Clean. Engineering. Expertise.

Solvent Purification Systems

SAFE & ECONOMIC DRYING OF SOLVENTS

- Complete systems ready to operate
- Safe alternative to distilling
- Quick collection of ultra-pure solvents
- Purifies up to 7 solvents per system
- Purifies up to 800 liters with one loading of the filter columns
- Connect directly to a MBRAUN glovebox or use as a stand alone unit
- Fire safety storage cabinet for flammable liquids ensure lab safety

INERTGAS TECHNOLOGY

Operation

MBRAUN offers the safest, fastest and easiest way to dispense ultra dry solvents.
MBRAUN SPS systems provide laboratories with unique safety features and benefits, specifically designed to meet the needs of the customer.

The MBRAUN Solvent Purification System operates by way of solvent storage vessels being pressurized through an inert gas supply (Typically a nitrogen source of 99.99% purity or better).
The solvent rises through the dip tube and flows through a series of two filter columns that absorb moisture from the solvent.
Ultra dry solvents are then dispensed into evacuated collection vessels directly at the system and/or into an integrated glovebox system.
Exhausted purifier columns are disposed of by the customer and activated replacement columns are provided by MBRAUN.

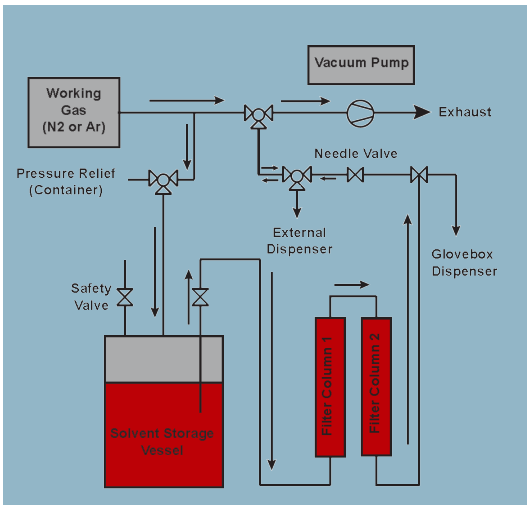


Figure A. Shows the gas and solvent flow throughout the system

MBRAUN Solvent Purification System Features:

