

HLR[®] 1000E-M



HVAC Load Reduction[®] (HLR[®]) Technology

HLR technology represents a vital addition to conventional HVAC systems to reduce the heating and cooling load of outside air. enVerid's molecular air cleaning technology removes previously hard-to-capture contaminants from indoor air, thereby decreasing the required volume of outside air ventilation and providing more control over air quality.



The HLR[®] 1000E-M can be installed both horizontally and vertically.

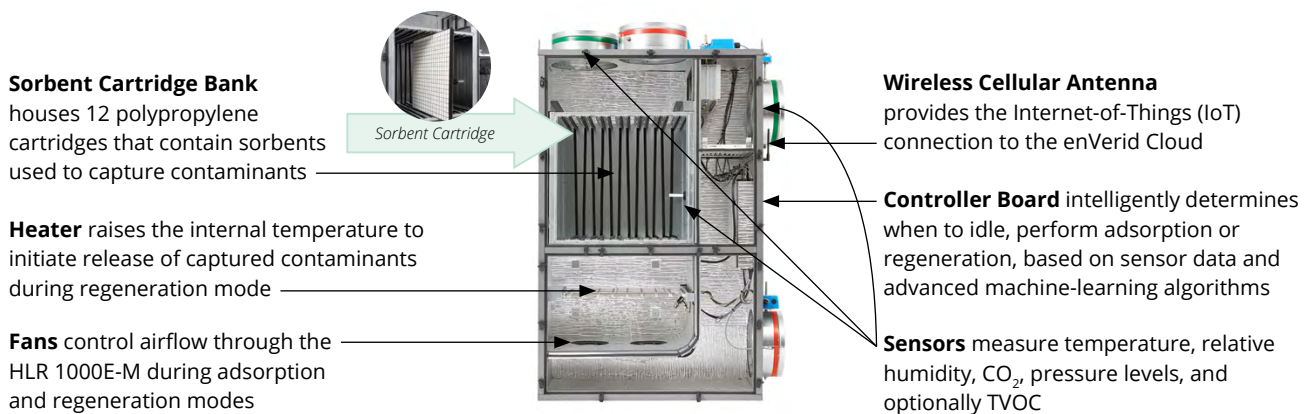
ASHRAE Standard 62.1 Compliance

The HLR 1000E-M is fully compliant with ASHRAE Standard 62.1 Indoor Air Quality Procedure (IAQP), the preferred approach to achieve energy efficiency and indoor air quality (IAQ). Introduced in 1981, IAQP is a performance-based design procedure that determines outdoor air intake rates based on an analysis of contaminant sources, contaminant concentration limits and level of perceived indoor air acceptability.

The ASHRAE Standard 62.1 guide recognizes that “The IAQP may allow for a more cost-effective solution to providing good air quality.” Additionally, “The IAQP may also be used to achieve better air quality than VRP (lower contaminant levels and/or higher perceived acceptability).”

