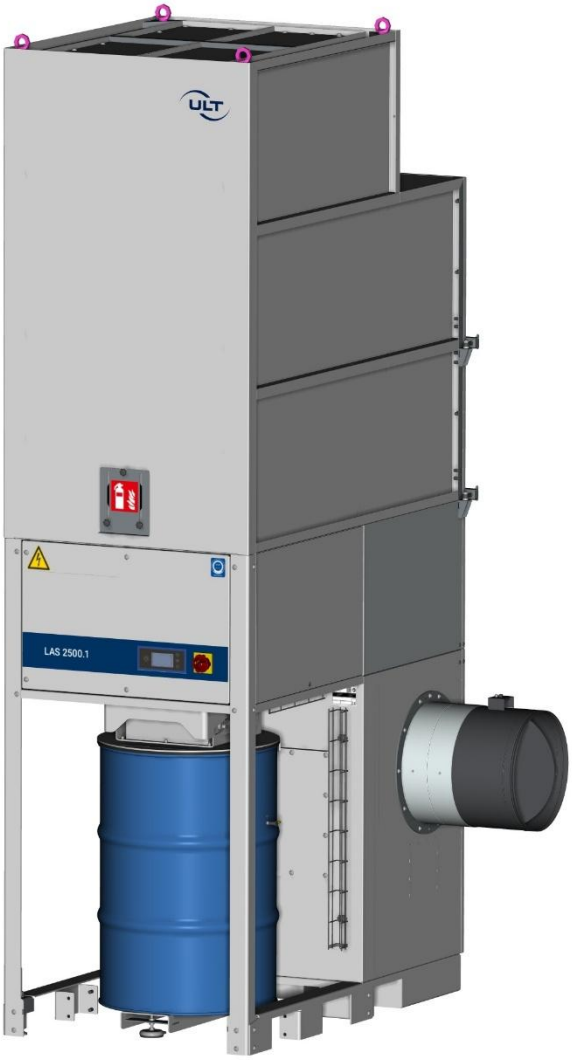


Technical Documentation ULT 2500.1

Version 003

ULT
air quality

Contents

Description of product series

Areas of application

Laser cutting | Laser marking | Laser structuring | Laser engraving | Laser welding

Grinding | Engraving | Polishing | Filling and Dosing Processes | Restoration

Applications and use

The ULT 2500.1 is used for the capture and filtration of dry and combustible dusts in air mixtures that are not potentially explosive and are produced during machining processes.

Dust particles that are dangerous to health are produced in a wide range of different work processes. For example, laser smoke is produced when lasers are used. This toxic, corrosive mixture of aerosol, gas, and nanoparticles represents a health hazard and has a negative impact on the quality of products and the machining process. Depending on the particular machining process, the resulting mixtures of substances that are produced and need to be removed from the raw gas can differ greatly.

The ULT 2500.1 represents a complete cartridge filter solution for this purpose. Thanks to the wide range of available configuration options, highly varied filtration requirements for capturing the resulting harmful substances and gases can be addressed, even in demanding applications.

In its standard configuration, the extraction and filtration unit is designed to be free of sources of ignition and is therefore also suitable for the capture and filtration of flammable dusts that have the following properties:

- Not capable of self-ignition
- MIE (minimum ignition energy) > 10 mJ
- Glow temperature > 180°C
- Ignition temperature > 180°C

The HEPA H14 particulate filter is part of the safety equipment and will trigger an automatic switch-off above a certain dust saturation level. Carryover of critical dusts is prevented through monitoring of the H14 secondary filter.

Operating principle

During the extraction process, a blower on the clean gas side of the filtration unit generates a volumetric flow rate that is appropriate for the particular application. In the configuration with an EC fan, the extraction power can be continuously adjusted. The raw gas containing pollutants or harmful substances is therefore reliably extracted.

The raw gas extracted at the point of capture is initially transported via the air piping system to the intake of the Extraction and Filtration Unit ULT 2500.1. Here the flow of the raw gas is slowed down and diverted via a baffle plate. During this process, a large portion of the particles transported in the raw gas is slowed down and retained so that they do not directly impact on the filter elements. The baffle plate has a copper coating at the inflow point, which enables effective cooling of hot particles and prevents the generation of impact sparks inside the unit.