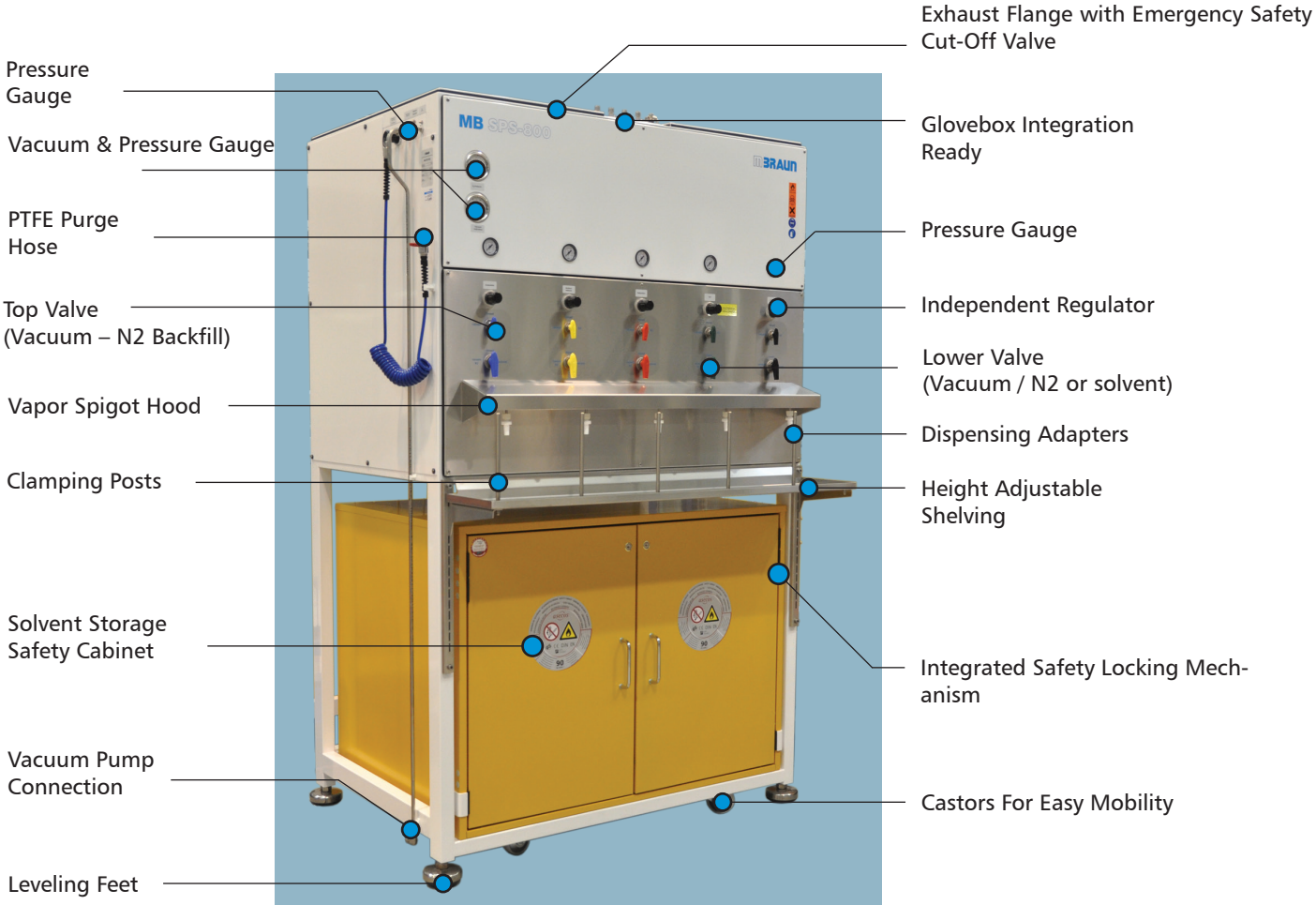


Figure B. Shows the basic system configuration of an MBRAUN SPS-5. System configuration, color and flammable cabinet specification may vary.

SPS COMPACT

Description
The MB SPS Compact is a single solvent purification system specifically designed for customers who require a compact more economical setup in their solvent purification needs. The compact design and high quality construction gives customers the ability to dispense ultra dry solvents directly from the laboratory bench top.

Standard Features
Purifies up to 800 liters of solvent before replacing columns*
Connects directly to any glovebox system
Ready to operate completely encapsulated system

SPS5 - SPS7

Description
The MB SPS is designed specifically for laboratories that need a safe, fast and easy method for dispensing ultra dry solvents. Unique features include glovebox integration ready piping, integrated vapor hood with 4 inch ventilation exhaust port, double column filtration, 17 liter solvent reservoir and independent regulators for each solvent line. Up to 7 solvents reservoirs can be fitted into the system.

Standard Features
Purifies up to 800 liters of solvent before replacing columns*
Connects directly to any glovebox system
Ready to operate completely encapsulated system
Fire resistant storage cabinet ensures laboratory safety
Each solvent line includes an independent regulator
No cross contamination of solvent vapors

SPS AUTO

Description
MBRAUN offers the industries first and only automatic solvent purification system. With its integrated PLC, the MB SPS AUTO offers a high level of ease of use compared to the MB SPS 5 or 7 platform.

Standard Features
World's first fully automated solvent purifier (US patented)
Ideal for laboratory or industrial environments
Connects directly to any glovebox system
PLC controlled dispensing process for all solvent lines
Each solvent line includes an independent regulator
Purifies up to 800 liters of solvent before replacing columns*
No cross contamination of solvent vapors

*Solvent filter column capacity varies according to solvent type and quality of solvent being used.