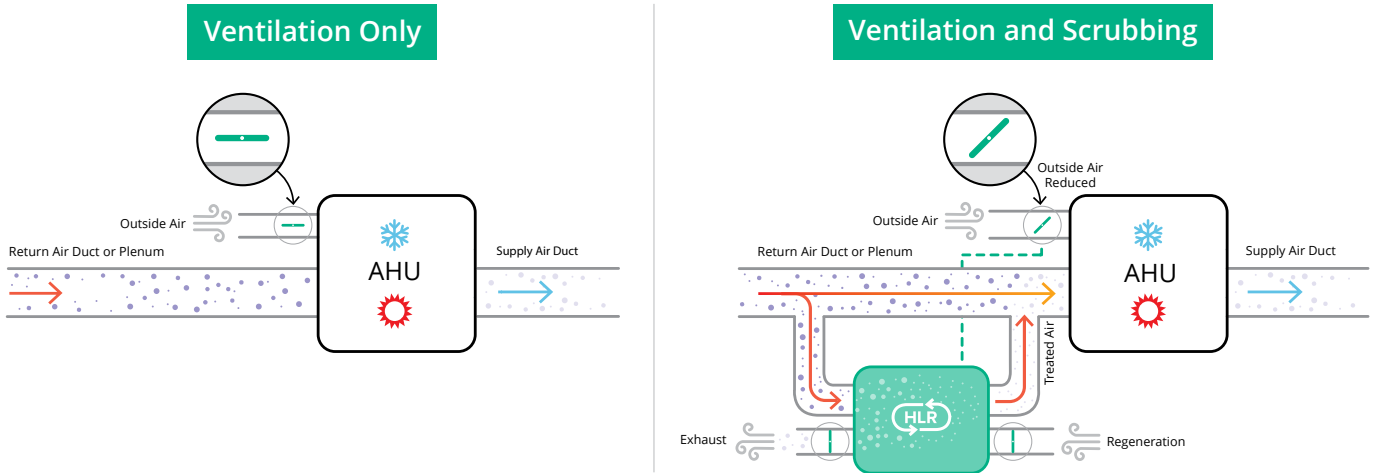
What's Inside

The HLR 1000E-M is an all-inclusive solution that contains a cabinet, replaceable sorbent cartridges, along with embedded web-accessible controls and sensors. The system is designed to be scalable to building size. Individual or multiple HLR modules can be used in new construction, or easily retrofit to an existing HVAC infrastructure. The HLR 1000E-M is designed for indoor use. The unit is placed inside an HVAC mechanical room or air plenum. It easily fits through doorways and elevators, and can be configured vertically or horizontally. Weatherized units for rooftop use are also available.



How it Works

The diagrams below compare HVAC operations using ventilation only (outside airflow based on ASHRAE 62.1 Ventilation Rate Procedure, or VRP) with HLR 1000E-M scrubbing and ventilation (outside airflow decreased using ASHRAE Standard 62.1 IAQP¹ calculations and maintaining positive building pressure).



HLR 1000E-M modules have four integrated capabilities:

Indoor Air Scrubbing (Adsorption Mode)

A fraction of the return air stream (1,000 CFM) is directed through the HLR 1000E-M to remove contaminants of concern. Sorbents in the HLR modules feature selective chemistry which removes 250+ volatile organic compounds (VOCs) along with carbon dioxide (CO₂), carbon monoxide (CO), ozone, aldehydes and particulate matter (PM_{2.5}) resulting in cleaned air that is redirected to the building's indoor circulations.



Outside Air Intake Management

Electromechanical control of the HVAC system's outside air damper minimizes the amount of outside air ventilation, adjusting for optimal energy savings, air quality targets, building air pressure, and HVAC economizer modes. The HLR module can have direct 2-10 VDC control of the outside air damper, or use BACnet to coordinate with the Building Management Software (BMS) which can over-ride control of the outside air damper when required.



Automatic Self-Cleaning (Regeneration Mode)

Sensors monitor sorbents in the HLR 1000E-M for saturation, and then initiate a regeneration process to clean the sorbents of captured contaminants, which are then purged outside of the building. Regeneration is scheduled and managed for optimal performance and minimal energy use.



Monitoring and Reporting

HLR software communicates continuously with the onboard sensors to record, report and optimize all aspects of HLR 1000E-M operation. HLR modules provide secure, real-time reporting of IAQ and operating parameters to the enVerid Cloud.



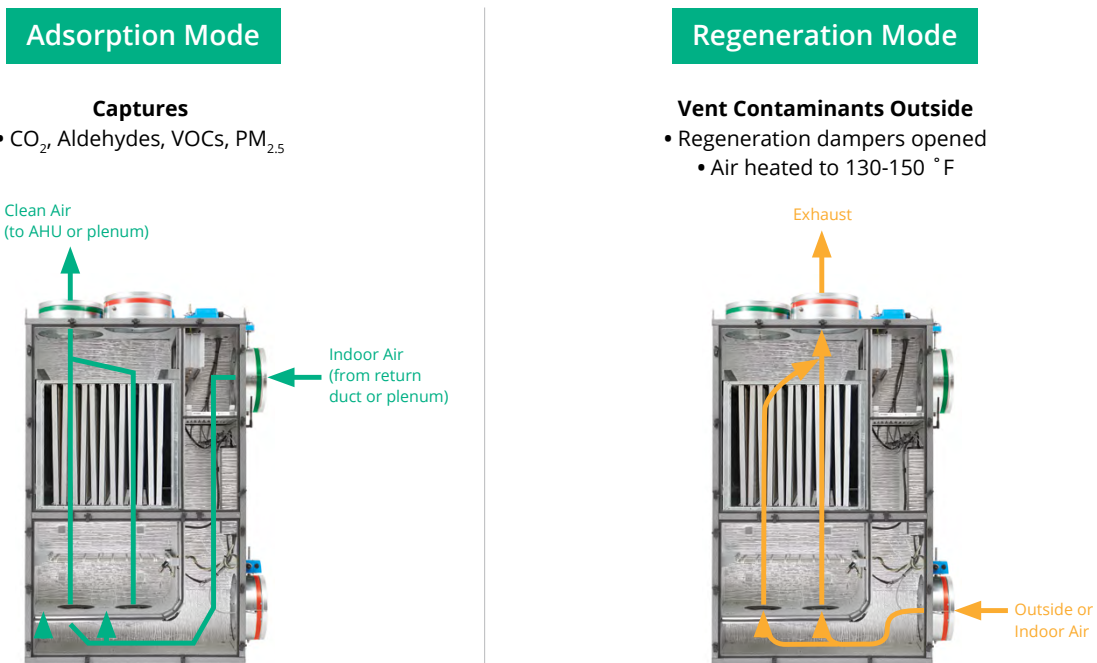
¹ The mass balance analysis is performed per contaminant and per zone to ensure all contaminants are properly below their established limits. These "per zone" outside air CFMs are summed to yield the total ventilation required for the building. enVerid's IAQP calculator makes it easy.