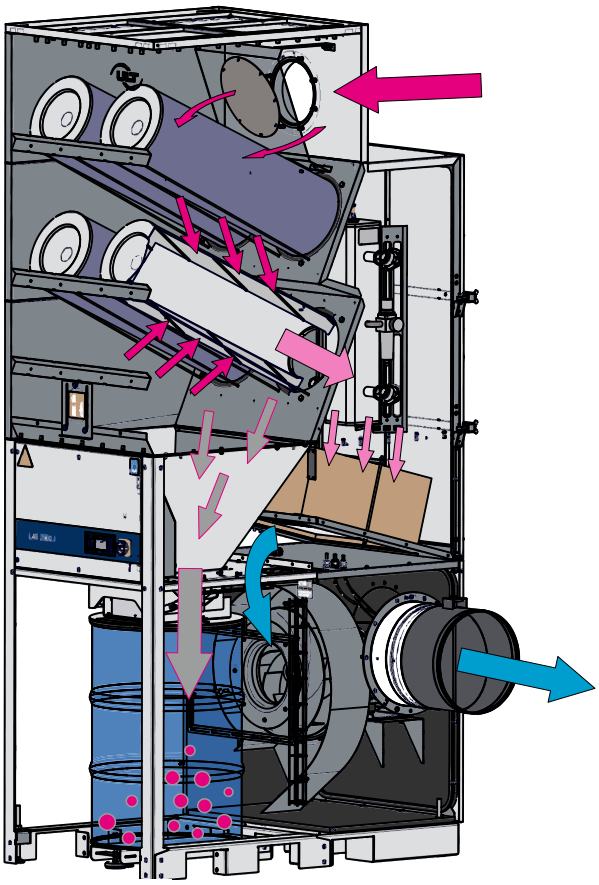
The raw gas then arrives at the membrane of the cartridge filter elements (dust extraction class M). Here, the dust particles are separated using the principle of surface filtration. Cleaning of the coated filter cartridges is performed automatically via pulse-jet nozzles by means of compressed air purging using the reverse-flow principle. A compressed air connection (6–8 bar) is required for operation of the unit. The cleaned particles fall into a disposable hobbock container for removal and disposal of the filtered material with minimal contamination risk.

The purified air then passes to the clean gas chamber and is discharged via an air vent. Before this happens, the air passes through a secondary filter stage equipped with a HEPA H14 filter. The HEPA H14 particulate filter enables the separation of the finest airborne particles and guarantees a filtration efficiency of 99.995%.

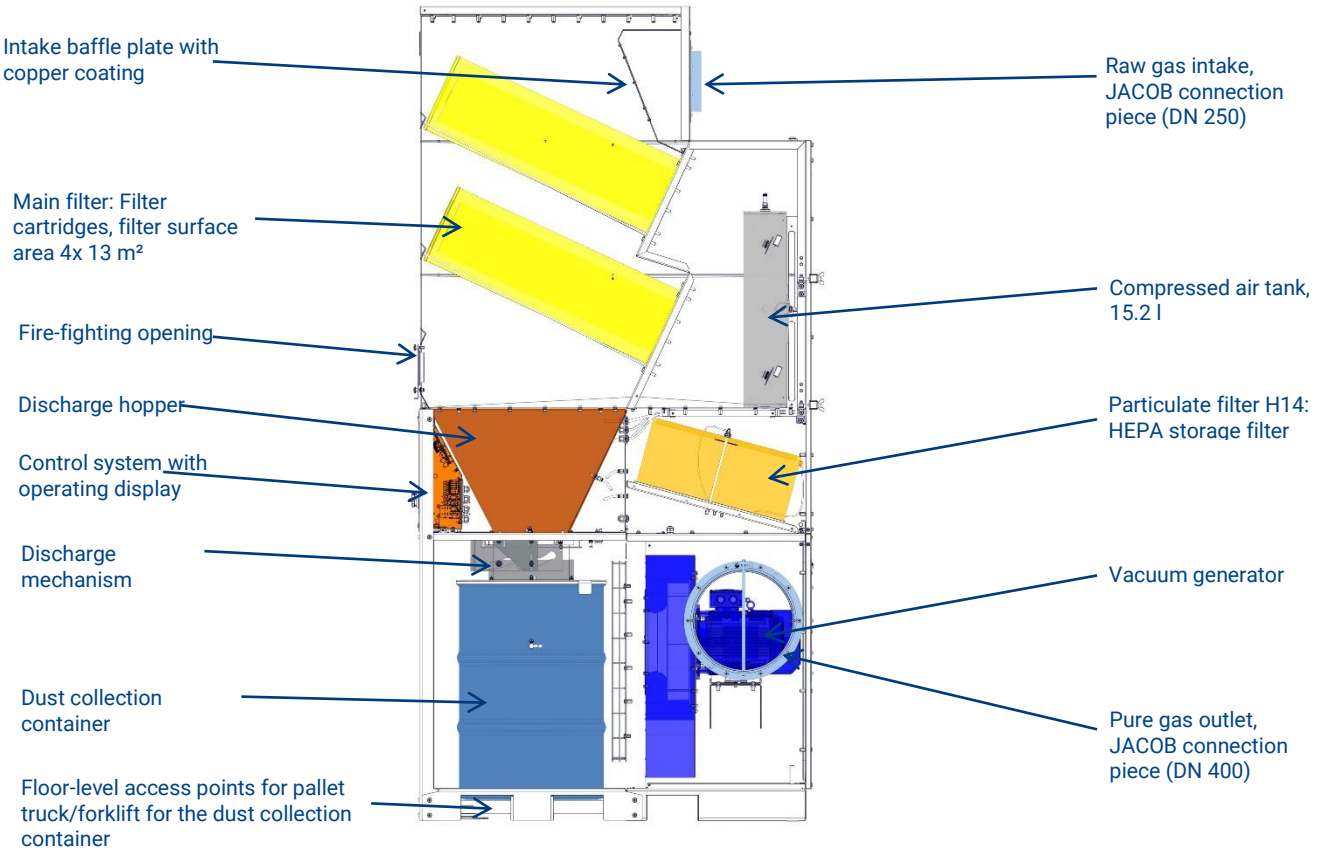
To improve the filtration of sticky and ultrafine dusts, the ULT 2500.1 can be equipped with an automatic filtration aid dosing system. Here, a filtration aid is mixed into the raw gas. In the process, due to the agglomeration effect particles and aerosols contained in the laser smoke are bound on the filtration aid and enveloped, preventing clogging and blinding of the filter cartridges. This prevents premature wear of the filter elements and improves their cleaning behavior.

