

Installation Guide

Vacuum Drying Ovens VDL

Dear Sir or Madam,

Thank you very much for your interest in our vacuum drying ovens VDL series for use with flammable solvents.

This ATEX-compliant, explosion-proof device requires special requirements for installation and commissioning.

You can find these in the form of a checklist in this installation guide.

Please note in particular:

- Installation, testing and commissioning must be performed by qualified and trained personnel with additional skills in explosion protection (ATEX).
- Your laboratory personnel should be familiar with all precautionary measures required for working acc. to ATEX Directive 2014/37/EU
- The ATEX Directives require you (operator) to create an explosion protection document including classification of explosion protection zones, which must be available prior to installation of the chamber. The system requires e.g., the following specific deployments on site:
 - Vacuum supply, see page 8-10 – BINDER offers you for this purpose an ATEX-compliant vacuum pump as well as other accessories with the VP5 EX pump
 - Compressed air supply for sweeping certain areas of the chamber with compressed air, see page 10
 - Technical ventilation (extraction) in the installation area see page 5
 - [...]
- This introduction page does NOT replace the information contained in this installation guide; we ask you to observe the entire document.
- You can find detailed information in the VDL operating manual, which is available in the Download Center on our website www.binder-world.com
- We will be happy to answer your questions at this email address: info@binder-world.com

Please check ☒	Dear customer,
	This chamber requires for its transportation at the destination, failure-free and secure operation as well as adherence to its technical rating data the following prerequisites and installations on the site

General information / ATEX		
Personnel Qualification	☐	Installation, testing, start up: Qualified personnel with additional skills in explosion protection (ATEX), which is familiar with installation, commissioning, and operation of the chamber. Qualified personnel are persons whose professional education, knowledge, experience and knowledge of relevant standards allow them to assess, carry out, and identify any potential hazards in the work assigned to them. They must have been trained and instructed, and be authorized, to work on the chamber. This includes a basic knowledge of explosion protection (ATEX training), instruction based on the risk assessment by the operator and knowledge of the Operating Instruction by the operator.
	☐	Operation: Laboratory personnel especially trained for this purpose and familiar with all precautionary measures required for working acc. to ATEX Directive 2014/37/EU. Observe the national regulations on minimum age of laboratory personnel
	☐	All persons who use the chamber and its associated work equipment must have read and understood the Operating Manual
PPE	☐	The personal protective equipment (PPE) of the operating personnel must be implemented ESD protected
Operator documentation	☐	Risk assessment performed by competent personnel which enables an employer to evaluate risks that may arise before using work equipment and to derive necessary and suitable tests and measure.
	☐	Explosion protection document to be created by the operator, which represents the entirety of the technical and organizational measures for explosion protection determined and specified on the basis of the risk assessment. The explosion protection document serves to document the results of the risk assessment in accordance with § 6 Para. 9 GefStoffV (for Germany).

Information on zone classification	☐	VDL: The entire VDL chamber, with the exception of the power plug, the plug connection of the optional analog output, and the plug connection for Ethernet is designed in Device category 3 in relation to the environment The VDL may be installed in areas in which explosive atmospheres may occur on a rare and temporary basis. The chamber must not be installed or operated in an occasionally or continuously / for long periods / frequently potentially explosive area.: They are not intended for installation in a Zone 1 or 0.			
	☐	VDL: The electrical connection cable is fixedly connected with the VDL. The VDL power plug is unprotected and must therefore be connected outside a zone. The electrical connection of the VDL must be located outside the installation area of the VDL and the pump.			
	☐ Option	VP5 EX vacuum pump: The electrical connection cable is fixedly connected with the vacuum pump. The power plug is unprotected and must therefore be connected outside a zone. The electrical connection of the pump must be located outside the installation area of the VDL and the pump.			
	☐ Option	Ethernet: The connection cable is fixedly connected with the VDL. The connector for the customer's Ethernet is unprotected and must therefore be connected outside a zone. The Ethernet connection must be located outside the installation area of the VDL and the pump.			
	☐ Option	Analog output: The connection cable is fixedly connected with the VDL. The plug connector of the analog output is unprotected and must therefore be connected outside a zone. The plug connection of the analog output must be located outside the installation area of the VDL and the pump.			
Transport					
No. of persons required for lifting	☐	VDL 23	VDL 56	VDL 115	
		4	4	6	
Minimum width (doors, elevators ...)	☐	VDL 23	VDL 56	VDL 115	
		54 cm / 22 in	66 cm / 26 in	77 cm / 31 in	
Weight	☐	VDL 23	VDL 56	VDL 115	
		72 kg / 159 lbs	104 kg / 229 lbs	158 kg / 348	

