Gas Purification UHP Helium

. . . for GC & [GC/MS] see FlipPAGE Catalog Restek; VICI Valco

Improved Performance
TEE Ball Valve VENT V1

Helium Gas Supply
Industrial
99.95% MIN

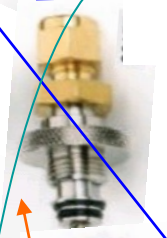
GasCon UltraHigh Purity Helium Regulator
(SS Diaphram Nickel-plated Brass

1

22605

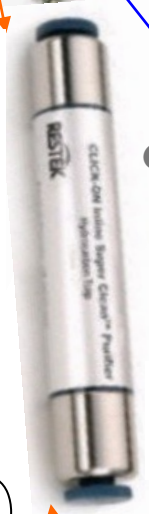
VICI –

22600
HCs
moisture
O2



22475

2



Click-on

22468

22479

22474

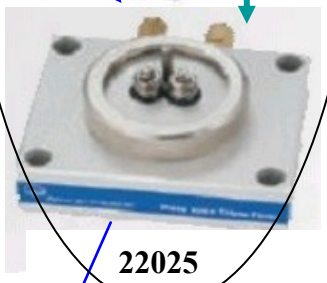
Indicator
OXYTrap

22010

moisture
O2

22020

HCs
moisture
O2



22025

Super Clean System

3

20623 (O2)

High Capacity
Ind. OxyTrap
replaceable cartridge

4

"self-piercing" Air-free connection

Improved Performance
2-Way Ball Valve V2

Click-on System

GC/MS

Gas Purification UHP Helium

. . . for GC & [GC/MS] see FlipPAGE Catalog Restek; VICI Valco

Simple Helium Gas Purifier System
Options for GC/MS

99.95% Start He Gas > <<1ppM 02 hopefully

1

1 VICI-Matsen Helium Purifier (High Capacity ~4 Cylinders) **#22600**
In-line Indicating OxyTrap #22019

2

2 Click-On System *(self-piercing connectors - minimum Air ingress)*
#22475 Click-on End-Connector
High Capacity Click-On OxyTrap #22468
#22479 Click-on Double Trap Connector
Click-On Indicator Trap #22474

3

3 Super-Clean System
3x Adsorbent **Replacement Cartridge #22020**
Fixed Base Plate #22025

4

4 High Capacity Oxytrap #20623
(replacement Cartidges #20625 are self-piercing - minimum Air ingress)

Ultra High Purity Gascon Helium Regulator HD5S-A-700-GGP-T10-F/A-He

A10 Bottle spiggot Fitting
Option (but redundant Diaphram or Needle Valve)

SS Ball Valve Improved design
(MAX 0.1cc/min N2 @1000psi leak tested / certified)
2-Way Gas Isolation > when GC/MS Off- V1 *line*
Tee-Valve > for venting V2

Assumptions : for a Basic Capillary GC /MS

Single column 5cc./min He Max operating, "spasmodic" Splitter operation @ 50ml/min
NO leaks >220cubft cylinder should last 400 days if left running 24/7

Changing of cylinder and venting will help preserve Oxytraps
Indicator trap on outlet of Main OxyTrap (non-see thru') is essential
Assume Commercial Helium is suspect and 99.95% purity is OK but triple traps recommended to ensure <1ppM moisture, HCs clean up

High Purity Helium assumed 10-100ppM impurities
but NO guarantees commercially in practice

Gas Purification UHP Helium

. . . for GC & [GC/MS] see FlipPAGE Catalog Restek; VICI Valco

Some Hints

Re Installation :

Use a High Purity Gas Regulator - Ni-plated brass body is OK
- SS diaphragm is essential.
Optional : On/off Valve allows isolation of the Regulator during trap replacement etc.
Mount Traps in a vertical position (or at an angle) packing settles in time .
and channelling can occur where Helium may tend to by pass the absorbent.
Always use Chromatography Grade (heat-clean)ed SS tubing for transfer lines.