Thanks to the high degree of purification, the purified gas is then free of harmful substances and can be directed back into the working space (recirculated air mode). As a result there are no thermal losses.

Recirculated air mode is not permitted when the equipment is used to extract substances that are carcinogenic, mutagenic, or toxic for reproduction. In these cases the filtered clean gas must be directed via a connected pipe section into a central air outlet system.

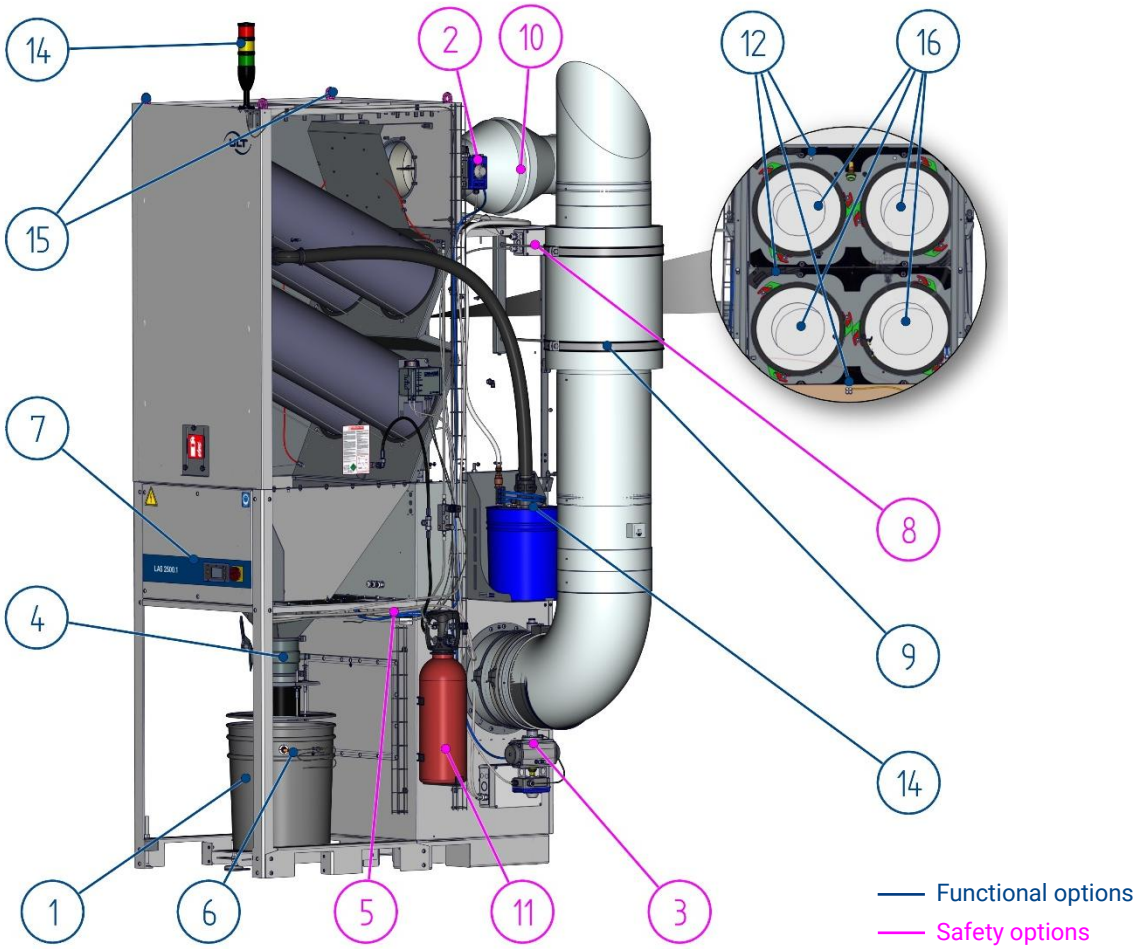


Equipment



- Intake baffle plate – for pre-separation of coarse particles and protection of the filter cartridges against premature wear
- Fire-fighting opening in the raw gas chamber
- Dust collection and disposal containers are available in a range of sizes. They offer high capacity and are easy to change with the aid of a pallet truck or forklift.
- Control panel with display screen and the following basic functions:
  - Display of the filter condition and device status
  - Adjustment of fan power settings and selection of different operating modes (volumetric flow rate control mode / constant pressure holding mode)
  - Automatic filter cleaning – pulse-jet compressed air blast; can be set to manual operation, or different modes can be selected (differential pressure-dependent cleaning “Δp” or cleaning after fixed time intervals)
  - Post-run cleaning of the filter cartridges can be activated
  - Language selection: German, English, or French
  - Display of alarms & error messages – via the control interface & visually via the operating display (fault code display)
- Analog control interface – terminal strip in the control cabinet for integration in the overall system and for external device control (interface/terminal assignments: see interface diagram XG30 in the attachment)
- All interfaces for all configuration options are pre-wired, allowing these options to be retrofitted at a later date.