SPS COMPACT

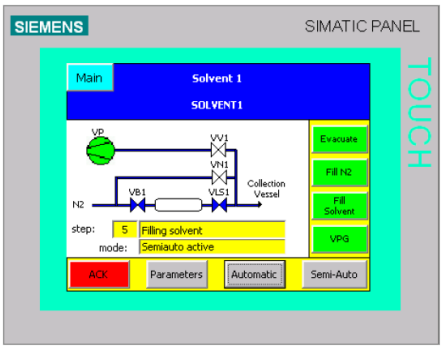
Solvent purification system	Type	Encapsulated Solvent Purification System
	Dimensions	275 mm x 873 x 520 mm (W x H x D)
	Number of solvents lines	1
	Operation	Hand valves
	Material	Stainless steel (1.4301 / US 304)
	Leveling feet	Included
	Manifold	Stainless steel piping w/ three way hand valve
	Work shelf	-
	Positioning system	Jack stand for the correct positioning of the collection vessel
	Castors for easy mobility	-
	Solvent flow rate	< 1 l/min
	Power	230V / 50-60Hz, 10 amps, 115v / 50-60 Hz, 15 amps
	Solvent storage safety cabinet	-
	Solvent storage safety cabinet EU	-
	Solvent storage safety cabinet US	-
	Vapor removal for dispensing area	-
	Vapor removal for the safety cabinet	-
	Dispensing	From the SPS system
	Working gas	Nitrogen or argon (typically a nitrogen source of 99.99% purity or better)
	Solvent regulation pressure	Individual regulation for each solvent line, 0.3 - 0.5 bar
	Solvent line material	Stainless steel line (1.4301 / us 304)
	Inlet pressure	Inlet pressure set between 4.0 bar and 6.0 bar
	Working pressure	Set between 0.3 bar and 0.5 bar
Filter columns	Filter type	Double column solvent filtration
	Filter column	Two stainless steel columns (1.4301 / US 304)
	Filter column size	4.8 l (1 gallon)
	Particle filtration	Filter columns equipped w/ pre-filters
	Filter material	Depends on solvent type
	Filter column capacity	Up to 800 l (depends on solvent type)
	Filter column activation	Columns activated before shipment
	Attainable purity	Below a few ppm H20 and O2, varies according to solvent type
Solvent storage vessels	Reservoir material	Stainless steel reservoir (1.4301 / US 304)
	Reservoir capacity	17 l (optional sizes available)
	Reservoir features	Two shut off valves, Swagelok connectors, over pressure relief valve
	Reservoir piping	Stainless steel jacket and 1/4" piping w/ Swagelok fittings
Options	Vacuum pump	Oil free diaphragm vacuum pump, resistant to aggressive gases (reinforced with a PTFE layer)
	Glass ware storage flask	250 ml

MB SPS-5 and MB SPS-7 are also available in bench-top version

SPS5

SPS7

Encapsulated Solvent Purification System	
(SPS-5) 1300 x 1040 x 2063 mm (W x D x H)	(SPS-7) 1700 x 1040 x 2063 (W x D x H)
Up to 5 solvents	Up to 7 solvents
Hand valves	
Stainless steel (1.4301 / US 304)	
Included	
Stainless steel piping w/ three way hand valve	
Height adjustable rack w/ vertical clamping posts	
Vertical clamping posts	
Included	
< 1 l/min	
230V / 50-60Hz, 10 amps, 115v / 50-60 Hz, 15 amps	
Cabinets available for 2, 5 and 7 solvent systems	
Type 90 (EN 14470-1), Fire resistance up to 90 minutes	
Meets NFPA regulation code 30	
DN 75 connection to exhaust system & emergency cut-off valve	
DN 50 connection to exhaust system & emergency cut-off valve	
From the SPS system, inside glovebox, or combination of both	
Nitrogen or argon (typically a nitrogen source of 99.99% purity or better)	
Individual regulation for each solvent line, 0.3 - 0.5 bar	
Color coded stainless steel line (1.4301 / US 304)	
Inlet pressure set between 4.0 bar and 6.0 bar	
Set between 0.3 bar and 0.5 bar	
Double column solvent filtration	
Two stainless steel columns per solvent (1.4301 / US 304)	
4.8 l (1 gallon)	
Filter columns equipped w/ pre-filters	
Depends on solvent type	
Up to 800 l (depends on solvent type)	
Columns activated before shipment	
Below a few ppm H_2O and O_2, varies according to solvent type	
Stainless steel reservoir (1.4301 / US 304)	
17 l (optional sizes available)	
Two shut off valves, Swagelok connectors, over pressure relief valve	
Stainless steel jacket and 1/4” piping w/ Swagelok fittings	
Oil free diaphragm vacuum pump, resistant to aggressive gases (reinforced with a PTFE layer)	
250 ml	