- *When leak checking > Human Nature is to over-tighten adfinitum.*
  - DON'T—eventually the cone on Swagelok will "bell out "and seal will be compromised
- *Do Not mix and match different brands of fittings and ferrules Swagelok and Parker maybe*
  > but NOT good practice.
- *NEVER use Sulfinert/Silcosteel ferrules in similarly treated fittings they just do NOT seal at all*
  – like sand paper on sand paper !
- *Teflon Thread sealing Tape can be of marginal use Teflon tends to be air porous at trace levels.*
  Ultra High Purity threads generally us industrial thread "goo" wax such fittings ca be very difficult to disassemble without proper tools (WE don't do it due to risk od damaging scoring expensive fittings regulators etc DO IT AT YOUR OWN RISK !
- *Use old fittings ferrules tubing sets at YOUR RISK !*
  You can ruin expensive Oxytraps and GC columns and Mass Spec filament if ANY leaks.
- *Never use industrial Regulators these have rubber diaphragms and infuse air badly (albeit at "trace" levels but disastrous long term for Oxytraps columns etc.*
- *An Oxytrap properly used will absorb uo tp 1000cc of O2 depending on size of trap etc.*
  Manually changing traps etc can easily ingress 10cc of Air if you are not careful.
- *Regulators can have a dead volume of 100 to500ul and should be sensibly purged when changing cylinders and traps.*
- *For both GC and particularly GC/MS use an isolation valve on inlet of GC.*
  On standby/closedown the GC System can back diffuse air throughout the system.
  Any dead pockets in fittings, Tees gauges can act as exponential dilution flask and take "hours" to slowly diffuse air out.
- *Of course any rubber diaphragm, O-rings Teflon Components will slowly release absorbed air/O2.*
  - *30mins purge time from start-up is recommended before heating columns or activating a Mass Spec*
- *NEVER EVER use water or SNOOP Leak Detector solution on ANY fitting columns connectors etc*
  Even against positive pressure this "contamination can diffuse in.
- *Use a Electronic Leak Detector.*
  MORE > Use a bit of "common sense" !
- *DON'T Let a "bean counter" or "bush mechanic" anywhere near your GC/MS with a 24" Shifter spanner.*
  "False Economy" by skimping on maintenance and old parts - you are dealing with expensive delicate instrument (100's of 1000's of $$$'s maybe " think of the consequence due to ANY down time !
- *ALWAYS use a secondary Indicator Trap DON'T rely on Unsight(ly) manifold systems mounted Traps*
- *Install Oxytrap (preferably am Indicating type) close to the GC AND actually look at the indicator as they get used Chenge the "Main" Trap on the first change in color.*

despite the high cost they can be still ultimately COST EFFECTIVE !

Capillary GC

FERRULES

Graphite : Whilst 100% Graphite are perfectly satisfactory for conventional GC and the "crushed semi laminated" structure can diffuse "trace" amounts of air in a much more sensitive GC/Mass system.
for GC/MS use **15%Graphite/Vespel(polyimide)** for ALL column connections.
MAX recommended temperature (320degC) > they tend to shrink/crack/leak etc
or column High Temperature Application use MXT Columns (as inert as fused silica) use graphite ferrules in a "Capture-type" fitting configuration (custom).
- precondition at maximum Column Temperature in the GC oven - to minimise any potential bleed finger-handling contamination
100% Vespel tends to shrink on heating and the harder material requires more finesse in tightening onto fused silica columns
For glass (packed) GC Columns 100% Graphite is the preferred material (re softness/malleability
- minimise columns breakage etc or with care **15%Graphite/Poyimide) -**
- never use Teflon (transition point at about room temperature columns can even actually fall out on cooling if mounted in a vertical position.

Inlet Liners

- ***Siltek Deactivated Liners*** *: highly inert ! . . . similar to Restek column deactivation Rxu-1m Rxu-5 etc*

Gas Purification UHP Helium

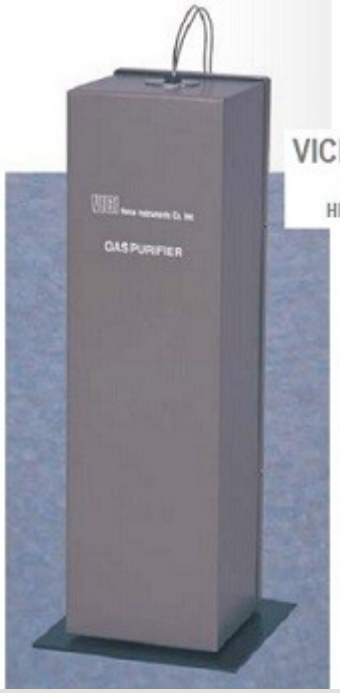
. . . for GC & [GC/MS] see FlipPAGE Catalog Restek; VICI Valco

UHP Gas Regulator

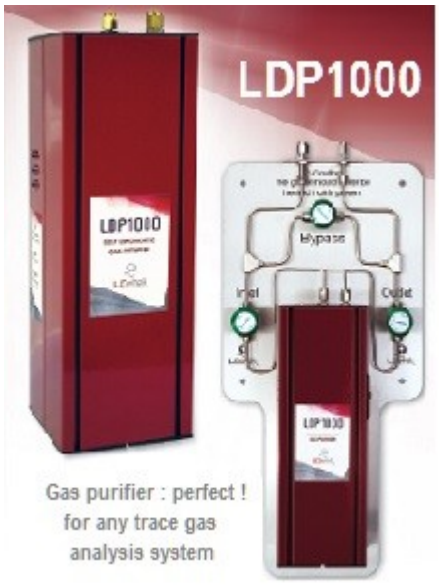
HD5S-A-700-GGP-T10-F/A-He $780
SS Diaphram Ni-plated Brass Body
A10 Spiggot Helium Australian
1/8 Swagelok Fitting Outlet
300psig Max
Outlet 100psi(or optional)
Optional On/OFF Valve