Required space						
Minimum distances	☐	Distance between several chambers of the same size: 250 mm / 9.8 in				
		Wall distances to rear: 100 mm / 3.9 in				
		Lateral wall distances: 70 mm / 2.76 in				
		Spacing above and behind the chamber: 100 mm / 3.9 in				
Dimensions	☐			VDL 23	VDL 56	VDL 115
		VDL, closed door	W x H x D	52 cm x 72 cm x 64 cm 20.5 in x 28.4 in x 24.9 in	64 cm x 84 cm x 68 cm 25.1 in x 33.0 in x 26.8 in	75 cm x 97 cm x 81 cm 29.2 in x 38.0 in x 31.6 in
		VDL, open door	W x H x D	59 cm x 72 cm x 96 cm 23.3 in x 28.4 in x 37.8 in	71 cm x 84 cm x 112 cm 28.0 in x 33.0 in x 44.1 in	81 cm x 97 cm x 135 cm 31.9 in x 38.0 in x 53.1 in
	☐ Option	VDL with pump module	W x H x D	53 cm x 143 cm x 64 cm 20.6 in x 56.3 in x 24.9 in	638 cm x 155 cm x 68 cm 25.1 in x 61.0 in x 26.8 in	743 cm x 167 cm x 81 cm 29.2 in x 65.8 in x 31.6 in
Required space with minimum distances on all sides	☐	VDL, closed door	W x H x D	66 cm x 82 cm x 74 cm 26.0 in x 32.3 in x 29.2 in	78 cm x 94 cm x 78 cm 30.7 in x 37.0 in x 30.7 in	89 cm x 107 cm x 91 cm 35.0 in x 42.1 in x 35.8 in
		VDL, open door	W x H x D	73 cm x 82 cm x 116 cm 30.7 in x 32.3 in x 45.7 in	85 cm x 94 cm x 122 cm 33.5 in x 37.0 in x 48.0 in	95 cm x 107 cm x 145 cm 37.4 in x 42.1 in x 57.1 in
Tilt protection	☐ Option	When placing the VDL on the BINDER pump module it is recommended to install the supplied tilt protection. To do this, the VDL must be set up in front of a wall.				
Requirements for the installation site						
Ambient conditions	☐	VDL: Permissible ambient temperature during operation: +18 °C / 64 °F to +32 °C / 90 °F.				
	☐ Option	VP5 EX vacuum pump: Permissible ambient temperature during operation: 40 °C / 104 °F max				

	☐	Permissible ambient humidity 70% r.h. max., non-condensing No installation in damp areas or in puddles			
	☐	Installation height: max. 2000 m / 6562 ft above sea level			
	☐	Setting up inside a building (indoor use).			
Room ventilation for dispersal of heat	☐	Good room ventilation. No installation in unventilated recesses Sufficient room-ventilation or air conditioning in regard to the heat energy released by all devices located there.			
		Energy consumption at 100 °C / 212 °F	VDL 23	VDL 56	VDL 115
			140 Wh/h	180 Wh/h	230 Wh/h
Accessible installation and operating surface Equipotential bonding	☐	Flat, even and non-flammable, free from vibration			
	☐	Electrically conductive			
	☐	Connection between the VDL and other equipment (e.g., pump module, vacuum pump) and the installation and operating surface according to the grounding concept.			
Ambient air quality	☐	NO dusts in the vicinity of the chamber			
Technical ventilation (extraction) in the installation area	☐	The operator must ensure active extraction before starting up the chamber: technical ventilation according to country-specific regulations (2152 Part 2 for Germany).			
	☐	Extraction must include the entire installation area of the vacuum drying oven, the pump and, if appropriate, the pump module.			
	☐	Extraction must be active during the entire operation of the chamber and when handling the condensate catchpot of the pump.			
	☐	If the technical ventilation fails, the power to the vacuum drying oven must be switched off automatically.			

