

CRYOVATION

Equipment Catalog



Innovative Cylinder Filling Systems

SUPERPRO™ - PUMP PROTECTION

The leading cause of pump failure is prolonged cavitation. Save money on excess repairs with one of our Pump Protection Kits!

Cavitation - Pump Prime Protection Kit

To monitor pump discharge temperature and interrupt operation if temperature rises above, and maintains for 45 seconds, a higher temperature than set point. Includes the following:

Blow-By Protection

Monitoring for cryogenic temperatures leaking or blowing-by the cold end. Preventing Drive end from freezing up.

Liquid Saver Kit

Provides remote control of liquid supply to the pump with automatic shut-off after selected time delay of inactivity

Includes liquid supply solenoid valve; fittings and safety relief for installation in liquid line, and control panel

Pump Unloader Kit

Automatically "unloads" the pressure from the pump discharge line to allow start-up against a low back-pressure. Pump life is increased and cavitation minimized. Vent silencer optional.



Super Pro Panel

Can be added to any make or model of pump





Auto CO2 Fill Manifold - Switchover

Allows for automatic switching between (2) fill manifolds upon "full" sensing of either cylinder. Includes the following:

- Control panel with necessary relays, "Ready" push-buttons, and status indicator lights
- Solenoid Valves – (2) ea. cylinder fill and (1) ea. bypass
- Scales – (2) digital, 36" platform
- Fill hoses, gauges, safety relief valves and support stand

W50 Carbon Dioxide Pump

- 50 lbs. / min. (22.7 kg. / min.) at 1500 psi maximum working pressure
- 7.5 hp motor with surge chamber, relief valve, liquid- filled pressure gauge, safety bypass valve set @ 1000 psi, cool-down valve and heavy duty base



SC-5 Low Volume CO2 pump

- SC-5 is splash lubricated
- Pumps at a rate of 6 pounds per minute
- Discharge pressure of 1200-1500 psi.



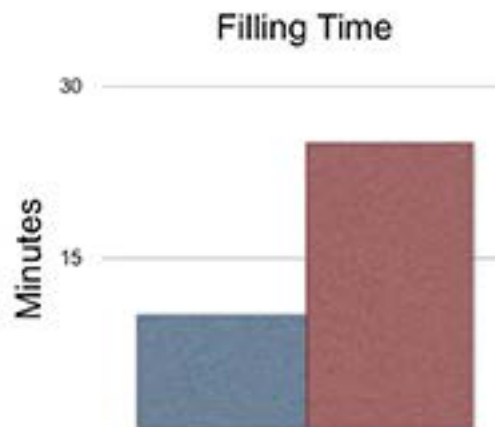
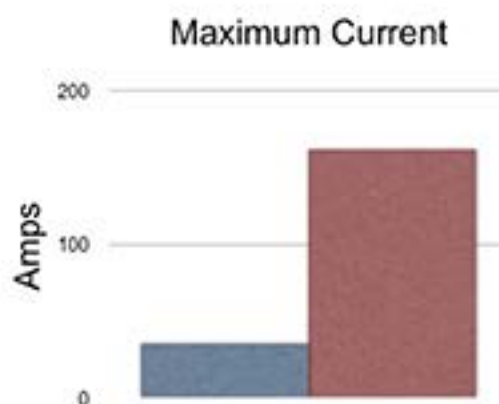
Water bath

The Fastest, Most Efficient CO2 Vaporizer



Water Bath Vaporizer

- Uses only 15 KW, less electricity than traditional electric vaporizers that generally run up to 75 KW
- Reduces fill time by 60%, no need for downstream temperature shut off valves and reheat time, you will not overrun the vaporizing capacity
- Easy to maintain and service
- Glycol and water mix prevents water from freezing, and sealed tank prevents evaporation



■ CryoVation's Water Bath Vaporizer
■ Traditional Electric Vaporizer

SUREGAS™ SYSTEM

Issue: Interrupted gas supply at pressures above 400 PSI

Many fabrication shops require a constant, uninterrupted gas supply at pressures exceeding bulk tank capability (laser cutting, injection molding, etc.). For these applications, any pause in the gas supply can result in lost productivity, ruined work-pieces, and even downtime for an entire operation.