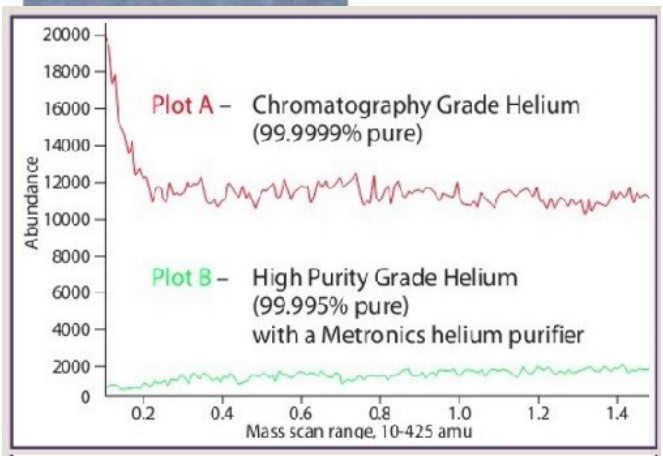
UltraHigh Purity Helium

(UHP) Multi GC/MS
System Purifier - ***High(er) Capacity***
Use a "getter" System
VICI-Valco see FlipPAGE Catalog
Standard Helium HP2-220 $1750
mini Helium Purifier HPM-220 $1230



UltraHighPurity ***2-stage for High Purity*** Gas Analysers
LDetek LDP1000 ~$7500
see PDF inc **APP Note**





V1
V2

Ball Valve Isolation & Venting

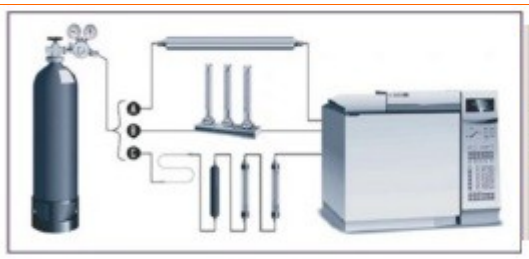
To be advised Standard Industrial Ball are ABSOLUTELY USELESS !
Even most Precision Engineered versions have Teflon Ball CTFE Seats or Teflon-coated internal components whilst the better ones are certified to MAX N2 leak test of 0.1cc/min at 1000psi.
Few if ANY OEMS are "game enough" to rate them for GC/MS use re Air in-diffusion.

Chromtech is independantly "sourcing" similarly Valves with PEEK innards to absolutely Minimise these potential problems
ASK for more details !

INVEST IN PROPERLY DESIGNED Quick-Connect Traps such as Click-on or Easy-Clean . . .

Gas Purification UHP Helium

. . . for GC & [GC/MS] see FlipPAGE Catalog Restek; VICI Valco



Some Pricing : *Ex GST etc July 2017 USD/AUD 0.72) Indicative ONLY Call or ASK for QUOTATION*

see details / more Restek FlipPAGE Catalog Gas Management Systems

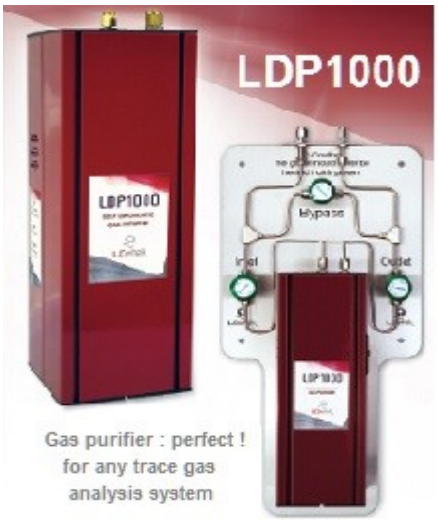
22600 Purifier Module Helium 1/4in Fittings : $610 see also VICIValco FlipPAGE MS-P100-1 $575 minimises number of fittings but use with an Indicating Trap as well
22010 Trap Oxygen Indicating 1/8in Fittings $337
22019 Super-Clean Gas Filters Complete Carrier Gas Filter Kit. Baseplate and Triple Filter. Oxygen ,Moisture and Hydrocarbon trap (1/8in) :$932
22468 Super-Clean Click-on Trap Replacement Oxygen Trap Ultra High Capacity : $295
22479 Click-On Trap Connectors Double Connector : $535
22474 Super-Clean Click-on Trap Indicating Cartridge : $306
22020 Super-Clean Gas Filters Replacement Triple Trap for Carrier Gas. Filters Oxygen, Moisture & Hydrocarbons :$395
22025 Super-Clean Baseplate Single Position Baseplate for One Cartridge Filter 1/8in Brass Fittings : $547
20623 Trap Oxygen Indicating High Capacity 1/4" Fittings : $747
20625 Trap Oxygen Indicating High Capacity Refill Cartridge For Cat #'s 20624/20623 Only : $569

UHP Gas Regulator

HD5S-A-700-GGP-T10-F/A-He $780
SS Diaphram Ni-plated Brass Body Helium Australian A10 Spiggot On/OFF Valve 1/8 Swagelok Fitting Outlet

UltraHigh Purity Helium (UHP) Multi GC/MS System Purifier - ***High(er) Capacity***

Use a "getter" System
VICI-Valco see FlipPAGE Catalog
Standard Helium HP2-220 $1750
mini Helium Purifier HPM-220 $1230
UltraHighPurity 2-stage for HighPurity Gas Analysers LDetek LDP1000 ~$7500.
see PDF inc **APP Note**



V1
V2

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Chromtech is independantly "sourcing" similarly Valves with PEEK innards to absolutely Minimise these potential problems
ASK for more details !

