pré-mélangées par une entreprise de gaz extérieur.

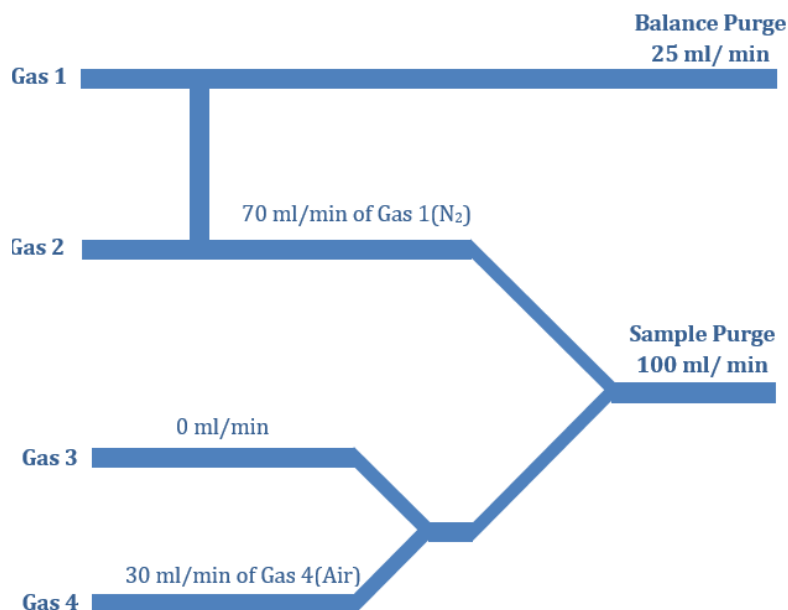


Figure 2 Flow schematic.

The Blending GDM can be controlled from the **General** panel of TRIOS software, the user interface on Discovery TGA550/5500 and SDT650 units, or with specific method segments within a constructed experimental method. The segments shown below have been selected based on the flow schematic shown above.

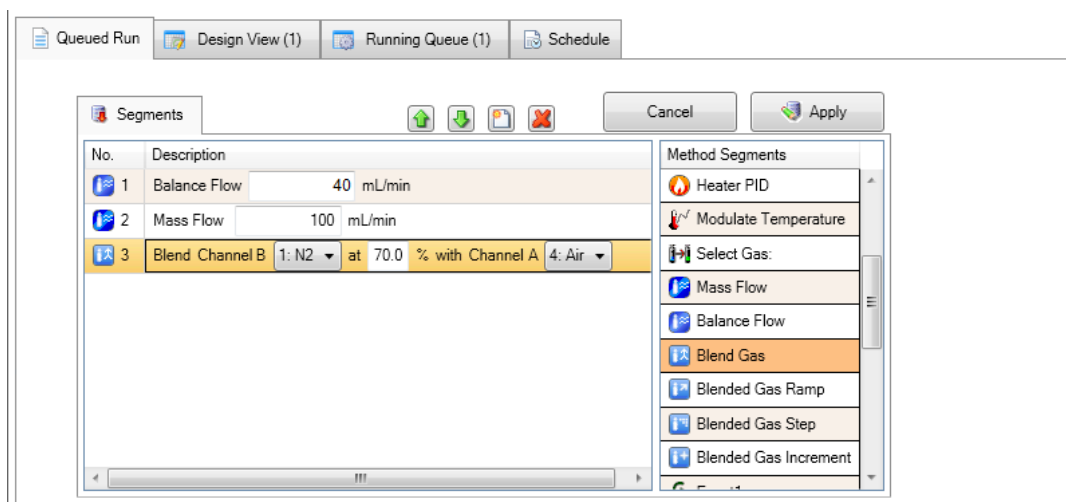


Figure 3 Method segments based on flow schematic.

NOTE: Balance and Sample purge flow will depend on the specific instrument to which the Blending GDM is attached. Refer to the table below for typical flow rates by instrument type.

Instrument	Balance Flow	Sample Flow
TGA550	40	60
TGA5500	10	25
SDT650	100	100

Components

The Blending GDM consists of mass flow controllers (MFCs) and valves contained within an enclosure that can be easily positioned near the thermal instrument to which it is connected. There are three plumbing fittings that you can access for normal operation:

- The first two fittings are Legris fittings used to accept designated gases 3 and 4 (gases 1 and 2 are located on the main GDM of the thermal instrument) They are located on the rear of the Blending GDM.
- The third fitting is a 1/8 inch Swagelock fitting used to connect the GAS OUTPUT on the Blending GDM to the Reactive Gas port on the back of the thermal instrument. This connection is also located on the rear of the Blending GDM.

