

# VAPORNA

PLUS



**FAST EVAPORATION AT NORMAL PRESSURE**



## FAST EVAPORATION BY BLOWING-DOWN ...

The **VAPORNADO®Plus** blow-down system is an innovative and efficient instrument for the evaporation of samples and fractions at normal pressure. The method of blowing down the solvent is an alternative technique in comparison to the evaporation at reduced pressure. It has therefore specific advantages. The **VAPORNADO®-Plus** blow-down system is used to evaporate large numbers of samples in parallel which originate from extractions, chemical synthesis as well as from chromatographic purification. The **VAPORNADO®Plus** is a compact instrument for the evaporation of samples under conservative conditions.

### THE PROCESS

The evaporation of the solvent with the **VAPORNADO®-Plus** system is achieved by a closed circuit of an inert gas such as nitrogen at normal pressure. The evaporation is effected sweeping away the solvent vapors from the surface of the liquid by a constant gas flow. In the closed circuit of the **VAPORNADO®Plus** the carrier gas is blown onto the surface of the liquid through thin stainless steel tubes. The saturated carrier gas is then aspirated from each vessel (no cross contamination) separately and led to the condenser. After condensation of the solvent the dried gas flow is returned to the blow-down unit.

The evaporation energy is supplied by the dried carrier gas which is passed through a heater prior to the repeated blow-down process. In addition, an efficient evaporation rate is achieved holding constant the distance of the blow-down tubes to the descending liquid surface.

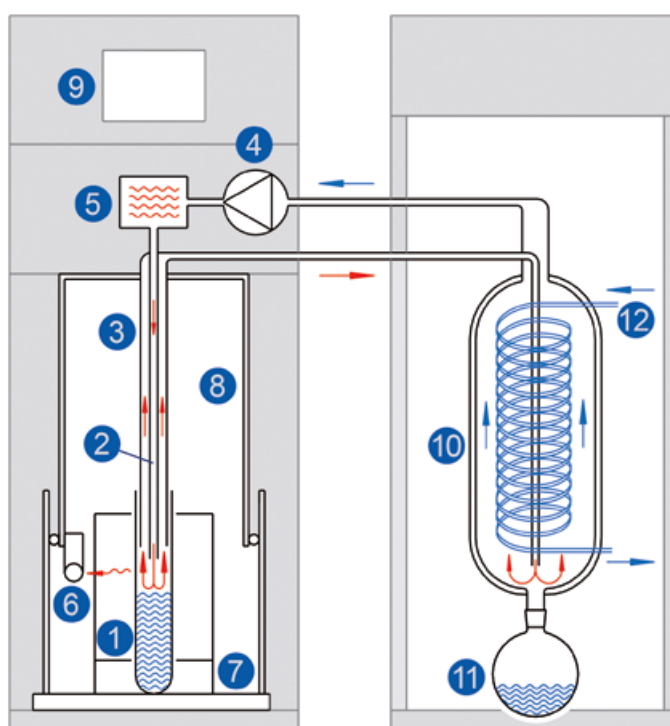


## ... AND CONDENSING OF THE SOLVENT IN A CLOSED CIRCUIT



The VAPORNADO®Plus system is a blow-down instrument on which standardised processes are run. This means that reproducible methods are executed where several parameters are accurately controlled:

- temperature of the solvent of the samples
- temperature of the heater
- flow rate of the circulating gas
- descending speed of the blow-down tubes
- pyrometric level detection to keep constant the distance between the surface of the liquid and the blow-down tubes.



### SYSTEM DIAGRAM

- |                      |                                   |
|----------------------|-----------------------------------|
| 1. Sample glass      | 7. Rack mount, sample tub         |
| 2. Blowing tube      | 8. Sample chamber                 |
| 3. Suction tube      | 9. Touch panel, control interface |
| 4. Circulation pump  | 10. Condenser                     |
| 5. Heating           | 11. Liquid                        |
| 6. Level measurement | 12. Cooling medium                |



## GENTLE EVAPORATION IN INERT ATMOSPHERE

### EASY to use

#### THE SYSTEM

The blow-down unit and the condenser of the **VAPORNADO<sup>®</sup>Plus** together constitute a closed system. The lower part of the blow down chamber is a pull-out tray which holds the rack with the sample tubes. A working height of 160 mm allows the system to be configured for a wide range of tube sizes and shapes.

#### RACK SYSTEM

An optionally available and easily adaptable rack system with various height adjustable panels and shelves permits the use of a wide range of container types and sizes.



### EASY to operate

#### TOUCH SCREEN

The **VAPORNADO<sup>®</sup>Plus** is operated by means of a touch screen at the front side of the instrument representing an easy and clearly arranged user interface. The blow-down process can be started and stopped at any time pushing the **START** or **STOP** button on the main screen of the touch panel.

All process parameters of the method may be modified at any time, see figure 1.

All-important data of the process such as temperatures are displayed on the main screen, see figure 2.