	☐	Extraction must lead into an explosion-proof area.
Extraction at the pump module	☐ Option	When using the pump module, connect an extraction system to the provided port as described in the mounting instructions for the pump module (Art. No. 7001-0717).
Exhaust system for extracted vapors	☐	Conduct the extracted vapors e.g., into a fume extractor facility. Connect a suitable hose to the vacuum pump outlet that may be located in the pump module.
Fire extinguisher	☐	During operation a fire extinguisher must be available.
Lightning protection device	☐	The building in which the vacuum drying oven is installed must have a lightning protection system. All internal connections in the operator's building must contain lightning protection in accordance with EN/IEC 62305-3 Lightning protection measures must be taken in order to prevent melting and spraying effects. The operator's zone classification shall be used to plan lightning protection measures. The lightning discharge paths must be designed so that heat or ignitable / spray sparks cannot become the ignition source for an explosive atmosphere.
Electrical connection		
Explosion protection / zone	☐	VDL: The chamber plug (power plug) is unprotected. The electrical connection must be established outside a zone. The electrical connection must be established outside the installation area of the VDL and the pump.
	☐ Option	VP5 EX vacuum pump: The chamber plug (power plug) is unprotected. The electrical connection must be established outside a zone. The electrical connection must be established outside the installation area of the VDL and the pump.
Protective conductor	☐	The domestic socket must provide a protective conductor. The connection of the protective conductor of the domestic installations to the chamber's protective conductor shall meet the latest technology The protective conductors of the socket and plug must be compatible.

Accessibility of disconnection from power supply	☐	To completely separate the chamber from the power supply, you must disconnect the power plug. Install the chamber in a way that the power plug is easily accessible and can be easily pulled in case of danger. A customer's emergency stop switch or a comparable power disconnecter can also be used in case of emergency. It must be possible to switch off the chamber immediately at any time. The connection cable is provided with a plug. This can be cut off if permanent wiring is required.
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VDL Electrical connection data	☐		VDL 23 / VDL 56 / VDL 115	VDL 23-UL	VDL 56-UL / VDL 115-UL
		Power connection cable	Length 2000 mm / 78.74 in, fix connection	Length 2000 mm / 78.74 in, fix connection	Length 2000 mm / 78.74 in, fix connection
		Power plug	CE grounded plug Several national types (Europe)	NEMA 5-15P 	NEMA 5-20P 
		Ex protection of power plug	unprotected	unprotected	unprotected
		Nominal voltage +/- 10% at the indicated power frequency	200-230 V at 50 Hz 200-230 V at 60 Hz	100-120 V at 60 Hz	100-120 V at 60 Hz
		Current type	1N~	1N~	1N~

VP5 EX vacuum pump Electrical connection data	☐ Option		VP5 EX – 230V
		Power connection cable	Length 3 m / 9.8 ft, fix connection
		Power plug	CE grounded plug Several national types (Europe)
		Ex protection of power plug	unprotected
		Nominal voltage +/- 10% at the indicated power frequency	230 V at 50 Hz
		Rated current consumption	1.2 Amp
		Motor power	0.15 kW