Gas changeover manifolds can be utilized by smaller operations that are using only a limited amount of product. However, the process of delivering and changing out empty cylinders is tedious, labor intensive and expensive.



Solution: Smart Control Systems

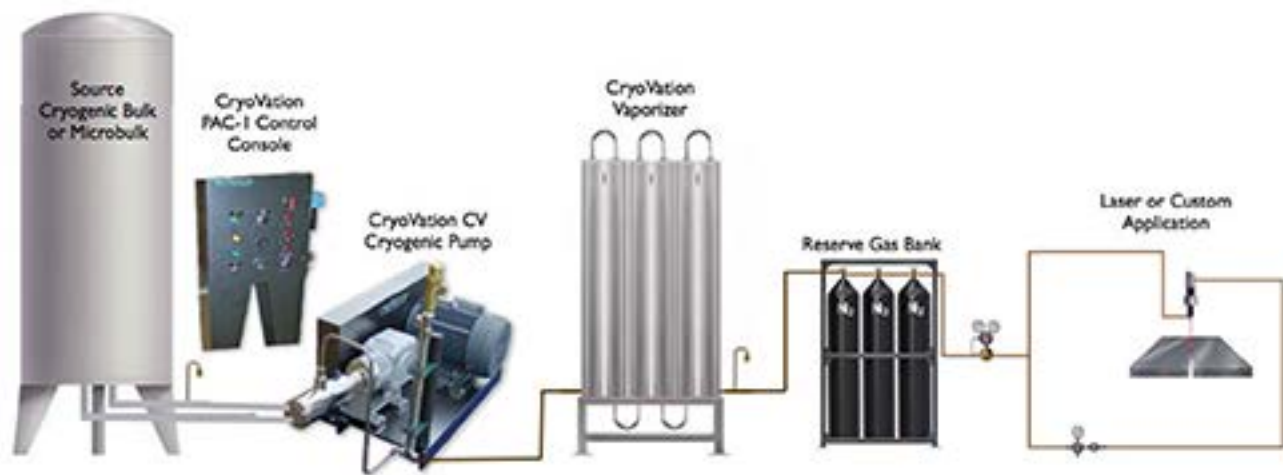
CryoVation offers its PAC-1 (Pump Automated Control) Console and its CV Cryogenic Pump to pressurize a high pressure gas pack or reserve bank of cylinders.

The PAC-1 is PLC controlled and will sense a programmed low pressure in the reserve gas bank to turn on and, at high pressure set-point, turn off again. Regulators control the desired flow of product into the building. This entire process is automated and requires virtually no human interaction as long as the liquid source is maintained.

SUREGAS

automatic gas supply system

Providing unattended and constant gas flow to keep customers producing



VAPORIZERS - LOW PRESSURE

Flow Boosting Vaporizers

The SOS Series Vaporizers are designed to quickly install on any Liquid Cylinder to increase the output gas use capacity. The SOS Vaporizer can be used with one or two cylinders. While one cylinder is "on-line" the other is on standby, with any excess pressure build-up venting into the gas use stream. Includes brass manifold, liquid and economizer hoses, check valves and vaporizer module.



