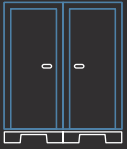




**ARM PURIFICATION**  
BY APPLIED ENERGY SYSTEMS



# Bulk Gas Purifiers

Long-Lasting Gas Purifiers for Large Flow Rates

At ARM Purification, we know that bulk applications mean large flow rates and long life spans. That's why we are committed to delivering a full suite of bulk purifiers that meet your requirements for volume and purity while also maximizing purifier lifetime.

ARM Purification's bulk purifiers offer large flow rates, serving high purity and permanently installed plumbing to complete facilities. Whether it's a bulk gas purifier, pressure regulator station, or flow control panel, ARM Purifications cost-effective bulk purifiers are designed to meet the specific requirements of a multitude of gas delivery systems by allowing for customization of critical features.

## Our Suite of Bulk Gas Purifiers

### Advantage™ Bulk Series

Meet specific requirements with a modular, configurable design across three technologies:

- Getter
- Catalyst
- Adsorber-Reactive Catalyst



### At-a-Glance

#### FEATURES

- Flow rates of 60 to >5000 nm<sup>3</sup>/hr
- Powder coated steel enclosure
- 316L stainless steel construction
- Pressures up to 20.5 MPa
- Fully integrated PLC control
- Touchscreen HMI

#### OPTIONS

- Flow indication
- Bypass valve
- Inlet/outlet connections
- Air-operated or manual valve options
- 100-120/220-240VAC, 50/60Hz input power options<sup>1</sup>

#### APPLICATIONS

- High production rate weld gas/purge gas
- Pharmaceutical production
- Semiconductor process equipment
- High volume process gas
- Annealing cover gas
- High volume HP and UHP applications

<sup>1</sup> Higher voltage options available.

Bulk purifiers typically offer a large flow rate serving a complete facility through high purity, permanently installed plumbing to each point-of-use. This brochure outlines the features, benefits, and performance of ARM Purification's Bulk purifiers.

ARM Purification purifiers are categorized into three groups. The primary distinction is based on flow rate of the gas being purified. The following is offered as a general rule:

Category	Flow Rate
Point-of-Use	0.1-100 slpm
Micro-Bulk	100-1200 slpm
Bulk	60->5000 nm <sup>3</sup> /hr

# Advantage™ Bulk

The Advantage™ Bulk Series is a modular design, configurable to meet your specific requirements. Three basic technologies used are described in the following pages, with the ideal technology varying based on the gas to be purified and the impurities to be removed.

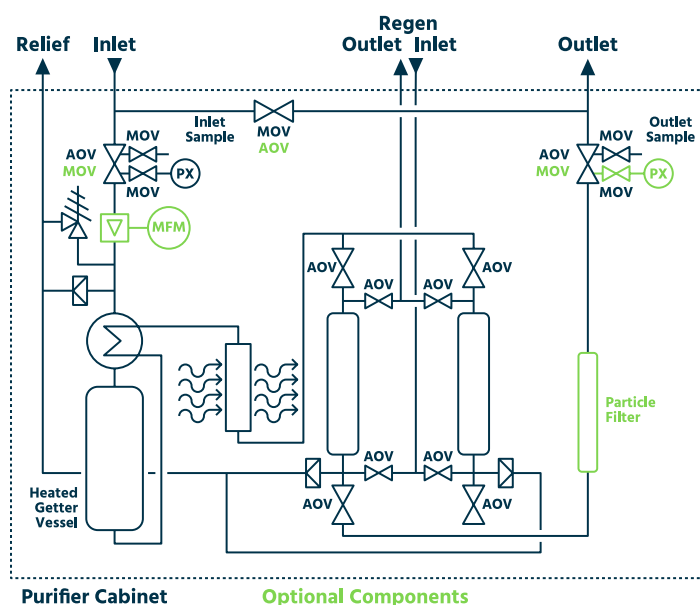
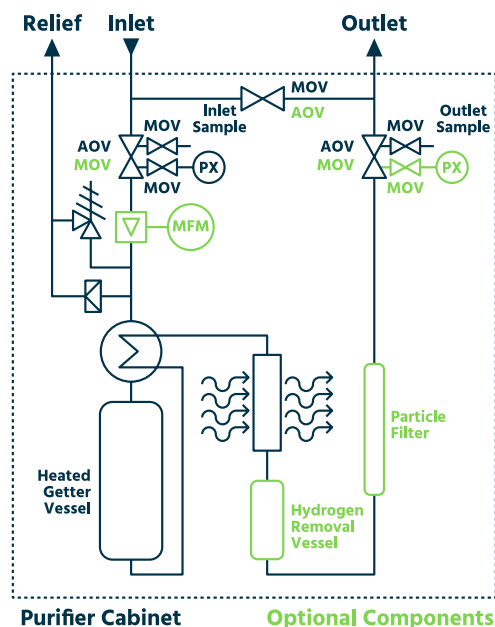
## Getter