LDP1000 SERIES

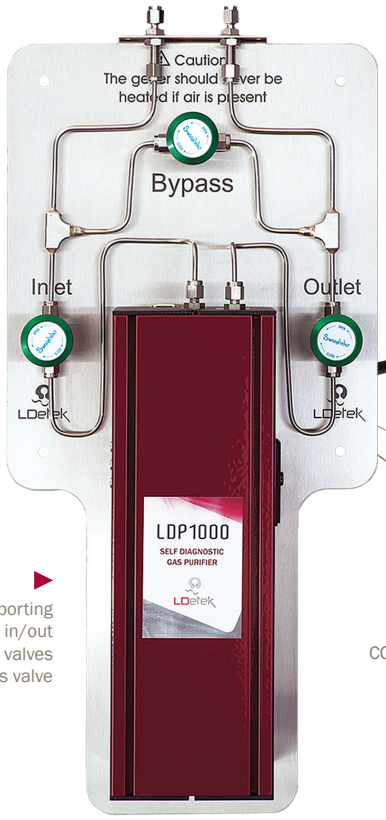
GAS PURIFIER COMPATIBLE WITH ANY TRACE GAS ANALYSIS SYSTEM

The LDP1000 series is a sub ppb purifier used for generating high purity calibration gas for online analyzers as well as generating high purity carrier gas for gas chromatograph.

Designed with two steps of purification, this purifier design ensures no undesired impurity is released during process.

WHY CHOOSING LDP1000 SERIES ?

- **2 beds of purification**
  Allows perfect purification
- **RS-232 port**
  Monitor the temperature of the 2 beds of purification
- **LEDs indication**
  Self-diagnostic and status of the purifier
- **Cost effective solution for long-term use**
  Interchangeable getter
- **Available in different format**
  Compact version makes it ideal when space is limited
- **Real end of life monitoring**
  Combined with PED technology and MultiDetek series, LDP1000 series gas purity can be monitored in real time to offer real auto diagnostic.



Optional supporting plate with in/out isolation valves and bypass valve

COMPACT-LDP1000 version

SPECIFICATIONS:

GETTER TYPE	Alloy of Zr/V/Fe 2 beds (350 and 200 Celsius)
GASES PURIFIED	Ar/He/Ne/Xe/Kr - Nitrogen and hydrogen version available
IMPURITIES REMOVED	H2O,O2,CO,CO2,N2,THC, H2, CH4 (heated) H2O,O2,CO,CO2,H2 (room temperature)
IMPURITY LEVEL	<10 ppb and <1 ppb available
FLOW	200 cc/min (nominal) Higher flow rate version available (contact LDetek for more details)
GAS CONNECTIONS	1/16'' – 1/8'' – 1/4'' compression or VCR®
RECOMMENDED OPERATING PRESSURE	100 PSIG (689 kPAG)
SUPPLY	120 VAC, 50 – 60 Hz or 220 VAC, 50 – 60 Hz
POWER CONSUMPTION	Start-up : maximum 200 Watts (allows quick start-up) Normal operation : maximum 50 Watts (designed for low consumption)
WEIGHT	5 lbs (2.26 kg) LDP1000 2 lbs (0.90 kg) Compact-LDP1000

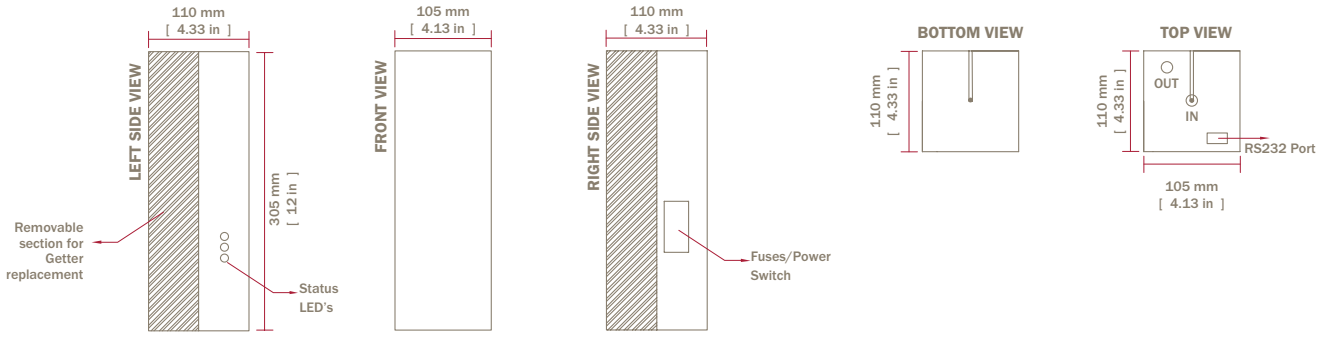
CERTIFICATION:

CE In compliance with EMC directive 2004/108/EC, EN 61000-6-2:2005 for immunity & EN 61000-6-4:2007 for emissions.