Device state :		Starting
Max. head temp.:	160 °C	
Max. solvent temp.:	30 °C	
Solvent level (Start):	84 mm	
Solvent level (End):	0 mm	
Level control:	Level	
Performance factor:	100 %	

STOP Settings WASH

figure 1

Device state :		Purging
Start time:	00:00 hh:mm	
Time elapsed:	00:00 hh:mm	
End time:	00:00 hh:mm	
Head temp.:	158 °C	
In gas temp.:	36 °C	
Solvent temp.:	27 °C	
Control:	time	
Descending speed:	0 l/100mm/min	
Delta level calc/act:	0 mm	

STOP Settings Man.control

figure 2

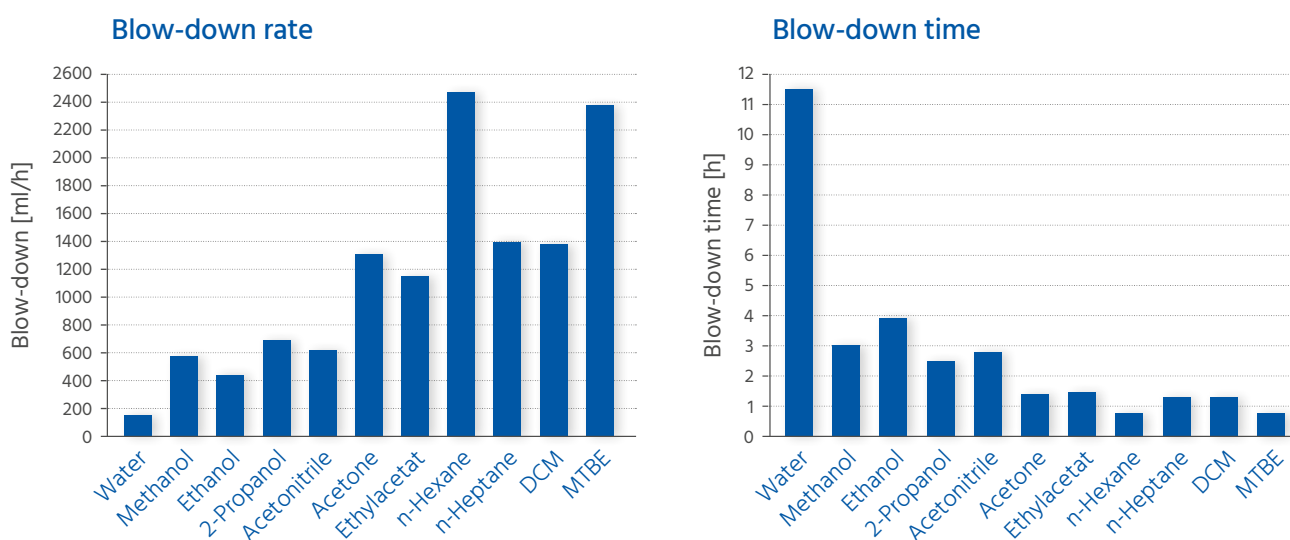
# GENTLE EVAPORATION AT LOW TEMPERATURE



## EFFICIENT evaporation

### PERFORMANCE

The height of the blow-down unit of the **VAPORNADO®Plus** is controlled in a way that the distance of the blow in tubes is held constant to the descending solvent level. This leads to an optimum blow-down rate at any time of the process. The **VAPORNADO®Plus** is suitable for the efficient evaporation of a-polar and polar organic solvents as well as of water and mixtures of these liquids.



Conditions: 36 tubes of 45 ml at 35°C

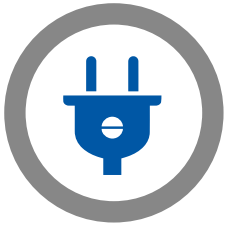
## EFFICIENT condensation

### COOLING POWER

The **VAPORNADO®Plus** is equipped with a powerful condenser in order to dry the circulating gas efficiently. This allows an optimal uptake of solvent vapors from the liquid surface of the samples in the tubes.

An automated defrost function, which is started at regular intervals, retains the condensation efficiently in the case of freezing solvents such as water.





## ECONOMIC CONSUMPTION OF GAS AND ENERGY

### RELIABLE during operation

#### PYROMETRIC TEMPERATURE MONITORING

The pyrometry from the outside of a reference tube allows a precise temperature control of the liquid as well as of the gas phase in the sample tubes. It prevents the temperature to exceed the preset value.

#### AUTOMATED CONTROL OF THE „BLOW IN DISTANCE“

The pyrometry, in addition, allows a contact-free level detection in the reference tube. It permits the instrument to keep constant the distance between the blow in tubes in respect of the descending liquid surface. As a consequence an optimal blow-down rate is maintained during the entire process of evaporation.