Configuration options



	Option	Description
1	Discharge container	Discharge container in the sizes 200 L (standard), 30 L, and 70 L for container replacement with minimal contamination risk, e.g. in conjunction with a shut-off flap for the discharge.
2	Shut-off flap / air intake	Flap at the raw gas intake, can be pneumatically actuated via the system control Standard function: – Closes when the unit is switched off and during post-run cleaning Optional function: – Closes in the event of overtemperature or if the fire detection system is triggered
3	Shut-off flap / air outlet	Flap at the clean gas outlet, can be pneumatically actuated via the system control Standard function: – Closes when the unit is switched off and during post-run cleaning Optional function: – Closes in the event of overtemperature or if the fire detection system is triggered Shut-off flap increases the overall dimensions by 300 mm.

Option		Description
4	Shut-off flap / discharge	A manually operated cover flap between the discharge hopper and the dust collection container allows the container to be replaced without stopping operation of the unit. Only possible in conjunction with a 30 L or 70 L discharge container.
5	Compressed air monitor	A pressure sensor monitors the compressed air tank and detects if there is a lack of compressed air.
6	Fill level sensor	This sensor enables an alert to be displayed on the device controller when the dust collection container needs to be replaced. This makes visual inspections of the fill level unnecessary. Compatible with dust collection container sizes 30 L, 70 L and 200 L
7	PROFINET BUS communication	Control interface: BUS communication via PROFINET enables network integration of the unit.
8	Fire detection through temperature monitoring	Excessive temperature rises in the filter compartment are reported and the system is shut down for fire prevention. An external fire alarm is triggered and the compressed air tank vents to the outside. Optional: Closing of the shut-off flaps.
9	Outlet silencer	Reduces the sound pressure level by up to 5 dB(A) in recirculated air mode. The outlet direction with the silencer is vertically upward. Additional space required: ▪ Upward: 180 mm ▪ To the side: 950 mm or ▪ 1100 mm (with butterfly valve)
10	Spark trap	Spark trap in the intake line: Prevents isolated sparks from being drawn into the system. Installation is recommended with a distance of at least 1.5 m to the unit. Further protective devices are required for applications involving a risk of explosion and/or fire.
11	Extinguishing system (incl. 2 shut-off flaps)	Extinguishing gas feed: Fires are suppressed using extinguishing gas (CO_2). The extinguishing gas is fed through several nozzles into the raw and clean gas chambers. When extinguishing is in progress, the system is shut down and the shut-off flaps at the intake and outlet close. The system operates independently, even during a mains power failure. The extinguishing system includes the following options: shut-off flaps for pure gas and raw gas (2 / 3), fire detection system (8). When using the extinguishing system in recirculated air mode, a clear floor space of 55 m² is required at the installation site of the unit.

Option	Description
12 Filter removal with minimal contamination risk	Plastic adapters are mounted on the filter head plate for changes of the cartridge filters with minimal risk of contamination. During filter changes, ready-made film sleeves can be hooked into these adapters for containment of the contaminated filters.
13 Dosing device for filtration aid	Automatic dosing of filtration aid: Admixing additives improves the separation of sticky and ultrafine dusts.
14 Stacklight	Stacklight (three-color signal tower): A stacklight mounted on the roof of the system indicates the operating status using three colors (red, yellow, green). The stacklight increases the height of the unit by 370 mm.
15 Lifting eyes	M12 lifting eyes for lifting the unit. 4 attachment points are provided on the roof and 2 on the plinth of the unit to facilitate installation.
16 Alternative filter packs	These increase the filter surface area to 64 m². Reduces the filter surface load at high dust volumes to ensure a longer service life.