SOS-500
Total Flow capacity: 500 scfh



SOS-1000
Total Flow capacity:
1000 scfh

| Part No. | AMBIENT VAPORIZERS - LOW PRESSURE, 500 PSI |
|-----------|--|
| 3026-3099 | SOS-500, Liquid Cylinder Mount, O2 service, with hoses / ftgs. |
| 3026-3101 | SOS-500, Liquid Cylinder Mount, Inert service, with hoses / ftgs. |
| 3026-3095 | SOS-500, Liquid Cylinder Mount, CO2 service, with hoses / ftgs. |
| 3026-3157 | SOS-1000, Liquid Cylinder Mount, Inert service, with hoses / ftgs. |
| 3026-3158 | SOS-1000, Liquid Cylinder Mount, O2 service, with hoses / ftgs. |
| 3026-3087 | VD1000B, 1000 SCFH, Free Standing |
| 3026-2660 | V1500ALW, 1500 SCFH, Wall / Tank Mount |
| 3026-2700 | V02KAL, 2000 SCFH |
| 3026-2701 | V02KAL, 2000 SCFH, O2 Clean |
| 3026-2760 | V04KAL, 4000 SCFH |
| 3026-2770 | V04KAL, 4000 SCFH, O2 Clean |
| 3026-2960 | V05KAL, 5000 SCFH |
| 3026-2961 | V05KAL, 5000 SCFH, O2 Clean |
| 3026-3159 | V08KAL, 8000 SCFH |
| 3026-3160 | V08KAL, 8000 SCFH, O2 Clean |
| 3026-3360 | V10KAL, 10,000 SCFH |
| 3026-3361 | V10KAL, 10,000 SCFH, O2 Clean |
| 3026-3560 | V12KAL, 12,000 SCFH |
| 3026-3561 | V12KAL, 12,000 SCFH, O2 Clean |
| 3026-3740 | V15KAL, 15,000 SCFH |
| 3026-3741 | V15KAL, 15,000 SCFH, O2 Clean |
| 3026-3965 | V18KAL, 18,000 SCFH |
| 3026-3966 | V18KAL, 18,000 SCFH, O2 Clean |
| 3026-3970 | V22KAL, 22,000 SCFH |
| 3026-3971 | V22KAL, 22,000 SCFH, O2 Clean |

VAPORIZERS - HIGH PRESSURE

Ambient Vaporizers

Ambient vaporizers are manufactured in a wide range of sizes and working pressures:

- ☒ • High Pressure – 4000 psi & 6000 psi
- ☒ • Size – Calculated based upon fluid, duty cycle, climate and pressure
- ☒ • Tubing – Stainless, Brass & Monel



| AMBIENT VAPORIZERS - HIGH PRESSURE, 4000 PSI | |
|--|--|
| 3046-2880 | V05KSS, 5000 SCFH, Stainless steel lined, Inert Service |
| 3046-2881 | V05KSS, 5000 SCFH, Stainless steel lined, Oxygen service |
| 3046-3280 | V08KSS, 8000 SCFH, Stainless steel lined, Inert Service |
| 3046-3281 | V08KSS, 8000 SCFH, Stainless steel lined, Oxygen Service |
| 3046-3480 | V10KSS, 10,000 SCFH, Stainless steel lined, Inert Service |
| 3046-3481 | V10KSS, 10,000 SCFH, Stainless steel lined, Oxygen Service |
| 3046-3400 | V10KBR, 10,000 SCFH, Brass lined, 3600 PSI |
| 3046-3680 | V12KSS, 12,000 SCFH, Stainless steel lined, Inert Service |
| 3046-3681 | V12KSS, 12,000 SCFH, Stainless steel lined, Oxygen Service |
| 3046-3600 | V12KBR, 12,000 SCFH, Brass lined, 3600 PSI |
| 3046-3860 | V15KSS, 15,000 SCFH, Stainless steel lined, Inert Service |
| 3046-3862 | V15KSS, 15,000 SCFH, Stainless steel lined, Oxygen Service |
| 3046-3780 | V15KBR, 15,000 SCFH, Brass lined, 3600 PSI |
| 3046-3970 | V18KSS, 18,000 SCFH, Stainless steel lined, Inert Service |
| 3046-3971 | V18KSS, 18,000 SCFH, Stainless steel lined, Oxygen Service |
| 3046-3990 | V18KBR, 18,000 SCFH, Brass lined, 3600 PSI |
| 3046-4010 | V22KSS, 22,000 SCFH, Stainless steel lined, Inert Service |
| 3046-4012 | V22KSS, 22,000 SCFH, Stainless steel lined, Oxygen Service |
| 3046-4011 | V22KBR, 22,000 SCFH, Brass lined, 3600 PSI |