#### INERT GAS ATMOSPHERE

At the beginning of the process, the instrument is automatically purged with an inert gas such as nitrogen. This reliably protects compounds which are susceptible to oxidation. It also avoids the formation of vapor mixtures with oxygen. During the process it is possible to repeat the purging with nitrogen at regular intervals.

As the **VAPORNADO®Plus** is working with an inert gas in a closed circuit only small amounts of inert gas are consumed for purging at the beginning of the process as well as during the repeated purging.

#### NO RISK OF CROSS-CONTAMINATION

As the solvent vapors are extracted by suction out of each tube separately there is no risk of cross-contamination. In addition there is a constant by pass flow from the outside of the tubes to the inside, which avoids solvent vapors occurring in the sample chamber (outside the tubes).

#### REPRODUCIBLE METHODS

A set of standard blow-down methods for common solvents and mixtures thereof is available from the repository. Individual methods may be created and stored as well. Based on the fluid level a method also defines the finalizing and halting of the process. Partial evaporation e.g. may be useful to evaporate acetonitrile from aqueous samples prior to lyophilisation.

## APPLICATIONS VAPORNADO



PHARMA INDUSTRY  
Research, development  
and quality control



ANALYSIS OF RESIDUES  
Concentration of extracts  
from textiles and other  
consumer goods



PURIFICATION OF SAMPLES  
Evaporation of fractions  
following chromatographic  
purification

## APPLICATION AREAS VAPORNADO®Plus



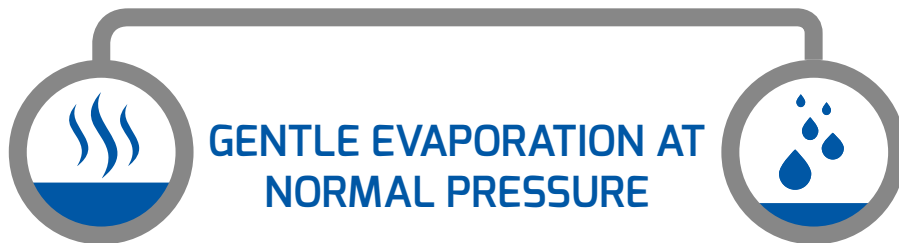
LIFE SCIENCE  
Research in Chemistry,  
Biochemistry and Biology



ENVIRONMENTAL ANALYSIS  
Concentration and isolation  
of environmental samples



FOOD INSPECTION  
Concentration of extracts  
of any type of foods



## EXCELLENCE of the VAPORNADO®Plus systems

- Fastest method for parallel evaporation of organic solvents and a very fast method for evaporation of water and of aqueous mixtures.
- Gentle evaporation method at a moderate temperature (25–40°C) in an inert gas atmosphere.
- Ideal method for the automated evaporation of samples which are susceptible to temperature and oxygen.
- No risk of bumping and no risk of cross-contamination.
- Closed circuit of an inert gas (nitrogen). Economical nitrogen consumption.
- 100% solvent recovery due to a powerful condenser.
- > 50% recovery of energy by an integrated heat exchanger.
- Easy operation due to a touch screen user interface. Pre-defined as well as individual methods. Reproducible procedures and results.
- Easy and fast configuration of the system (rack and tube type).
- No restrictions to the tube types used.
- Tube height up to 160 mm; tube ID 10–30 mm and even larger.
- Flexible rack system available for adaption to the tube type used.
- Transparent sample chamber for visual monitoring of the process.
- Accurate temperature control by the pyrometric temperature measurement of the liquid as well as of the circulating gas.
- Stand by function with pre-set period of non-usage for automated shut off heating and cooling.
- Scalable system: Up to two blow-down units may be connected to a single condenser.
- Compact system: The VAPORNADO®Plus may be installed on the recommended trolley or on top of a laboratory bench.



# TECHNICAL DATA

## BLOW-DOWN UNIT

Connection of inert gas	7 bar, tube OD 6 mm
Connection to ventilation	Tube ID 14 mm
Circular flow rate	180 l/min.
Temperature range (conveying gas)	20–60 °C
Rack capacity	1
Rack dimensions (max.)	300 x 150 mm
Tube dimensions	OD = 12–30 mm, h = 40–160 mm
User interface	Touch panel 5.7"
Interfaces	DB9f (chiller), USB
Power	220–230V / 50–60 Hz
Current, Fuse	13 A, 16A slow-blow
Dimensions	24 x 66 x 65 cm (w x d x h)
Weight	48 kg
Trolley	80 x 75 x 93 cm (w x d x h)



## CHILLER/CONDENSER

Chiller	JULABO CF40
Cooling capacity at 0 °C	0.4 kW
Heating capacity	2 kW
Power	220–230 V / 50–60 Hz
Interface	RS 232, DB9f
Dimensions condenser	28 x 69 x 85 cm (w x d x h)
Dimensions chiller	28 x 46 x 46 cm (w x d x h)
Weight condenser	46 kg
Weight chiller	41 kg



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