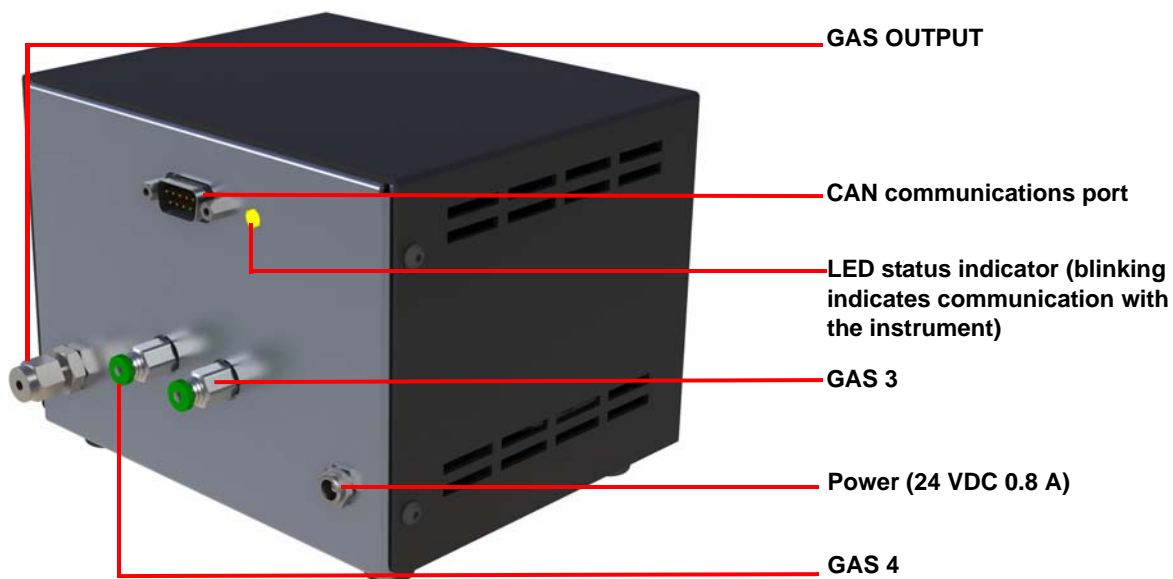


Figure 4 Back panel of the Blending GDM.

Accessory Specifications

The table found below contains the technical specifications for the Blending GDM

Table 1: Blending GDM Technical Specifications

Item/Area	Specification
Instrument compatibility	Discovery TGA550/5500 and Discovery SDT650 The Blending GDM is <u>not</u> compatible with Q Series instruments, Discovery DSC, or TGA55
Size Height Width Depth	13 cm (5 in) 15 cm (6 in) 15 cm (6 in)
Weight	0.5 kg (1 lb)
Power requirements	100–240 VAC / 0.5A, 50/60Hz Approved for operation on a 20 amp branch circuit with protective conductor (ground) DC requirements: 24V, 0.8A. Use only TA Instruments-provided power adapter
Gas inlet maximum pressure	140 kPa gauge (20 psig)
Recommended gases	Nitrogen, helium, argon, air, oxygen, carbon dioxide, carbon monoxide, forming gas. All gases must be free of oil, dirt, and water.
Operating environment conditions	Temperature: 15–35°C 5% to 80% RH from 15°C to 31°C, decreasing to 66% RH at 35°C (non-condensing) Installation Category II Pollution Degree 2 Maximum Altitude: 2000 m (6560 ft)

Chapter 2:

Installing the Blending GDM

Unpacking and Inspecting the System

Inspect the contents of the Blending GDM shipping box. Check all inner boxes for documentation, parts, and accessories. You should retain the shipping container and packing materials at least until the unit has been successfully installed and verified to be functioning correctly, and you may wish to retain them in case you want to repack and ship your Blending GDM.

If the Blending GDM received rough handling in shipment and signs of damage are apparent, contact the carrier immediately for advice on how to make a claim. Please call TA Instruments to advise us of the problem. DO NOT use or install the accessory until an authorized representative of TA Instruments has repaired it.

Contact your TA Instruments representative if parts are missing.