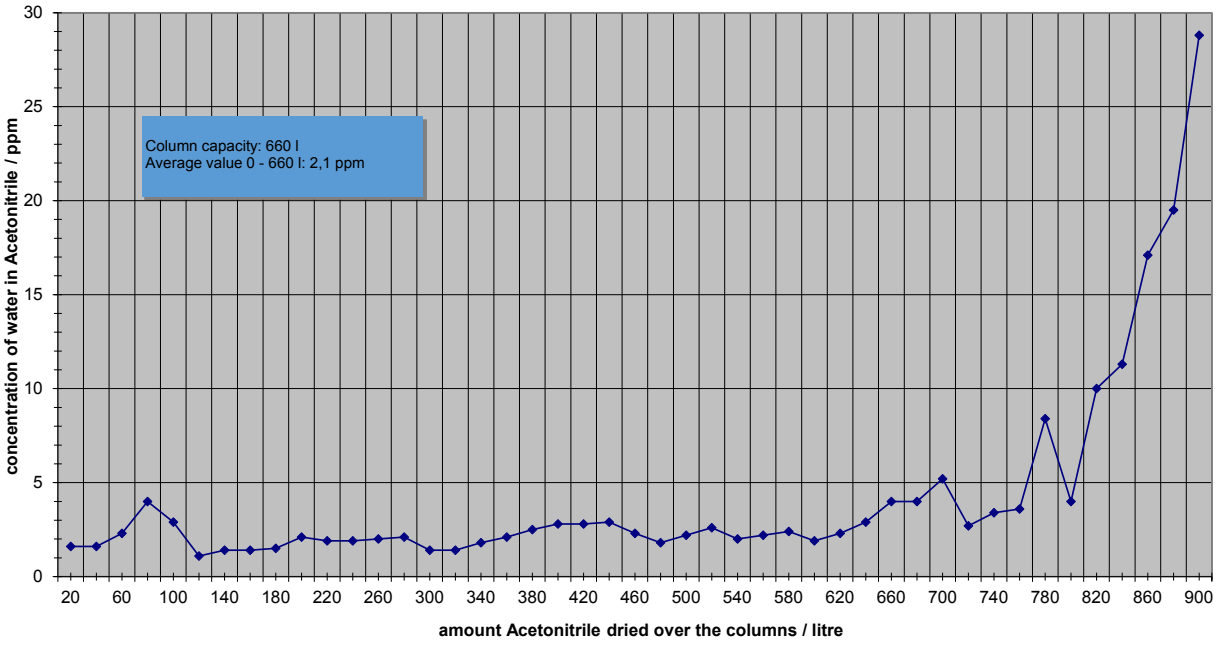


MB SPS AUTO
Increased ease of use through PLC unit

Solvent	Type	Water concentration in solvent feed	Mean value of residual water after drying	Capacity of the columns
n-Hexane	Aliphatic hydrocarbon	53 ppm	<1 ppm	Theoretical 9000 l
Toluene	Aromatic hydrocarbon	302 ppm	<2 ppm	1090 l
Dichloromethane	Halogenated hydrocarbon	436 ppm	<1 ppm	500 l
Acetonitrile	Dipolar aprotic solvent	560 ppm	<5 ppm	660 l
THF - Inhibitor free	Ether	550 ppm	~10-15 ppm	400 l

Please Note: Test results may vary, these results were operated in an inert glovebox workstation.

SPS column capacity for Acetonitrile
(feed concentration of water in Acetonnitrile approx. 556 ppm)

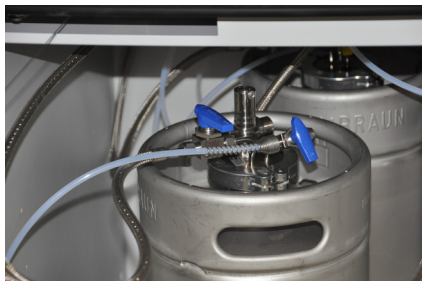


List of Solvents Purified		
Acetic Acid	Diethyl Ether *	Methylcyclohexane
Acetic Anhydride	Diethylene Glycol Dimethyl Ether	N,N-Methylpyrrolidone
Acetic Acid Ethyl Ester, Ethyl Acetate	Diisopropylamine (DIPA)*	Nitromethan
Acetic Acid Methyl Ester	Diisopropyl Ether	Pentane
Acetone *	Dimethylbenzene	Petroleum Ether
Acetonitrile	N,N-Dimethylformamide (DMF)	1-Propanol
Benzene	Dimethyl Sulfoxide (DMSO)	2-Propanol
1-Butanol	1,4-Dioxane	1,2 Propylene Carbonate
2-Butanol	Dipropylamine	Pyridine
tert-Butanol	Dipropyl Ether	Tetrachloromethane
t-Butyl Methyl Ether	N-Ethyldiisopropylamine	THF - Inhibitor free
Chlorobenzene	Ethylene Glycol Dimethyl Ether	Tetramethylethanediamine
Chloroform	Formic Acid Ethyl Ester	Toluene
Chloromethane	n-Heptane, n-Hexane	Triethylamine
Dichloromethane *	2- Methoxyethanol	Xylene
More on request, please contact MBRAUN		