Technical Data ULT 2500.1

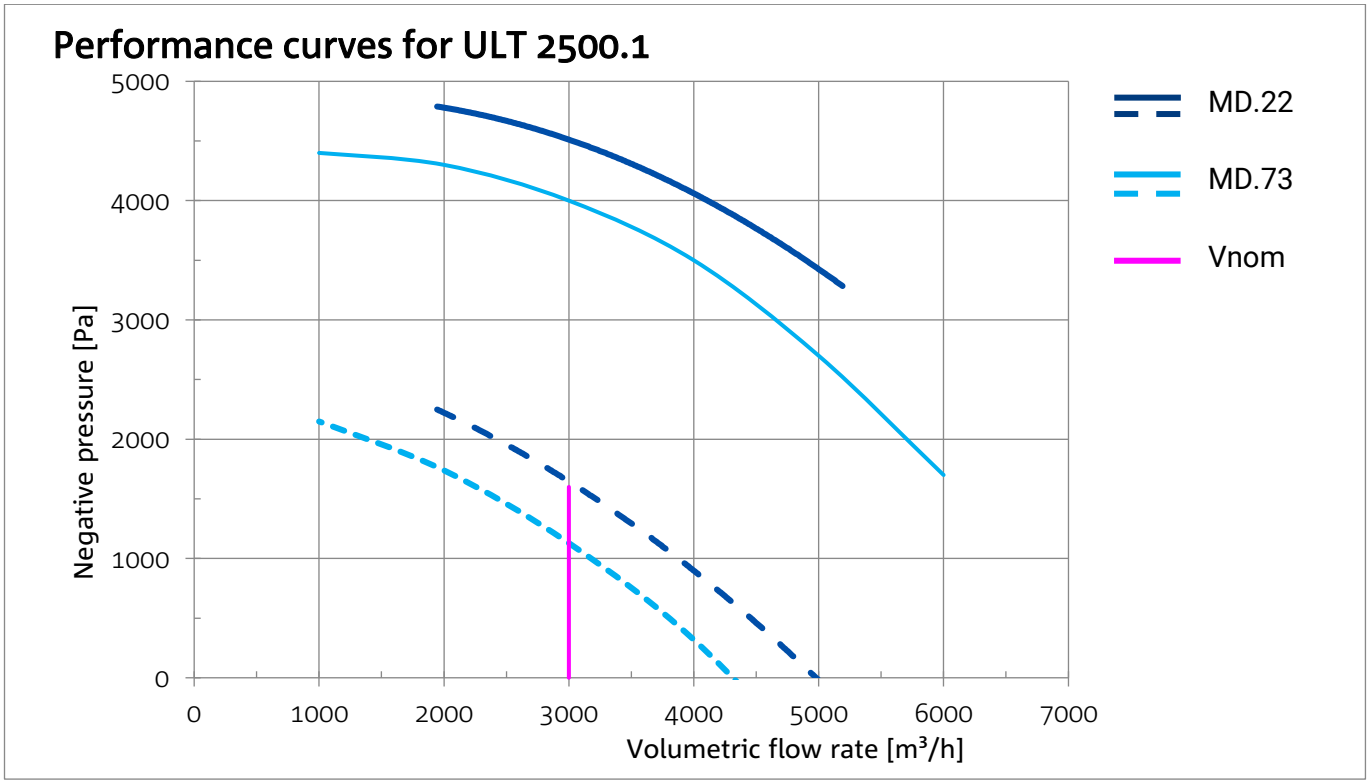
PARAMETER	UNIT	MD.73	MD.22	HD.66
Max. volumetric flow rate	m³/h	4,300	6,800	5,400
Max. negative pressure	Pa	4200	4,500	16,000
Nominal volumetric flow rate (fan characteristic curve)	m³/h @ Pa	3,000 @ 3,000	3,000 @ 4,300	3,000 @ 14,000
Externally available negative pressure: (at nominal volumetric flow rate)	Pa	1,100	1,600	11,000
Rated motor power	kW	5.5	7.3	15
Rated voltage	V AC	3~ 400	3~ 400-480	3~ 400
Rated current	A	10.1	8.2	32
Sound level (50–100% airflow rate)	dB(A)	< 70	< 75	< 80
Frequency	Hz	50	50 / 60	50 / 60
Volumetric flow rate adjustable		No	Yes	Yes
Negative pressure generator type		Medium-pressure fan, three-phase motor	2 x EC high-pressure blowers	High-pressure fan, three-phase motor
Inlet	Ø Position	1x Ø 250 mm JACOB connection piece Position: rear top		
Outlet air guidance	Ø Position	1x Ø 400 mm JACOB connection piece Position: left, right; bottom rear		
Dimensions (width x depth x height)	mm	1,350 x 1,645 x 3,250 (excluding options)		
Weight	kg	Approx. 695 (excluding options)		
Power cable		To be connected in the control cabinet		
Compressed air connection		DN10, 6–8 bar, 30 L/min		
Enclosure		Robust sheet steel, powder-coated in RAL7035, RAL5002		