Before Installing the Blending GDM

Installation of the Blending GDM is generally the same for all types of TGA and SDT instruments.

WARNING: Unplug the power cord before beginning any service or repair work.

AVERTISSEMENT: Débranchez le cordon d'alimentation avant de commencer des travaux d'entretien ou de réparation.

Choosing a Location

Because of the sensitivity of experiments using the Blending GDM, it is important to choose a location using the following guidelines. Refer to your thermal instrument's *Getting Started Guide* for more detailed information. Your Blending GDM should be:

In

- A temperature-controlled area.
- A clean environment.
- An area with ample working and ventilation space. Refer to the technical specifications in Chapter 1 for the accessory's dimensions.

Near

- A power outlet (100–240 Vac, 50 or 60 Hz).
- Your TA Instruments thermal analysis controller computer and Discovery TGA or SDT.

Away from

- Dusty environments.
- Exposure to direct sunlight.
- Direct air drafts (fans, room air ducts).
- Poorly ventilated areas.

Installing the Blending GDM on a Discovery Thermal Instrument

Installation of the Blending GDM onto a Discovery TGA550/5500 or SDT650 involves:

- 1 Connecting the input gases
- 2 Connecting the output gas to the Discovery TGA550/5500 or SDT650
- 3 Connecting the CAN communication cable
- 4 Connecting the power

This section provides the instructions for installing the Blending GDM on the Discovery TGA550/5500 or SDT650.

Blending GDM Installation Procedure

Follow the instructions below to connect the purge lines.

- 1 Locate the gas ports on the back of the Blending GDM and the Reactive Gas port on the back of the instrument.

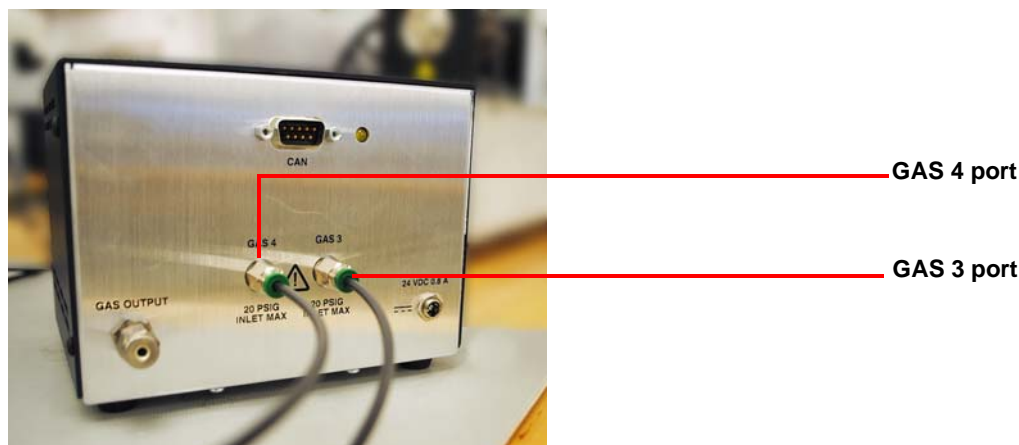


Figure 5 Rear of the Blending GDM.

- 2 Ensure that the pressure of your input gases are regulated to a maximum of 140 kPa gauge (20 psig).

NOTE: The gases used should be dry and free of oil, dirt, and water.

- 3 Use 1/8-inch O.D. tubing to connect the output gas to the **Reactive Gas** port on the rear of the TGA or SDT. Teflon[®] TFE or metal tubing with Swagelok fittings is recommended.



Rear of TGA550/5500



Rear of SDT650

Figure 6 Reactive Gas port on the rear of the TGA550/5500 (top) and SDT650 (bottom).

- 4 Use 1/8 inch OD tubing to connect the Gas 3 and/or Gas 4 gas sources to the **GAS 3** or **GAS 4** ports. Again, ensure that the pressure of your blending gas is regulated to a maximum of 140 kPa gauge (20 psig).
- 5 Connect the CAN communications cable from the CAN port on the Blending GDM unit to the CAN port on the rear of the Discovery thermal instrument.
- 6 Plug one end of the power cord into the Power port on the back of the Blending GDM. Then plug the mains end of the power cord into a power outlet. Once the connections are made, confirm that the Power LED on the front of the Blending GDM is on and that the CAN LED on the rear of the unit blinks.

Chapter 3:

Operating and Maintaining the Blending GDM

Using the Blending GDM

Once the Blending GDM has been properly installed, follow the steps below to set up and start an experiment.