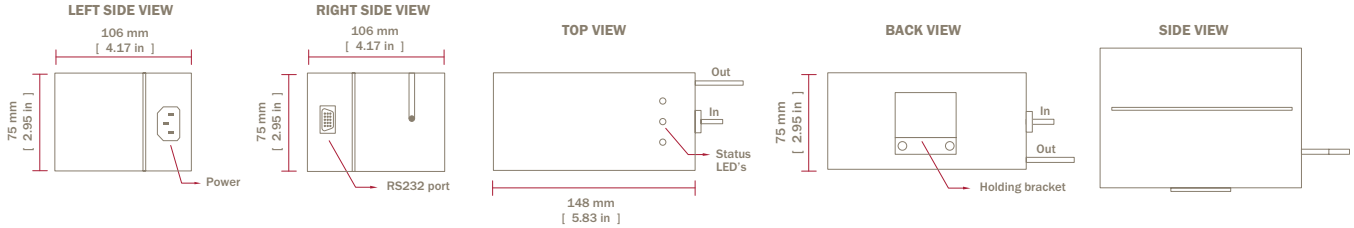
ORDERING INFORMATION:

LDP1000, COMPACT-LDP1000 OR GETTER	-XXX	-X	-X	-X	-X
	Operating Voltage: 120 volts **(-120)** 220 volts **(-220)**	Gas type: **None:** Noble gases **N:** Nitrogen version **H:** Hydrogen	Connection size: **1/16''** **1/8''** **1/4''**	Connection Type: Compression **(-C)** VCR **(-V)**	Supporting plate: **None:** no plate **P :** Stainless steel supporting plate with high purity bypass valve & 2 in/out isolation valves

DIMENSIONS LDP1000:

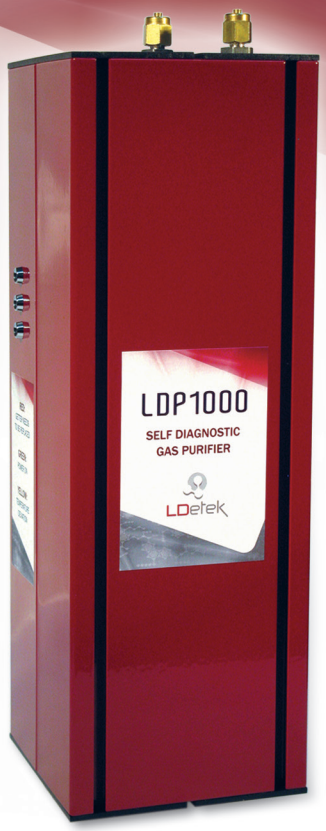


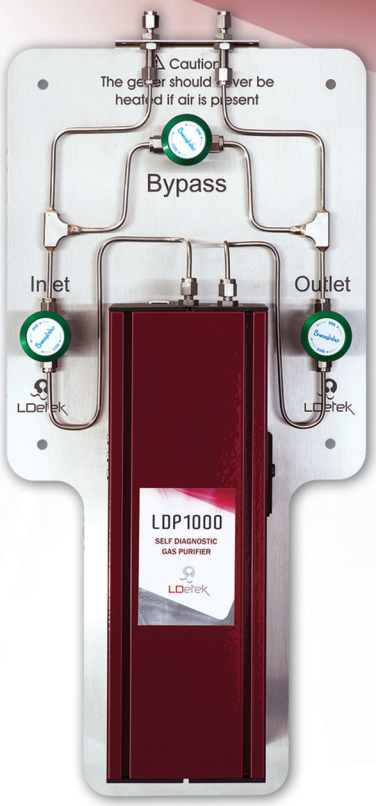
DIMENSIONS COMPACT-LDP1000:



LDP1000

Gas purifier perfect for any trace gas analyzer system





The LDP1000 is sub ppb purifier ideal for calibration gas for online analyzer as well as carrier gas for Chromatograph.

Its two steps purification design ensures that no undesired impurity is released from the purifier.

> FEATURES:

- Compact design
- 2 steps purification
- Interchangeable getter
- Easy-to-use
- Internal heater, insulation and electronics assembly
- Temperature controlled unit for better performance
- Nitrogen version available

> APPLICATIONS:

- Zero calibration gas
- Carrier gas purifier
- Mass spectrometer
- Ideal as reference gas for TCD