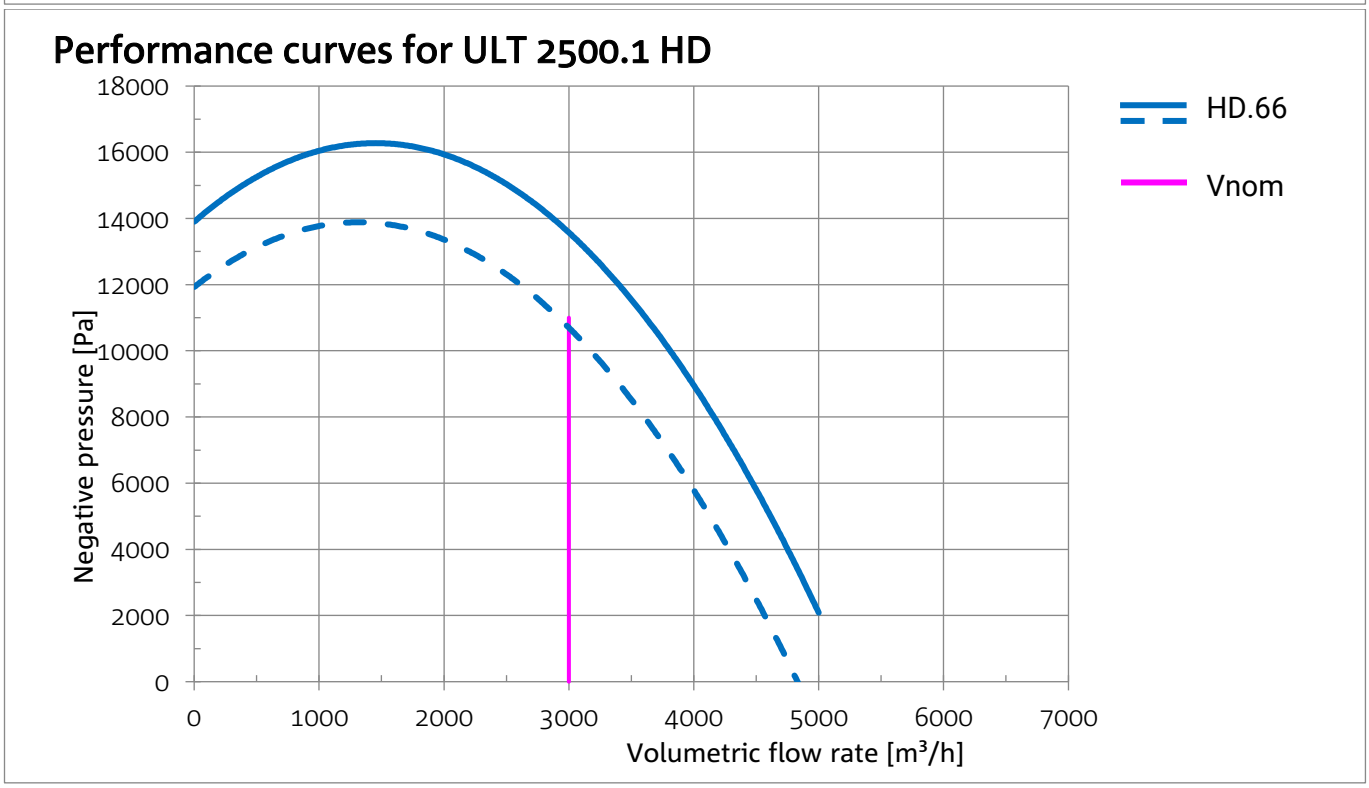
Characteristic curves

With standard filter configuration 4Pa52H14

Solid lines: **Performance curves with as-new filters without dust loading**

Dashed lines: **Available external negative pressure at maximum filter dust loading**

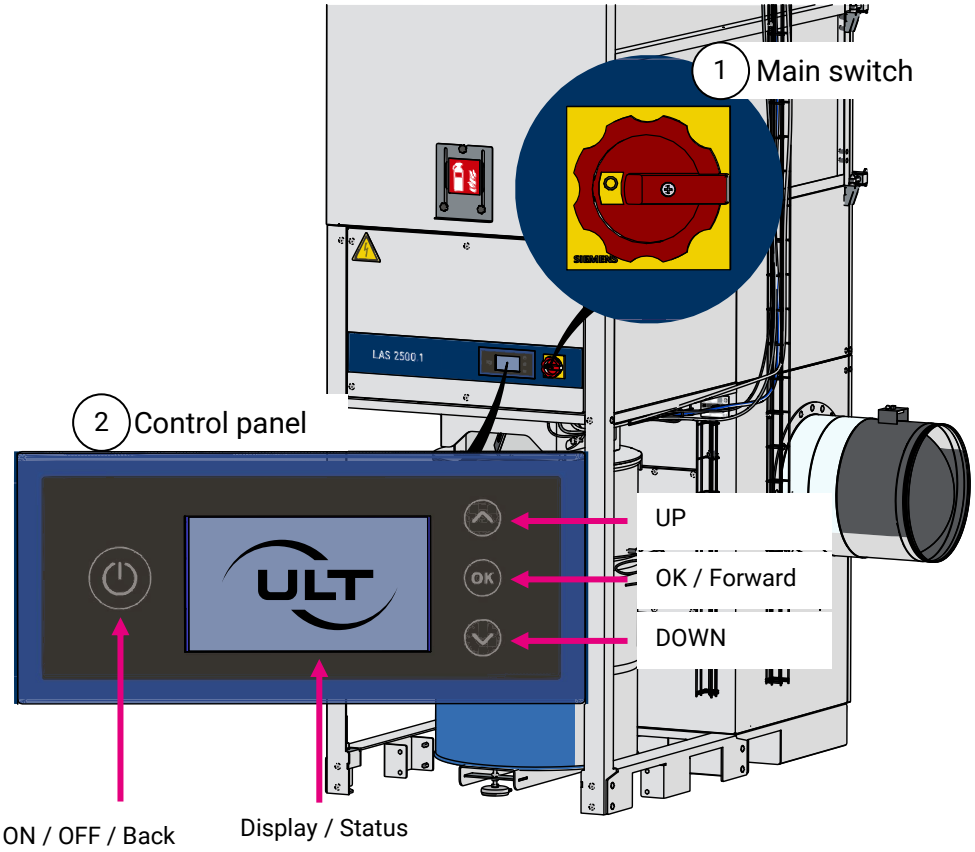




Operating controls

The ULT 2500.1 is operated via an easy-to-use, robust control panel featuring pushbuttons and a display screen. The current operating status and device error conditions are signaled by different display backlights.