Starting an Experiment

Before you start the experiment, ensure that the Blending GDM is connected with the instrument, the **GAS 3** and **GAS 4** connections are made, and that you have entered all necessary information through TRIOS software.

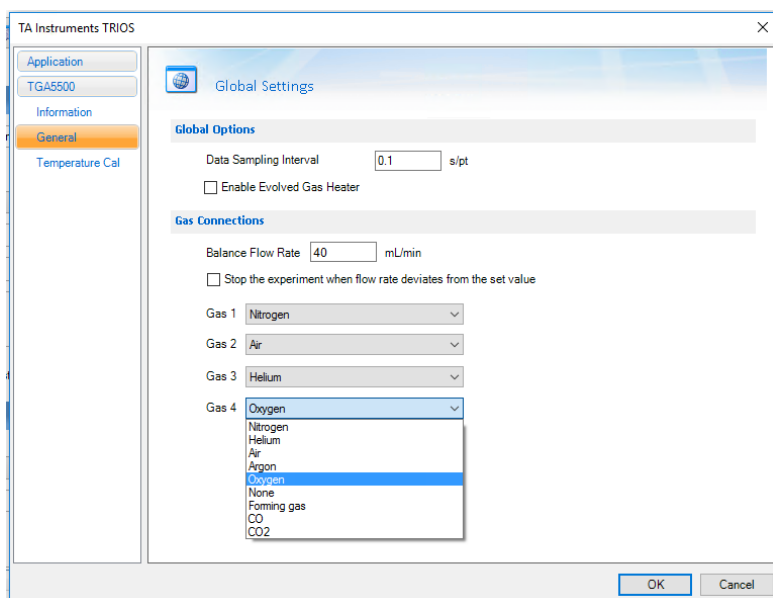


Figure 7 TRIOS Options.

NOTE: Possible gas blending options are as follows:

Gas Number	Gases Supported	Blend with Gas Number:
1 (balance purge)	N ₂ , He, Ar	3 or 4
2	N ₂ , O ₂ , Air, He, Ar	3 or 4
3	N ₂ , O ₂ , Air, He, Ar, Forming Gas, CO, CO ₂	1, 2, or 4
4	N ₂ , O ₂ , Air, He, Ar, Forming Gas, CO, CO ₂	1, 2, or 3

WARNING: Forming gas is a mixture of 4% hydrogen and 96% nitrogen. Do NOT use the Blending GDM to create this concentration. Only use cylinders pre-mixed by an outside gas company.

AVERTISSEMENT: former du gaz est un mélange de 4% d'hydrogène et 96% d'azote. N'UTILISEZ PAS le mélange GDM pour créer cette concentration. Utilisez uniquement des bouteilles pré-mélangées par une entreprise de gaz extérieur.

NOTE: Once the experiment is started, operations are best performed at the computer keyboard. The instrument is very sensitive to motion and might pick up the vibration caused by touching a key on the instrument user interface.

Start the experiment by selecting **Start** in TRIOS software or by touching the **START** key on the instrument user interface. When you start the instrument, the system automatically runs the experiment to completion.

Blended gas values can be set through a segment or on the Control panel in TRIOS. The image below shows the Control Panel that displays when a Blended GDM is attached to an instrument.

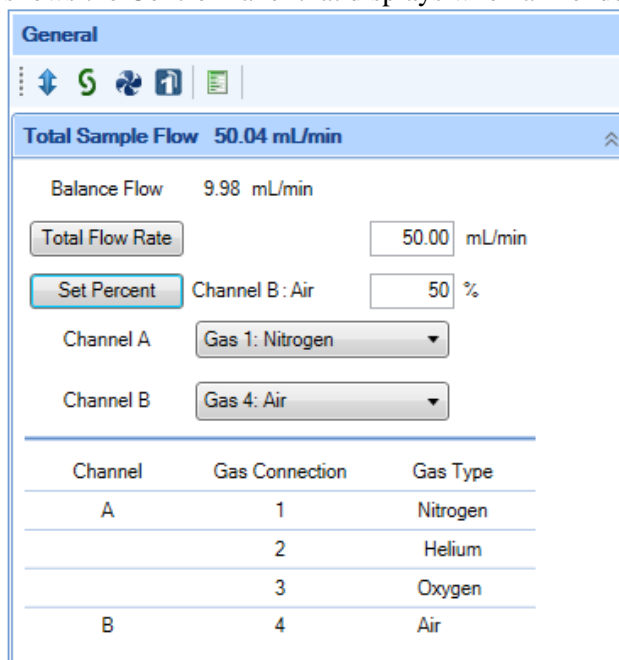


Figure 8 Control panel.