These purifiers use getter material, typically at elevated temperatures, to remove impurities that react with the getter and chemically bond it. Once this chemical bond is made, it survives for the life of the purifier.

To achieve overall thermal efficiency, a gas-to-gas heat exchanger is incorporated to use the gas entering the getter vessel to cool the gas leaving the getter vessel. For added protection of downstream components, additional air or optional water cooling of the outlet gas stream are incorporated into the design.

Gases Purified	Impurities Removed to <100 PPT <sup>1</sup>
N <sub>2</sub> , N <sub>2</sub> /Noble gas mix	CH <sub>4</sub> , CO, CO <sub>2</sub> , H <sub>2</sub> , H <sub>2</sub> O, O <sub>2</sub>
H <sub>2</sub>	CO, CO <sub>2</sub> , H <sub>2</sub> O, N <sub>2</sub> , O <sub>2</sub>
Hydrides	CO <sub>2</sub> , H <sub>2</sub> O, O <sub>2</sub>

<sup>1</sup> <100 PPT removal efficiency is based on 5N5 (99.9995%) inlet gas purity at nominal flow and rated pressure.



## Catalyst

These purifiers use true catalytic materials that react with hydrocarbons and other impurities, converting them to gas molecules. These molecules are removed by a downstream adsorber stage, which is a parallel dual column arrangement allowing for regeneration without interruption of purified gas flow.

Gases Purified	Impurities Removed to <100 PPT <sup>1</sup>
O <sub>2</sub> , CDA	CH <sub>4</sub> , CO, CO <sub>2</sub> , H <sub>2</sub> , H <sub>2</sub> O, THC
N <sub>2</sub>	CH <sub>4</sub> , CO, CO <sub>2</sub> , H <sub>2</sub> , H <sub>2</sub> O, O <sub>2</sub> , THC

<sup>1</sup> <100 PPT removal efficiency is based on 5N5 (99.9995%) inlet gas purity at nominal flow and rated pressure.

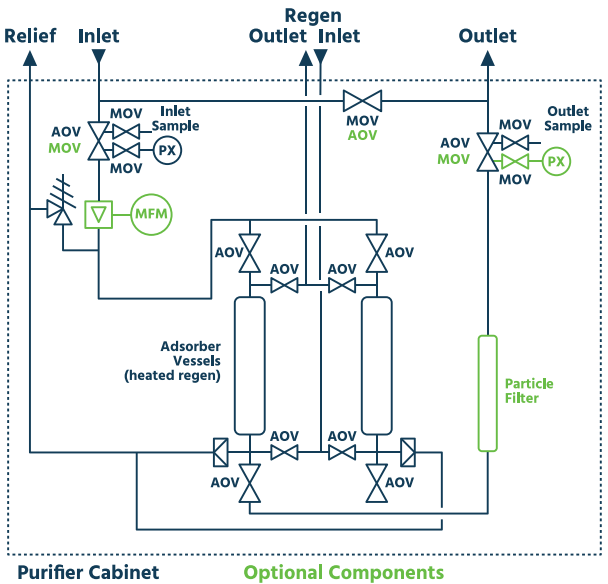
# Adsorber-Reactive Catalyst

Purifiers use adsorber material, or a reactive catalyst in certain instances, to remove impurities from a wide variety of gases.