| AMBIENT VAPORIZERS - ULTRA HIGH PRESSURE, 6000 PSI | |
|--|---|
| 3066-2900 | V05KSS6, 5000 SCFH, Stainless steel lined |
| 3066-3300 | V08KSS6, 8000 SCFH, Stainless steel lined |
| 3066-3500 | V10KSS6, 10,000 SCFH, Stainless steel lined |
| 3066-3700 | V12KSS6, 12,000 SCFH, Stainless steel lined |
| 3066-3880 | V15KSS6, 15,000 SCFH, Stainless steel lined |

VAPORIZER ACCESSORIES

Fan Ambient Vaporizer

Improve vaporizer rating up to 100% by adding thermoswitch, automatically controlled fan to push air through fins

☒ Includes 34" Enclosed Steel Fan, Thermocouple, Temperature controller and motor starter control box



Vaporizer Segment System

Split an existing vaporizer (or connecting 2 separate vaporizers) with an automatic valve and temperature controller. When cold temperature is sensed past the vaporizer, the valve opens and allows for additional vaporization. Available for LIN / LAR / LOX Service

CONTROL PANELS



Pure Gas



5 Gas Mix Panel with Fill-Free™



5 Gas Mix Panel



FILL-FREE™ - Semi - AUTOMATED

Fill-Free™ 1.0

Add new technology to your old fill system!

The Fill-Free™ 1.0 semi-automated control package can be added to an existing filling system or built into a new panel like the one at left. The system as shown includes:

- ☒ • Panel Mount, Color Touch Screen
- ☒ • Pressure Transducers (2)
- ☒ • Vacuum Transducer (1)
 - Programmable Controller (PLC) with fill "recipes"

The Fill-Free™ 1.0 allows the operator to enter the desired DOT fill pressure and vacuum level, on either the Manifold "A" or "B" set-up screen, and start the fill process. The cylinder temperature is monitored and the ultimate fill pressure is automatically calculated and displayed.

The operator is alerted at vent completion, at vacuum completion, and for leak check during fill cycle. Once full, the pump is automatically stopped and the operator is again alerted. Optional high-pressure valves may be added to shut off the vent, vacuum and/or fill lines.



Automated Filling With Touch-Screen Controls



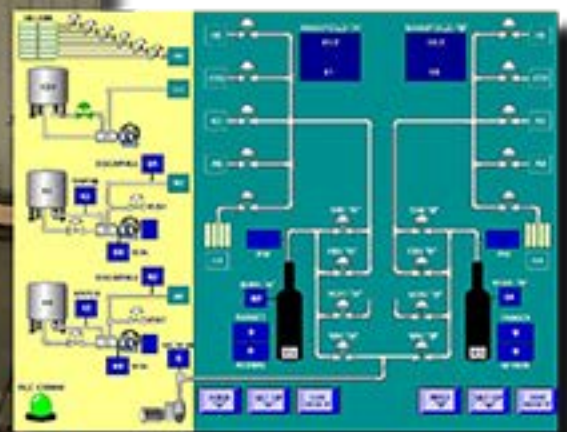
Fill-Free™ 2.0

Similar to above Fill-Free™ 1.0, but programmed with all of customer's mix "Recipes" to guide operator through accurate mixture filling

FILL-FREE™ - AUTOMATED

Fill-Free™ 4.0 and 5.0 Automatic Cylinder Filling System

- ☒ • Completely automatic, unattended filling of high-pressure oxygen or mixed gases
- ☒ • Control system with Mitsubishi PLC controller for all input and output interfacing with all other major components. Program is designed, installed tested and design-protected by CryoVatic
- ☒ • Temperature/pressure filling of oxygen
- ☒ • Gravimetric filling of mixes and pure inert gases
- ☒ • PC supported, full-color 19" "touch-screen" display, Wonderware® (windows-based) software.
- ☒ • Enclosure, NEMA 4, housing all control components; free standing
- ☒ • Control valve manifold with air-actuated valves
- ☒ • Audible or visual signaling of leak check requirement
- ☒ • Ethernet connection for remote monitoring
- ☒ • Control panel for manual operation.