Control options include:

- Setting the total flow rate
- Setting the percentage of gas for each channel
- Setting the gas types for each channel

TRIOS software provides several method segments that are designed to be used solely with the Blending GDM in the construction of experimental methods. These method segments include:

NOTE: Channel A and Channel B below refer to either **GAS 1, 2, 3, or 4**.

- Blend <Channel B> at <X>% with <Channel A>
- Ramp Channel B at <X.X>%/min to <X.X>%
- Step Channel B at <X.X>% increments for <X> min to <X.X>%
- Increment Channel B by <XX>%

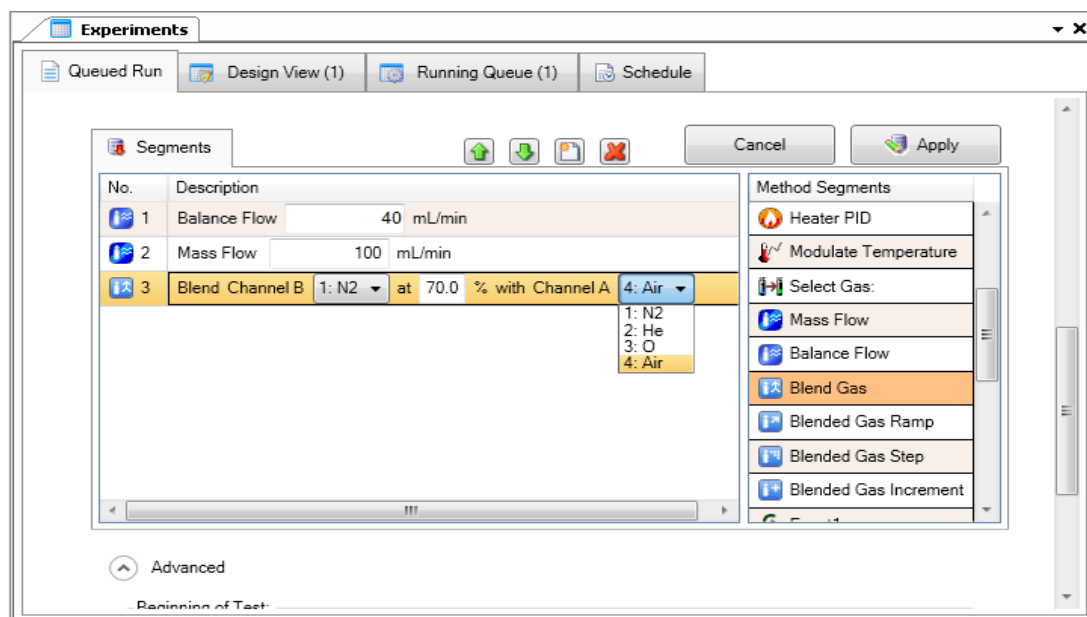


Figure 9 Method segments and Channel selection.

For example, if the Total Flow Rate is set to 100 mL/min, Channel A is set to Gas 4, Channel B is set to Gas 1, and Channel A percentage is set to 30% and Channel B percentage is set to 70%. Blended gas going to the sample will be 70 mL/min of Gas 1 and 30 mL/min of Gas 4. Refer to the flow schematic in [Figure 2](#).

Refer to TRIOS online help for more information on the method segments.

Maintaining the Blending GDM

No customer maintenance is required.

Cleaning the Blending GDM

You can clean the Blending GDM as often as you like. The unit should be cleaned with water and soft cloth. Dampen the cloth (not the unit) and then wipe off the unit and surrounding surfaces.

WARNING: Do not use harsh chemicals, solvents, abrasive cleansers, steel wool, or any rough materials to clean the unit.

AVERTISSEMENT: Ne pas utiliser de produits chimiques, solvants, de nettoyeurs abrasifs, de laine d'acier ou des matériaux bruts pour nettoyer l'appareil.

Replacement Parts

The table below lists the replacement parts for the Blending GDM.

Table 2: Blending GDM Replacement Parts

Part Number	Description
973990.901	CAN Communications Cable
203564.001	External Power Supply