(*) Notes:
For Diethyl Ether, Dichloromethane or Chloroform: if it contains a stabilizer this may be removed partly by the drying procedure.
For Acetone: please contact us. Side reaction due to Aldol condensation may occur during the drying procedure.
For Diisopropylamine (DIPA)*: please contact us

Glossary	Definition
Dispensing	Dispensing solvent is performed using a three step process. The first step involves evacuating the collection vessel to create an dry environment. The second step is the actual dispensing. Step three clears the line, so solvent does not remain stored in the dispensing line while the system is not in use.
Solvent Storage Reservoir	MBRAUN includes a 17 liter solvent storage reservoir per solvent line along with the SPS system. (Additional vessel sizes available upon request) Each storage vessel is equipped with connections for bubble degassing procedure. MBRAUN solvent reservoirs include an overpressure valve, solvent supply line, nitrogen push line and a dip tube assembly with clamp. MBRAUN SPS systems can also hook up directly to any third party solvent keg system.
Working Gas	MBRAUN SPS Systems are pressurized by an inert working gas (Typically a nitrogen source of 99.99% purity or better) with a minimum working pressure of 4 bars.
Filter Column	MBRAUN utilizes a double filter column per solvent. The filter column is designed to absorb the moisture from organic solvents and is equipped with pre-filters and a quick connection system for easy replacement once the column is fully saturated. New fully activated columns are available as spare parts.
Exhaust	The SPS system is equipped with two connections for exhaust (located at the top of the SPS system and at the rear side of the solvent storage safety cabinet) to be connected with customer's ventilation system.
PTFE-Purge Hose	The PTFE-Purge Hose is located on the left side wall of the system and is connected to the working gas. The purge hose is equipped with an adapter and a manual valve. The purpose of the purge hose is to clear the solvent line after dispensing.
Vacuum Pump	MBRAUN provides an oil free diaphragm pump as an optional item on all SPS systems. Customers may utilize other vacuum systems as well, including facilities vacuum system.
Pressure Reducing Valve	The pressure reducing valve is utilized to adjust the secondary pressure for pressurizing the solvent reservoirs. The pressure depends upon the viscosity of the solvent being used as well as the intended flow rate during dispensing. The permitted pressure range is 0.3 to 0.5 bar (30 to 50 kPa).
The Top Valve	The top valve opens/closes the connection to the vacuum pump and the working gas (N2 or Ar) which is used to purge out and back fill the collection vessel.
The Lower Valve	The lower valve dispenses ultra dry solvents into collection vessels that have been purged with the working gas via the top valve.
Degassing	The degassing process removes dissolved air from solvents by purging with inert gas (Nitrogen). Degassing is performed after installing the solvent reservoir inside the safety cabinet. The exhaust of the safety cabinet should be connected to the laboratory ventilation system during degassing, so that any solvent vapor released during purging is safely removed.
Clamping Posts and Shelving	Stainless steel clamping posts and shelving are standard features on the MB SPS 5 or 7 and the MB SPS AUTO. Clamping posts are used to secure the collection vessels for dispensing solvents. The stainless steel work shelf offers a height adjustable work space to which the clamping post are connected to.
Vapor Spigot Hood	MBRAUN offers an integrated vapor hood that connects directly to customers supplied HVAC system via a 4" port located at the top of the system.
Solvent Collection Vessel (Glassware)	Glassware is used to dispense ultra dry solvents into. Specially designed glassware for the MBRAUN SPS system are available.
Dispensing Adapters	MBRAUN offers NS 29/32 6 mm ground neck-fitting made from fluorocarbon polymer and/or glass, for connection to piping with an outer diameter of Ø 6 mm, with screw nut made from polypropylene (PP).
Glovebox Integration	All MBRAUN SPS systems have the option to dispense ultra dry solvents directly at the system or into an existing glovebox. Optional items include piping solvent lines directly through the glovebox or coming through the KF 40 vacuum feedthrough.

Safety Cabinet



Solvent Storage Reservoir

Filter Columns

Exhaust on the top, and optional connectors for integration to a glovebox

Side wall with PTFE-Purge Hose, Gas Inlet, Main Pressure Reduction Valve

Example of Integration in a Glovebox

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