FILL RACKS

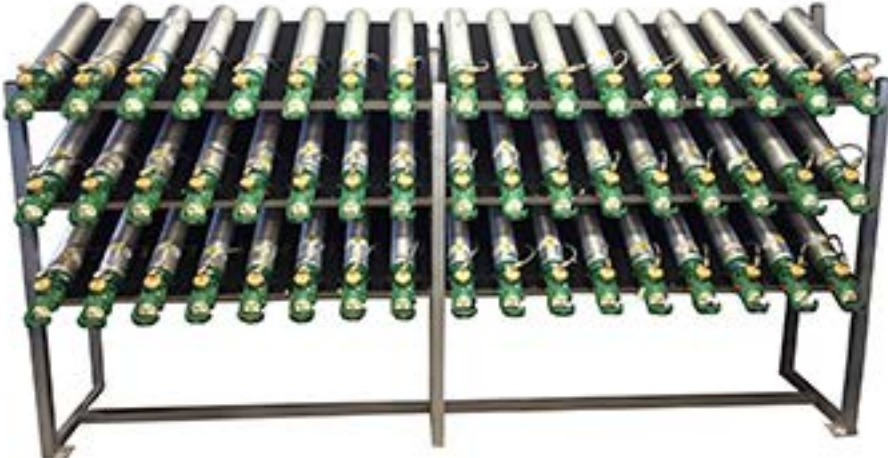
Starboard R20 Rack



A-Frame Rack



R60 Rack



PSC-52 Rack



R30 Rack



MEDICAL O2 FILL SYSTEMS

PPS 2500, 5000 and 10,000

CryoVation manufactures several self-contained filling systems, with volumes ranging from 2,500 scfh to 10,000 scfh



Portable Pumping System for Mobile, On-Site Filling



MOBILE FILLING SYSTEMS

CryoVation's turnkey mobile filling systems give you the competitive advantage! Simplify your distribution chain by bringing gas and liquid oxygen directly to your customers and filling their cylinders on site.



With mobile filling, the gas supplier can bring product to the DME provider, so that oxygen cylinders never have to leave the DME's provider's possession.

A mobile filling system also allows you to easily move your operations base, anytime you want.

CryoVation can build a system for you in either a cargo trailer or box truck, and tailor it to meet your needs with features such as a built-in storage and workbench, lighting, designated electrical outlets, upgraded racking, built-in generators, heat/air conditioning, analytic station and more.

Benefits:

- ☒ ● Reduction in cylinder handling
- ☒ ● Reduction in costs
- ☒ ● Improved sanitation/reduced infection risk
- ☒ ● Reduction in cylinder inventory
- ☒ ● Improved asset management and control of your oxygen inventory

Operational and FDA Compliance training are also available

MOBILE FILLING SYSTEMS

We offer the choice of a Box Truck or Cargo Trailer with interior layout options

Standard Features

Diamond-plated walls
Diamond-plated floor
Reinforced sub-floor
Ventilation system
Electric outlets/switches
Onboard generator

Customizable Features

Storage cabinet
Workbench
Additional lighting
Fans
Manifolds
Analytic station

Safety is very important when handling oxygen, so the CryoVation system is equipped with pressure and temperature safeties. Additionally, all contacting surfaces are specially cleaned and the excess product is carefully vented outside through a muffler.