The impurities are either absorbed into the material, to the surface of material, or with reactive catalysts from compounds on the surface of the material. To ensure uninterrupted purified gas flow, dual columns are arranged in parallel with the PLC control system performing the automatic switching and regeneration.

Gases Purified	Impurities Removed to <100 PPT <sup>1</sup>
Ar, He, Kr, Ne, Xe, N <sub>2</sub> , H <sub>2</sub>	CO, CO <sub>2</sub> , H <sub>2</sub> , H <sub>2</sub> O, NMHC, O <sub>2</sub>
CDA, CO <sub>2</sub> , N <sub>2</sub> O, O <sub>2</sub>	CO <sub>2</sub> , H <sub>2</sub> O, NMHC, Amines, NOx
Ar, CO, H <sub>2</sub> , He, Kr, N <sub>2</sub> , Ne, Xe	H <sub>2</sub> O,

<sup>1</sup> <100 PPT removal efficiency is based on 5N5 (99.9995%) inlet gas purity at nominal flow and rated pressure.



## Standard Features/Options

There are a variety of options available with the Advantage™ Bulk Series purifiers. The table below lists most of the common standard and optional features.

Instrumentation & Controls	Standard	Optional
Inlet Pressure Transducer	✓	
Outlet Pressure Transducer		✓
Captured Overpressure Exhaust	✓	
Emergency Shutdown	✓	
PLC Control of Automatic Functions	✓	
Microprocessor Control of Automatic Functions		✓
Remote Internet Access for Control, Upgrades		✓
Touchscreen HMI	✓	
Remote Internet Access for Troubleshooting		✓

Hardware	Standard	Optional
316L Stainless Steel Tubing, Fittings, Components	✓	
Wetted Surfaces Electro-Polished	✓	
Steel and Aluminum Enclosures, Powder Coated	✓	
Manually Operated Bypass Valves		✓
Pneumatic/Electric Operated Valves	✓	
Industry Standard Inlet/Outlet Connections	✓	
Gas-to-Gas Heat Exchangers (as required)	✓	
Air Cooled Heat Exchangers (as required)	✓	
Water Cooled Heat Exchanges		✓
Flow Meter/Flow Totalizer		✓
Overpressure Relief Protection	✓	
Particle Filtration		✓

## Common Specifications

The Advantage™ Bulk Series is designed in a modular fashion to meet the specific needs of the application. When quoted, the exact specifications will be defined and can include:

Specifications	Range	Specifications	Range
Maximum Allowable Working Pressure	150 to 250 PSI	Pressure Drop	1 Bar or Less
Inlet/Outlet Tube Diameters	1/2" to 4"	Outlet Purity	Down to <100 PPT
Flow Rate	60 to > 5000 nm <sup>3</sup> /hr	Input Power	100 to 240 VAC 50/60 Hz <sup>1</sup>

<sup>1</sup> Higher voltage options available.

# Control & Instrumentation

Advantage™ Bulk Series purifiers come standard with PLC controls and touchscreen HMI. For process flow and automated routines like regeneration, electro-pneumatic valves are controlled by the PLC. Manual valves are used for isolation of instruments such as pressure transducers and for sample or test ports as required.

The Advantage™ Bulk Series indication and control software provides three separate password controlled access levels:

## Operator

Level allows access to all indications necessary to verify proper operation.

## Engineer

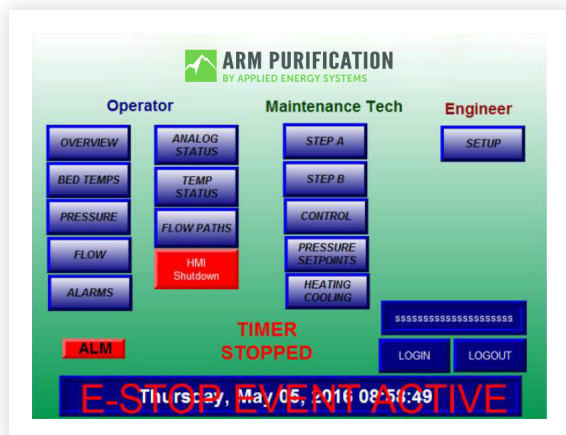
Level allows access to all operator and maintenance tech screens, as well as the ability to set up all parameters, limits, alarms, etc.