Connection of the analog output for temperature and pressure (optional)					
Explosion protection	☐ Option	The connection cable is fixedly connected with the VDL. The connector plug of the analog output for the customer's connection is unprotected. The plug connection of the analog output must be established outside a zone. The plug connection of the analog output must be established outside the installation area of the VDL and the pump.			
Connection data	☐ Option	Output	4-20 mA DC		
		Connection cable	Length 2 m, fixed connection		
		Connection	9-pole SUB-D socket		
			Pin allocation:	PIN 1: Temperature + PIN 2: Temperature –	PIN 4: Pressure + PIN 5: Pressure –
			Explosion protection: unprotected		
		Temperature range	0 °C to +110 °C		
Pressure range	0 mbar to 1100 mbar				
Ethernet connection (optional)					
Explosion protection	☐ Option	The connection cable is fixedly connected with the VDL. The connector plug for the customer's connection to the Ethernet is unprotected. The connection to the Ethernet must be established outside a zone. The connection to the Ethernet must be established outside the installation area of the VDL and the pump.			
Vacuum supply					
Type	☐	Vacuum pump or domestic vacuum system			
Suction capacity	☐	1 m³/h to 30 m³/h			

Gas inlet temperature	☐	The vacuum source must be designed for a gas inlet temperature corresponding to the used drying temperature. Observe the permissible gas inlet temperature of the vacuum pump in use. If appropriate, take measures to cool down the extracted vapor before it enters into the vacuum source
	☐ Option	VP5 EX: permissible gas inlet temperature 40 °C / 104 °F max.
Explosion protection	☐	If combustible solvent may be introduced into the inner chamber, the vacuum pump must be constructed in a suitable explosion-proof manner, suitable for suction from Zone 0 or 1. Use an ATEX Directive 2014/34/EU compliant vacuum pump, which provides an integral protective device and an integral explosion proof switch. We recommend the BINDER VP5 EX Vacuum pump.
	☐	When using ATEX Directive 2014/34/EU non-compliant pumps: • Provide a current-dependent, delayed protective device for the pump (for the triggering time of this protective device, see the manufacturer's specifications). The protective and monitoring device must not be able to independently turn on again or be released. • Install the switch gear box outside the hazardous area or provide it with explosion protection.
Setting up a vacuum pump	☐	Operate the pump in a stationary position and secure it so it is immobile. The pump must be set up so that it is protected from impacts. Observe the information in the original instructions for the pump.
	☐ Option	When installing the vacuum pump in the BINDER pump module, fix the pump in the pump module, see mounting instructions for the pump module (Art. no. 7001-0717).
Suction line	☐	The suction line to the VDL vacuum connection must be fix and conductive.
	☐ Option	Connection kits for the VP5 EX vacuum pump are optionally available: • VDL VP5 stainless steel (Art. no. 8012-2724) • VDL VP5 PTFE (Art. no. 8012-2614)

Exhaust pipe	☐	Make sure that the exhaust pipe is securely attached and conductive in case it may still conduct ignitable solvent concentrations. Ensure sufficient solvent condensation, e.g., in an exhaust waste vapor condenser, to avoid that ignitable solvent concentrations are conducted from the pump via the exhaust pipe.
Equipotential bonding	☐	Ensure equipotential bonding between the pump and VDL via the connected equipment grounding conductors of both units
	☐ Option	Ensure equipotential bonding between the pump, the pump module, and the VDL using the connections of the grounding conductors. See mounting instructions for the pump module (Art. no. 7001-0717).
Compressed air supply		
Inlet pressure	☐	Inlet pressure of 2 bar (pressure reducer of a gas cylinder or domestic installation)
Connection	☐	Customer side: Compressed air hose with compressed-air quick coupling NW 5 for the connection via the existing 5 mm brass plug for compressed air connection
Monitoring the inlet pressure	☐	The compressed air supply line provided by the operator must be equipped with active monitoring of the defined inlet pressure (2 bar), which clearly indicates a drop and increase in the inlet pressure outside the permissible tolerance of ± 0.2 bar.
Quality	☐	The compressor of the compressed air system must be equipped with an oil separator, or the compressed air system must be constructed oil-free
	☐	The air for the compressed air supply must not be taken from explosive atmospheres
Inert gas supply		
Connection	☐	Connection via a customer's pressure reducer to the VDL inert gas connection (8 mm hose olive).
Technical ventilation measures	☐	Correctly follow the technical ventilation measures, as described in the local and national regulations relevant for your country (for Germany: DGUV guidelines 213-850 on safe working in laboratories, issued by the employers' liability insurance association).