Once the system is installed, CryoVation will provide 1-2 days of operational training. We also offer FDA compliance training.

Two types of fill racks are available: a traditional linear design, or inverted fill racks. Both allow you to customize the number of cylinders you fill at one time from 20 to 200.



Accessorize:

CryoVation offers all the accessories needed to fully equip your mobile filling system, including Servomex analyzers, cylinder storage and transport carts, calibration gases, cylinder seals and labels, thermometers and more.



MEDICAL OXYGEN SUPPORT SERVICES



Recalibration / Recertification

- Gauges certified by CryoVation are traceable to N.I.S.T.
- CryoVation certification and oxygen cleaning practices meet FDA requirements used for filling Medical Grade
- According to the CGMP (Current Good Manufacturing Practices), the pressure and vacuum gauges as well as thermometer used for filling Medical Grade
- Oxygen must have annual recalibration by a certified NIST traceable gauge
- CryoVation provides customers with required documentation for your SOP manual traceable to N.I.S.T.



Model 5200 Servomex Analyzer

Ideal for the verification of oxygen concentration in industrial gas manufacture and oxygen transfilling. Easy to set up and operate. Meets all US FDA requirements for oxygen transfilling. Fully portable, with power supply included.

Regulators, fittings and hoses needed to calibrate analyzer and analyze CGA 540 and 870 style cylinders. Calibration gases not included.



Spare Set of Gauges

Includes back-up 6" Perma Cal and 4" McDaniels, gauges, Oxygen clean and certified, making annual recertification easier.

Analyzer Support Package

Regulators, fittings and hoses needed to calibrate analyzer and analyze CGA 540 and 870 style cylinders. Calibration gases not included



On-Site Compliance Service

Personal, on-site compliance training by CryoVation's FDA consultant. Includes personalized SOP manual and 2 days on site.

SPECIALTY GAS CONTROLS

Complete Specialty Gas Capabilities

- ☒ • Training and support
- ☒ • Full line of equipment manufactured in-house
- ☒ • Rollers, analyzers, purifiers, bakeout systems, manifolds and controls



Level 1: Take your existing gases (N₂, O₂, Ar, CO₂, He) to the next level using gravimetric and basic specialty gas analysis to achieve 10 ppm, UHP, USP, NF, zero gas, pure gas and blends.

Recommended equipment package includes: Spec gas panel with gravimetric option, high accuracy scale, radial manifold, linear manifold, and reserve gas banks for each product. Additional options include bakeout ovens and cylinder rollers.

Level 2: Introduce specialty and rare gases (H₂, CH₄, CO, Ethane, Ethylene, Propane, etc.) into the mix.

Recommended equipment package includes: Auxiliary panel, supply manifold for each product and additional analyticals.

Level 3: Add reactives and acidics.

Recommended equipment package includes: Separate panel, manifolding, scrubbers and abatement system.

SPECIALTY GAS CONTROLS

fusion

GRAVIMETRIC 10-GAS BLEND SYSTEM

- Large Color Touchscreen HMI
- ☒ ● PLC Control and Recipe Guide
- ☒ ● Sartorius Cylinder Filling Scale with 150 Kg capacity and 0.1 g accuracy
- ☒ ● Built-In High Vacuum Pump System
- ☒ ● Multiple Pressure and Vacuum Transducers
- ☒ ● 10-Gas Swing-Arm Selector
- ☒ ● Pump Start/Stop
- ☒ ● Additional Gravimetric Fill Lead for Primary Standards Production
- ☒ ● Scale Booth Enclosure with our New Stabilizer Arm
- ☒ ● 12 Cylinder Radial Manifold with individual isolation valves
- ☒ ● Ethernet Module for Remote Access



Fusion-10 Gravimetric Gas Blending Panel



BAKE-OUT SYSTEM

Cylinder Bake-Out System

Designed to prepare cylinders for specialty gas service by drying the internal cylinder walls. Cylinders are prepared by insertion into the bake-out enclosure that externally heats the cylinders. Simultaneously the cylinders are under a high vacuum to remove entrapped moisture. A Cold Trap, filled with liquid nitrogen, traps moisture before it can enter the vacuum pump. Likewise, the Trap also eliminates any possibility of lubrication molecules from back-flowing to the cylinders. An optional purge cycle is available.