## Maintenance Tech

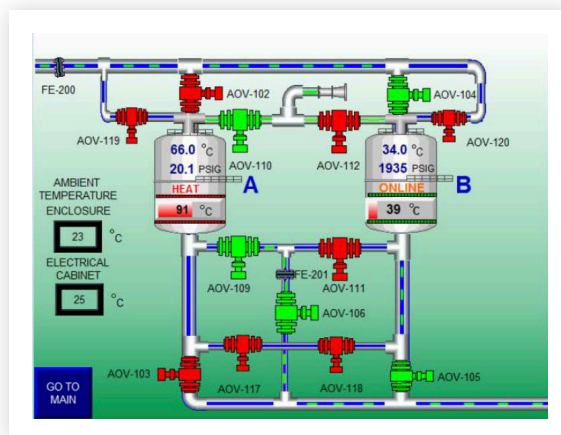
Level allows access to control a number of subroutines designed for care and maintenance of the purifier.

## Remote Access

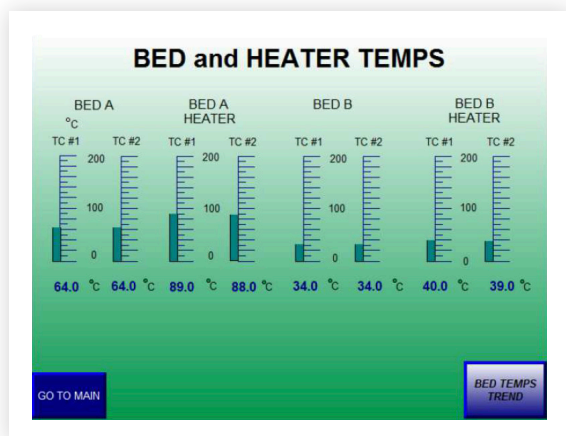
Option allows ARM Purification remote access to the purifier control program for updates and factory assistance with operations, or troubleshooting if necessary.



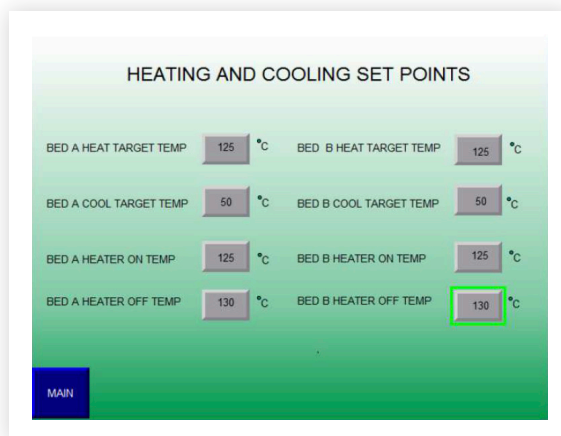
Main entry screen with three options for password protected operation.



Main status screen with valve condition, pressures, and temperatures displayed.



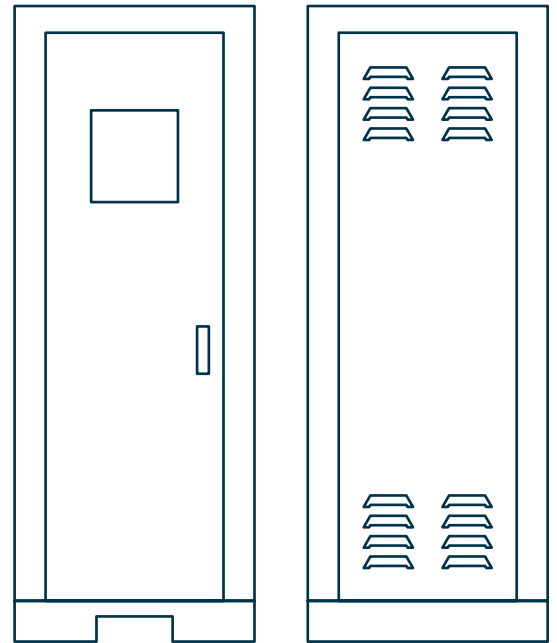
Typical indication screen with graphic display of bed temperatures.