LDetek

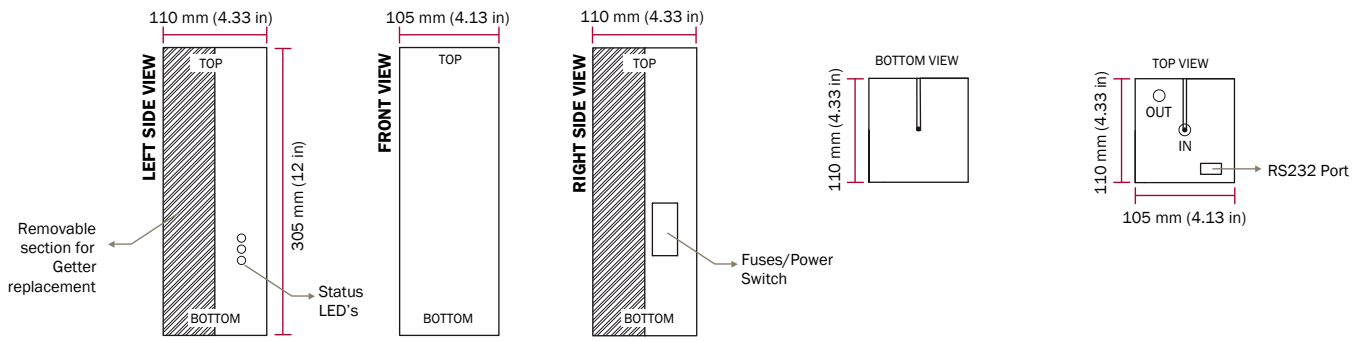
> SPECIFICATIONS:

GETTER TYPE	Alloy of Zr/V/Fe 2 beds (350 and 200 Celsius)
GASES PURIFIED	Ar/He/Ne/Xe/Kr. Nitrogen and hydrogen version available.
IMPURITIES REMOVED	H_2O,O_2,CO,CO_2,N_2,THC, H_2, CH_4 (Heated) H_2O,O_2,CO,CO_2,H_2 (room temperature)
IMPURITY LEVEL	<10ppb and <1 ppb available
FLOW	200 cc/min (nominal)
GAS CONNECTIONS	1/16''– 1/8''– 1/4'' compression or VCR®
RECOMMENDED OPERATING PRESSURE	100 PSIG (689 kPAG)
MINIMUM OPERATING PRESSURE	10 PSIG (28 kPAG) optional 1 PSIG (7 kPAG)
SUPPLY	120 VAC, 50 – 60 Hz or 220 VAC, 50 – 60 Hz
POWER CONSUMPTION	Maximum 200 watts
DIMENSIONS	12" (304.8) high, 4.12" (104 mm) deep, 4.25" (108 mm) wide
WEIGHT	5 lbs (2.26 kg)

> PART ORDERING:

LDP1000 OR GETTER	**-XXX**	**-X**	**-X**	**-X**	**-X**
	Operating Voltage	Gas type	Connection size	Connection Type	Supporting plate
	120 Volts (-120) 220 Volts (-220)	None: Noble gases N: Nitrogen version H : Hydrogen	1/16'' 1/8'' 1/4''	Compression (-C) VCR (-V)	None : no plate P : supporting plate with bypass valves

> DIMENSIONS:



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APPLICATION NOTE
LD12-5

Improving Gas Chromatograph measurements with the use of the LDP1000 gas purifier.

When measuring low level of impurity by gas chromatography, the carrier gas quality is quite important. Since the carrier gas is the reference gas for the device, good precaution to provide pure carrier is required. Using a grade 5 (99.999% pure) or grade 6 (99.9999%) is not enough is some cases. Even more, it is well known that many problems can simply come from the use of a bad quality gas cylinder or leakage on pressure regulator after cylinders manipulation. By using the LDP1000, it gives the certitude it catches all impurities coming from the carrier gas lines although you have sources of contamination.

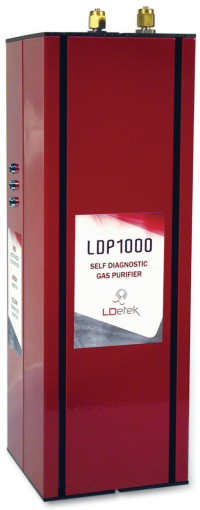
The LDP1000 purifies noble gases, nitrogen or hydrogen at level that give the best reference for any gas chromatograph and GC/MS. It's non-evaporable zirconium-based getter alloy is contained in a 316L Stainless Steel bloc to ensure high purity and safe operating mode. It removes impurities down to ppt level (total impurities).

> LDP1000 DESIGN

The LDP1000 gas purifier is designed to be used with any noble gases, nitrogen or hydrogen. Its changeable getter gives the possibility to avoid changing the whole unit but only the consumable parts inside. That is a cost effective solution for long term use.

Having an accurate temperature control for such purifier is critical. The LDP1000 is based on a microcontroller unit that regulates the temperature of the getter to ensure stability on the purity and maximum purification. An over temperature protection is also in place to ensure safety of the unit

Its mechanical design allows to use it on a table in a laboratory as well as in the industry with its holding plates. The bypass plate option gives also the necessary installation for maintenance purpose to avoid contamination and flow shutdown to the gas chromatograph.