- 12, 15 and 21 Cylinder Capacity
- All aluminum, double-wall insulated enclosure with convective heating system, thermostatic control and over-temperature safety switch
- PLC controlled cycle operation High Vacuum Meter, micron range Stainless Steel Vacuum
- Header with purge valve, Vacuum Pump Isolation Valve, Vacuum Gauge (reference), Vacuum Probe (for high vacuum meter) and flexible hoses with CGA-580 connections
- Hinged loading door with power interrupt safety switch
- Removable Lids
- Cold Trap – Free-standing all stainless steel with removable LN2 sump
- Touch Screen Control



CYLINDER ROLLERS & INVERTERS



SCGR-4 Cylinder Gas Mixing Roller

4-cylinder capacity (shown above) includes:

- Air actuated cylinder tilt rack
- Electrical control system to provide automatic, time delayed reversal of rolling direction
- Cylinder rollers, non-mar
- Safety Bar

Cylinder Inverter



Voltage options:

- 110v or 220v single-phase, or 240/480 3-phase

Also available in 2- and 6-cylinder capacity

PURIFIERS



Purifier, Trace Oxygen Removal

Deoxo 2.0 Purifier, 15,000 scfh inert gas capacity at 3000 PSI maximum working pressure



Purifier, Trace Moisture Removal

DeHydro 2.0 Purifier, 15,000 scfh inert gas capacity at 3000 PSI mawp



Helium Purifier

3 in 1 Purification System

The CryoVation Grade 6.0 Helium Purification System is designed to purify inert gases utilizing three unique Purifiers either individually or in series. The Purifier System is comprised of the following:

- Deoxo 2.0 Purifier
- DeHydro 2.0 Purifier,
- Helium Purifier System



Analytical Control Panel- Cabinet or In-Wall Mounting

Custom analyzer cabinets are built to suit the customer's requirements. Includes support gas and sample inputs. Each analyzer control has a bypass flow meter, purge and sample needle valves and sample source 5-way valve. The package has two sample headers.

Support gas connections include all zero and span gases and fuel and air for the HC analyzer.





SequeFill™ Automated CO2 Cylinder Filling System

Provides sequential, unattended filling of palletized cylinders, liquid cylinders or manifolded "packs."

Fill palletized CO2 or N2O cylinders automatically



System includes the following:

- Control console with Mitsubishi PLC, operator interface display station with data entry keypad, digital weight display, emergency stop button and keyed On/Off switch.
- Platform scale, 5000-pound capacity (2272 kg.)
- Retracto manifold with retractable fill hoses, individual air-actuated ball valves, air-actuated control valves vent, vacuum, fill and bypass), pressure transducer, vacuum switch safety relief valves and aluminum frame with customer decaled side panels
- Variable frequency controller to adjust pump motor speed.

Also available for nitrous oxide service



Reduces labor while providing consistent fill results



Self Contained Filling System

Factory assembled and tested complete pumping unit. Available in flow rates of 2,500 to 10,000 SCFH and pressures to 6000 PSI.

Argon/Nitrogen/CO₂/O₂ service, complete with the following components:

- ☒ ● Cryogenic Pump
- ☒ ● Vacuum Pump
- ☒ ● Electrical Control Panel
- ☒ ● Vaporizer
- ☒ ● Duplex Control Panel
- ☒ ● Heavy Steel Skid
- ☒ ● Fill Manifolds

Built-in safety features include over-pressure, cavitation and under-temperature shut-off switches, high pressure safety relief valve and over-pressurization vacuum line safety relief.



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