To start using the ULT 2500.1, first use the main switch (1) to turn on the power supply. Once the power supply has been turned on, the control panel (2) indicates standby mode on the display screen.



The device is controlled and the current device status is displayed via the display and the buttons on the control panel.

Pressing and holding the <ON/OFF> button switches the device on or off. Once the unit has been switched on, the display changes to operating mode (green).

When controlling the device and viewing information, the <UP> and <DOWN> buttons can be used to switch between the available functions within a menu level and to change parameter settings. The selected setting can be confirmed with <OK>. Furthermore, the button can also be used to navigate down to a submenu. The <ON/OFF> button can be used to return back up to the menu level above and/or to cancel the confirmation of settings.

Display screen navigation – ULT 2500.1

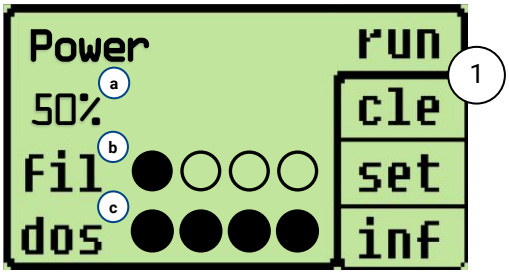
1 “run” menu – operation

Display and adjustment of the suction power (option), display of the filter cartridge saturation (main filter), and display of the dosing fill level (option):

a ... Suction power [%]: Can be adjusted via <OK> and <UP>/<DOWN>

Main filter saturation: 0 dots – empty;
4 dots – full;

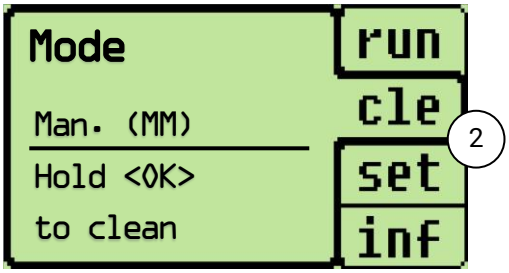
Dosing fill level: 0 dots – empty;
4 dots – full;



2 “cle” menu – filter cartridge cleaning

Display and selection of the mode for pneum. pulse-jet cleaning of the filter cartridges:

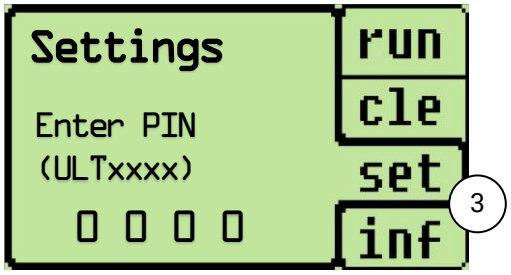
- Option to select between different modes with differential pressure-dependent triggering, triggering based on fixed time intervals, or manual triggering by the user or by a higher-level machine



3 “set” menu – parameter settings

Display and modification of advanced parameters for controlling the unit:

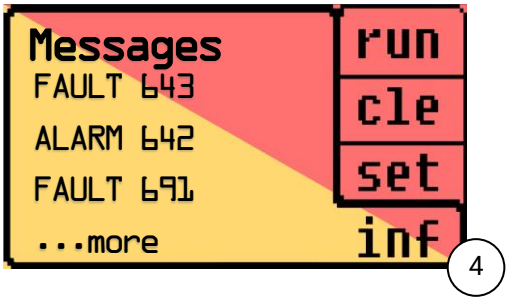
- Password-protected area: various user profiles ranging from “read-only” to “admin” are available.



4 “inf” menu – information

Display of information relating to the current operating status and to any pending error messages:

- Distinction between:
  - Alarm: Advisory, non-critical, display is backlit in yellow
  - Fault: critical condition, device can continue to be operated, display is backlit in red
  - Fault with shutdown: critical condition, device cannot be operated safely, display is backlit in red

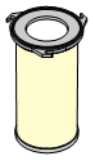


Filter system

The filter system of the ULT 2500.1 consists of a main filter stage containing 4 filter cartridges and a secondary filter stage with storage filter elements.

The filter cartridges of the main filter stage are designed to be conductive and, thanks to their nano-coating, they are excellently well suited to high dust volumes and regular pneumatic cleaning.