LDP1000 gas purifier

> AMBIENT VS HEATED PURIFIERS

Since the entirety of the alloy volume is used, the heated LDP1000 adds to the purifier capacities and life time in comparison to any conventional ambient purifiers and/or traps. Heating the alloy makes the impurity molecules diffuse into the bulk of the getter particles instead of only relying on surface absorption like ambient purifiers. Moreover, the LDP1000 technology has the capacity to remove nitrogen, hydrogen and methane in noble gases.

LDetek

> CONTAMINATION INFLUENCE

It is well known that a contaminated carrier gas in a gas chromatograph has a big impact on the stability, sensitivity and performances of the system. Picture 1 shows the impact on the nitrogen reading while having a contaminated carrier gas.

Having a carrier gas contaminated, but less than the sample gas to measure, we lose sensitivity by the amount of the contamination. From the picture 1, we clearly see that we lose about 50% response with a sample/contamination ratio of 2. That affects significantly the detection limit of the system.

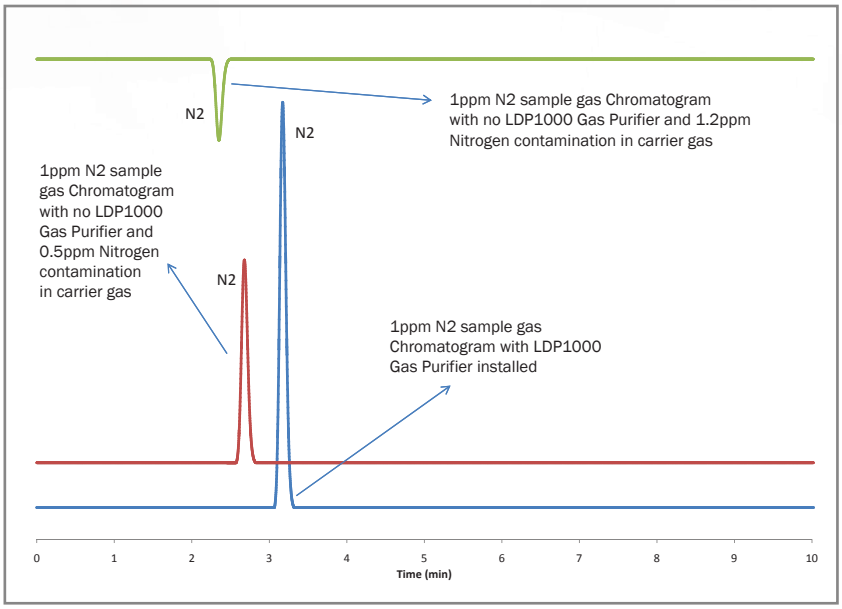
It is even worse when the contamination is higher than the sample to measure. Since the sample is more pure than the carrier gas, you get a negative peak for the impurity. The measurement is completely erroneous and cannot be used.

The LDP1000 ensures that the carrier gas of the system is at its best purity you can get. This way, the gas chromatograph can have the best performances for all its measurements.

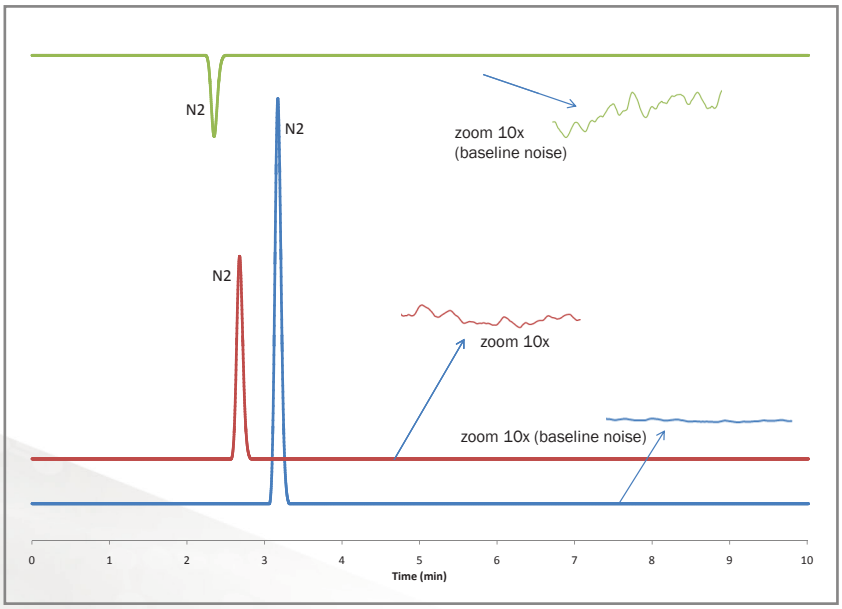
Referring to picture 2, the impact of bad carrier quality on a gas chromatograph system is clearly demonstrated. The chromatograms used to do the demonstration are the same that the ones used in picture 1 which are contaminated with different level of air.

The noise level increases with the level of air contamination. That makes the signal/noise ratio lower. That has also a direct impact on the performances of the system by degrading the columns stability and separation. It can even lead to capillary column destruction.

Having the LDP1000 installed on gas chromatograph keeps the system stable and extends the lifetime of the whole system hardware by removing any trace of particles and air contaminants.