Typical set point input screen for engineer level access.

# Enclosures

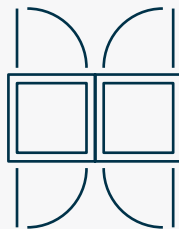
- Three common enclosure sizes are available for protected area installation. The typical door clearance required is 28.0" (711mm) for all doors shown.
- Hinge locations are as shown unless otherwise specified. Opposite hinge locations are optional (specify when ordering).
- Louvered side panels are standard and removable for easy maintenance access. Internally mounted filters are included to help maintain internal cleanliness.
- Steel and aluminum enclosures are powder coated standard ARM Purification colors.
- All metal enclosure components are properly grounded. Access to electrical control and instrumentation is protected with EMO interlocks.
- All user control and indication displays/interfaces are accessible without removing panels or opening doors.
- Leveling pads are included, and the base frame can accommodate user supplied seismic tiedowns when required.



## Single Enclosure

Dimensions are:

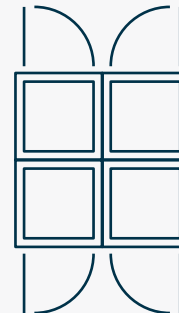
30.0" (762mm) wide  
30.0" (762mm) deep  
84.0" (2,032mm) tall



## Double Enclosure

Dimensions are:

60.0" (1,524mm) wide  
30.0" (762mm) deep  
84.0" (2,032mm) tall



## Quad Enclosure

Dimensions are:

60.0" (1,524mm) wide  
60.0" (1,524mm) deep  
84.0" (2,032mm) tall

## Unprotected Environments

When the purifier will be located in an area such as a gas pad, where protection from the elements must be incorporated into the design, ARM Purification is still your go-to source.

We can provide the same purifier technologies, with the same options as outlined in this brochure, in a suitable enclosure, regardless of whether the environment is cold or hot.

# A Different Approach from Inquiry to Commissioning

The typical purifier manufacturer presents a number of standard systems with available options and specifications for flow rate, output purity, etc. via their website or printed brochure. It is up to the customer to sift through the specs and determine which model is best suited for their application. The customer must then call to verify the suitability of their choice, define desired options, and request a quote. Many times flexibility is limited to specific model/size/option selections that the manufacturer's marketing group has determined are the most popular.

At ARM Purification, we are the experts when it comes to our products, and we understand the customer may not be familiar with the technologies and configuration flexibility that ARM Purification offers. Your time is valuable, and we have proven over the years that the shortest time between RFQ and quotation, with the least amount of customer time required, is through verbal communication. At ARM Purification, we approach bulk purifier inquiries with a level of customer service that leaves little doubt regarding performance, price, and total cost of ownership.



## Confirm Specs

Depending on the customer's preference, this can be as simple as a call or as involved as an in-person visit to relay the critical requirements: gas, impurities, flow, pressure, and desired features. Regardless, our objective is to review the pure gas needs and work together to develop a detailed statement of work, hardware descriptions, and performance specs.



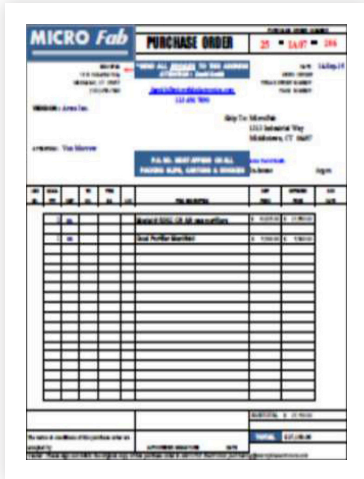
## Generate a Quote

If the need matches an existing Advantage™ Bulk Series configuration, a firm fixed price quote referencing a specific model number is generated. Alternately, we will generate a statement of work with a listing of specific configuration data. The quote can include ARM Purification performing the installation and startup, or managing the installation and startup using local contractors.