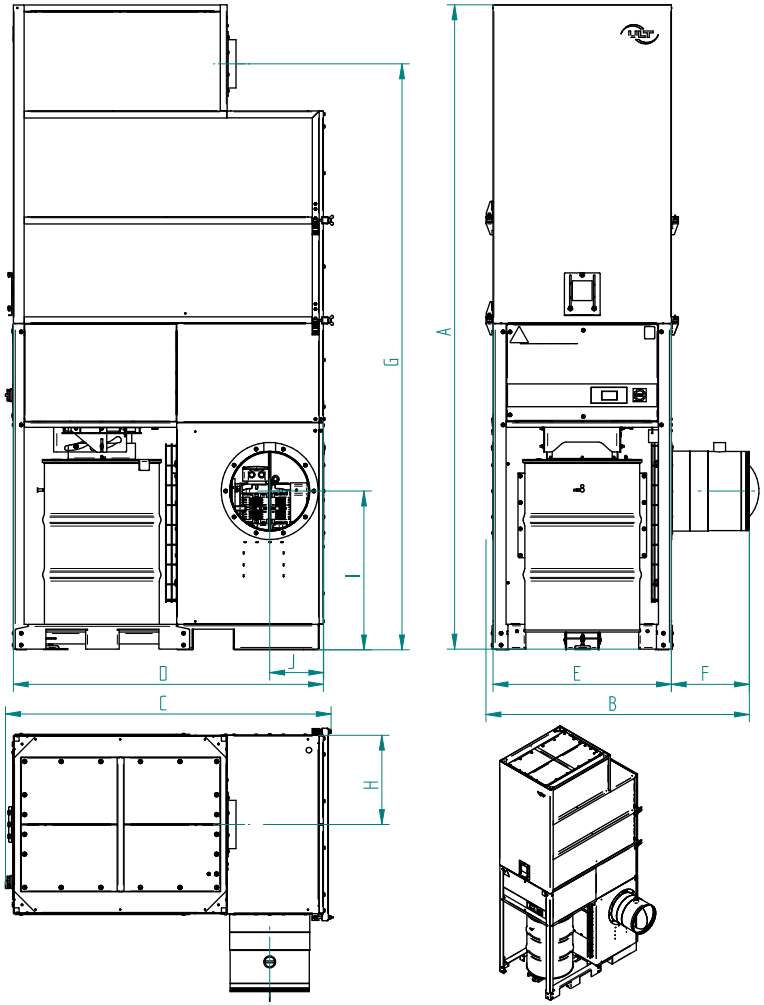
For the secondary filter stage, a conductive H14 particulate filter with automatic shutdown is an integral part of the equipment.

Main filter stage Filter system: Cartridge filter, automatic pulse jet cleaning		
Cartridge filter set, 52 m², polyester fibers, electrostatically dissipative, nano-membrane ▪ 4x filter cartridges, 13 m², Class M ▪ Filter surface loading (@3000 m³/h): 58 m³/m²/h ▪ Cylindrical design ▪ Installation on the clean gas side ▪ Incl. dust mask, gloves, bag for disposal	Prod. no.: 4-01023	■
Cartridge filter set, 64 m², polyester fibers, electrostatically dissipative, nano-membrane ▪ 4x filter cartridges, 16 m², Class M ▪ Filter surface loading (@3000 m³/h): 47 m³/m²/h ▪ Cylindrical design ▪ Installation on the clean gas side ▪ Incl. dust mask, gloves, bag for disposal	Prod. no.: 4-01030	■
Secondary filter stage Filter system: Storage filter for particles		
Conductive H14 particulate filter ▪ Filter class HEPA H14 in acc. with EN 1822 ▪ MDF filter chamber, seal on the clean gas side	Prod. no.: 4-01024	■

■ Basic configuration

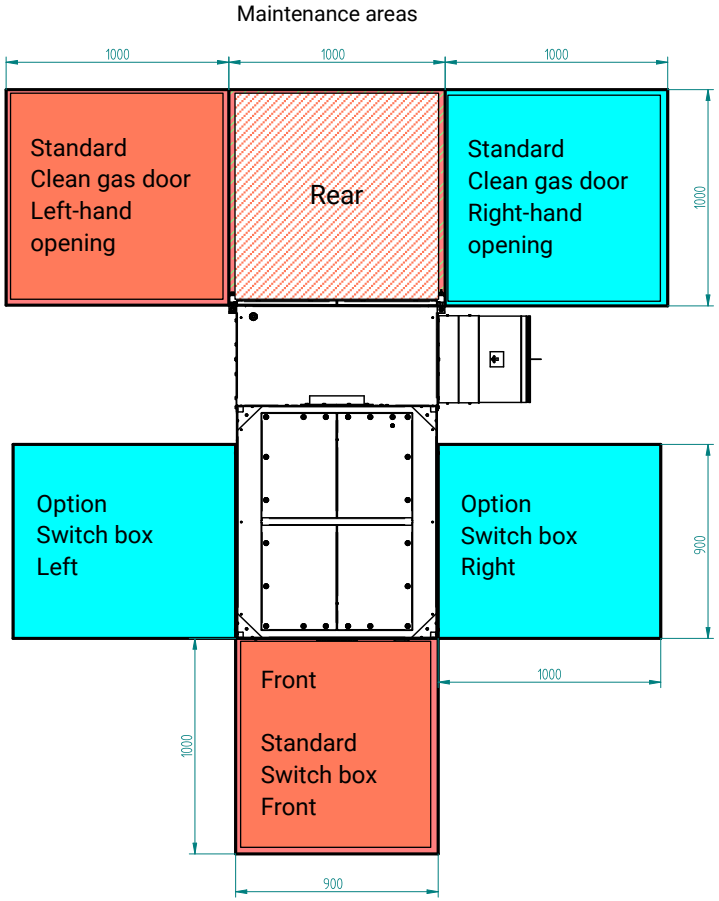
■ Optional

Dimensions and distances



	Dimensions
	[mm]
A	3250
B	1250
C	1645
D	1570
E	900
F	420
G	2960
H	450
I	800
J	270

Distances for maintenance and operation



Maintenance & operating areas

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