Picture 1: N2 contamination influence



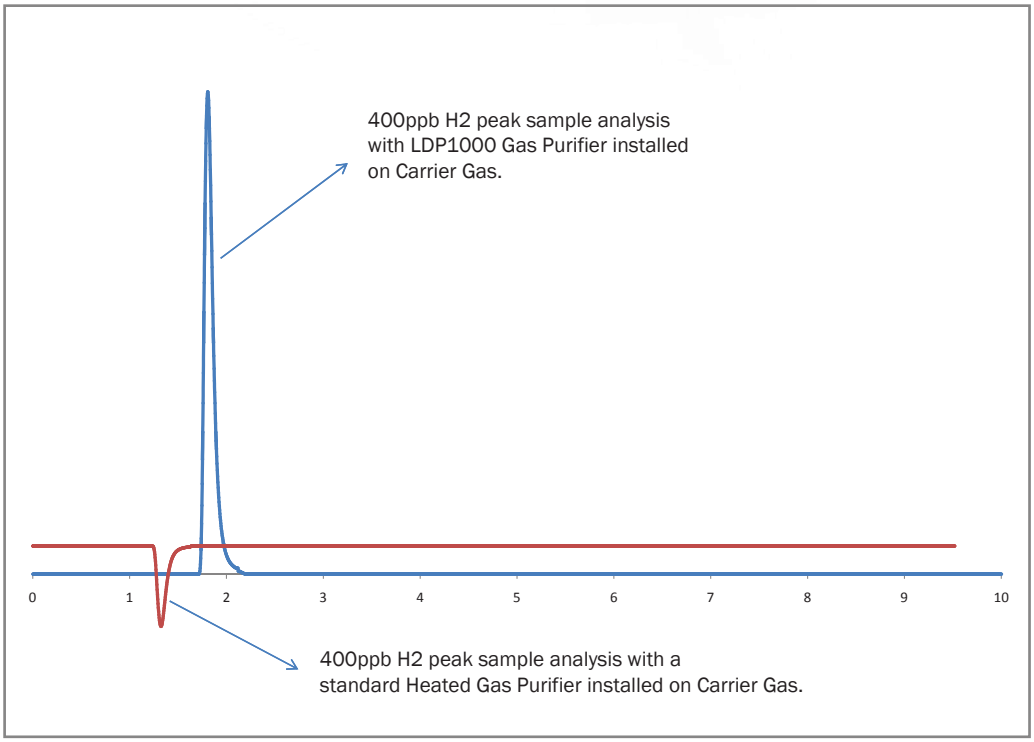
Picture 2: contamination influence on noise level

> TWO BEDS OF PURIFICATION

To ensure high purity, the LDP1000 noble gas version has two beds of purification. The first stage has an elevated temperature grabbing all components except some low level hydrogen. At this temperature, some H2 can be released from this bed. The amount of H2 can be as high as a few hundreds ppb with the use of one stage of purification only.

By having a second bed of purification operating at a different temperature, the hydrogen out of the first stage can then be totally trapped.

Both bed temperatures are controlled by a microprocessor ensuring stability and efficiency of the purifier.



Picture 3: Hydrogen influence on measurement with different purifiers

Having H2 released from the first bed could influence your H2 measurement considerably. Such phenomenon is known in the gas chromatography industry when measurement of low level hydrogen is necessary. A part of the hydrogen comes from the cracking of methane and non-methane hydrocarbons. The cracked by-products are then sorbed by the getter. However, the sorption capacity for H2 isn't high enough caused by high temperature which makes some low level hydrogen come out of the getter.

Picture 3 shows the effect of H2 presence coming out of a purifier in the carrier gas when only one stage of purification is used. Then, if the sample gas is more pure than the carrier gas, you will reduce sensitivity and even get negative reading for hydrogen in some cases, as illustrated on picture 3. With its two beds of purification, the LDP1000 removes completely the presence of H2 in the carrier which is ideal for low measurement.

> LEDS INDICATION & RS232 COMMUNICATION

The LDP1000 has intelligent features to be able to monitor some information:

Picture of the LDP1000 LED

- **Green LED**
  Indicates that the LDP1000 is powered ON
- **Yellow LED**
  Indicates if one of the beds has a temperature deviation
- **Red LED**
  Indicates that the lifetime of the purifier has expired.
  Getter needs to be replaced.

Those indications are very useful to know that your system is fully working or the purifier is not the cause of any performance issue you can have with your gas chromatograph. The diagnostic and control of those LED's is fully managed by the microcontroller and the different sensors in place.

A RS-232 serial port is also installed by default on the LDP1000. This feature gives the possibility to monitor the temperature of the 2 beds of purification. This is very useful for troubleshooting the device.

> CONCLUSION

With the LDP1000, the carrier gas quality becomes indisputable. With its specific mechanical and electrical design, the gas purity level has never been so good and stable. It is a must for the gas chromatography and GC/MS industry. Moreover, with its changeable getter, this may be the last gas purifier you will ever buy. The LDP1000 is the cost effective solution you need.

Where innovation leads to success!