## Receive the Order

Any order resulting from a quote is reviewed to make sure it matches the proper specifications. An order acknowledgment is then sent. This begins the process that results in your pure gas requirements being met.



## First Deliverables

Our initial deliverables include a detailed P&ID drawing for the specific Advantage™ Bulk Series configuration purchased, along with a fully documented facilities drawing so you can begin to prep the location to receive the purifier.



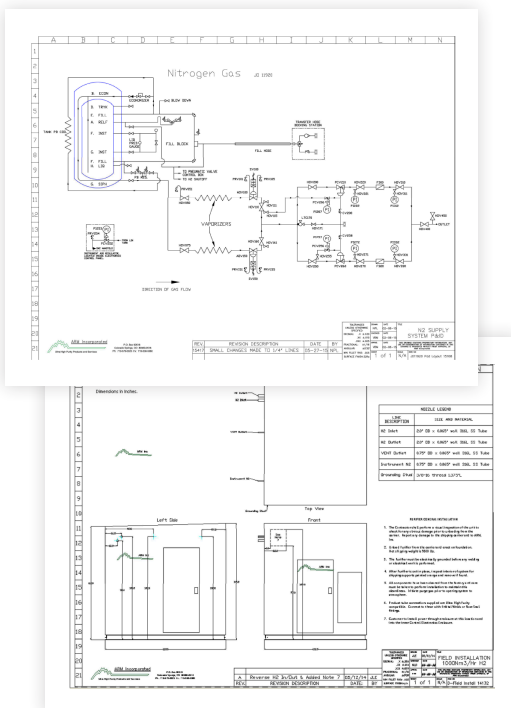
## Acceptance Testing

Acceptance testing is conducted at the ARM Purification factory. If quoted, we can accommodate the customer witnessing final assembly testing, including Helium leak checking, pressure decay testing, particle testing, and purity testing.



## Delivery, Installation & Startup

All ARM Purification bulk purifiers come with a detailed user manual defining installation, startup, operation, and service procedures to support the individual installing and activating the purifier. If purchased, ARM Purification personnel will perform installation and startup, or manage the project using local contractors.





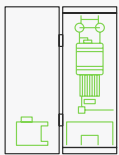
# How to Begin

It's as easy as a phone call. We will discuss your specifics: gas, flow, pressure, duty cycle, etc. To the right is a document that will help you collect the information we need in order to determine the type of technology, level of automation, and recommended options to meet your particular gas purification requirements.

Each Advantage™ Bulk Series purifier is assigned a model number that identifies the basics about the purifier. For example, it is determined that the system will purify Hydrogen gas at an 85 Nm<sup>3</sup>/hr. When quoted, the model number would be A-4009W-85-H2. The letter A indicates an Advantage™ Bulk Series purifier, 4009W indicates the vessel size and media used, 85 indicates the rated flow, and H<sub>2</sub> indicates Hydrogen gas.

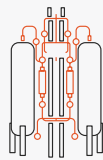
This is not the only way we identify a particular purifier. Each system is serialized with documentation that ties a particular unit back to engineering drawings, test records, control software, and unique qualities of that particular purifier, which helps us support our customers following a sale.

ARM Purification delivers a full range of point-of-use, micro-bulk and bulk purifier solutions for high and ultra high purity applications. Our proven purifiers have been trusted by the world's innovators to uphold the most stringent purity requirements for more than two decades.



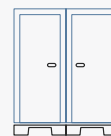
## Point-of-Use

0.1-100 slpm



## Micro-Bulk

100-1200 slpm



## Bulk

60- >5000 nm<sup>3</sup>/hr

**Contact ARM Purification**, or your local representative for assistance, or for gases and options not listed.

For more information on how we can meet your gas purification needs, visit [www.armpurification.com](http://www.armpurification.com).



BROUGHT TO YOU BY

**APPLIED ENERGY SYSTEMS**

[www.appliedenergysystems.com](http://www.appliedenergysystems.com)

180 Quaker Lane  
Malvern, PA 19355 USA  
610.647.8744  
[purification@appliedenergysystems.com](mailto:purification@appliedenergysystems.com)  
[www.armpurification.com](http://www.armpurification.com)