$$V_{ot} = \frac{N - Q_{HLR} E_f C_{bz} E_z}{(C_{bz} - C_o) E_z}$$

V_{ot} = Ventilation Rate N = Pollutant Emission Rate Q_{HLR} = Scrubbed Air
 E_f = HLR Air Cleaning Efficiency C_{bz} = Indoor Concentration at Breathing Level
 E_z = Ventilation Distribution Effectiveness C_o = Outdoor Concentration

HLR Modes

The diagrams below depict the “under-the-hood” view of HLR 1000E-M operation during the adsorption and regeneration modes.



For alternative air flow configurations, refer to the HLR Technology Design Guide.

enVerid Cloud

Each HLR 1000E-M module supports the IoT and is connected to the enVerid Cloud using a secure wireless broadband connection. End-to-end encryption and system hardening provide additional layers of security. With a secure login to the enVerid Cloud, facility managers and engineers have 24/7 access to IAQ measurements and HLR system configuration and monitoring.

- Anytime, anywhere access from any Internet-connected device (PC, tablet, smartphone)
- Secure login with username and password over encrypted HTTPS connection
- Different user types with different access levels
- Real-time and historical views of IAQ (CO₂, TVOC), comfort (temperature, relative humidity), outside air controls, energy savings and other measurement data.
- HLR system configuration and settings
- HLR system monitoring and performance



The enVerid Cloud enables users to monitor and manage HLR modules and building IAQ

Specifications

Module		HLR 1000E-M	
Indoor Installation		Mechanical Room or Air Plenum	
Sorbent Cartridges		12	
Unit Cabinet Weight		430 lbs / 195 kg	
Unit with Cartridge Set		630 lbs / 286 kg	
Static pressure added to AHU fan		Negligible	
Maximum Airflow		1,000 CFM	
Maximum allowed external static pressure		0.2 inches of water (50 Pascal)	
Maintenance		1x per year	
Operating Life		20+ years when scheduled maintenance is performed	
Dimensions (upright)		Unit with Dampers and Handles	
Height (allow additional 21 in clearance for elbow)		73.41 in / 1865 mm	
Width (allow additional 36 in clearance for control panel service)		48.80 in / 1240 mm	
Depth (allow additional 36 in clearance for cartridge service)		26.78 in / 680 mm	
Ducts (diameter)		14 in / 355.6 mm	
Voltage (VAC)	Frequency (Hz)	MCA	MOCP
208 – 277	50/60 Hz	32 Amp	35 Amp
Power Consumption	Min	Typical	Max
Adsorption	144W	288W	330W
Regeneration	N/A	5,000W	6,800W
Idle	N/A	<1W	
Communications			
Cellular Link		2.5G / 3G / 4G	
BACnet over MSTP		Optional	
Air Flow Components			
Fan(s)		24VDC / 120W max (each)	
Heater with PID Control (2 heater options)		277VAC / 6.5kW	
		208VAC / 5.5kW	
Required Control Connections			
Outside Air Damper Control		Output from HLR Module: 2-10 VDC or via BACnet	
Outside Air Damper Position Monitoring		Input to HLR Module: 2-10 VDC or via BACnet	
Fire Signal Dry Contact Output		Input to HLR Module	
AHU Mode Dry Contact Input		Input to HLR Module or via BACnet	
Additional Control Connections			
AHU Fan Speed Input		Direct wired Input to HLR Module or via BACnet	
Energy Meter Dry Contact Input		Input to HLR Module	
Available 24V Relay Output		Output from HLR Module 24V/1A	
Available Dry Contact Output		Output from HLR Module 1A (max)	
Available Dry Contact Input		Input to HLR Module	
Sensors	Location	Measurement	
Multi Sensor: measure incoming air	HLR Module Interior	T, RH, CO ₂ , TVOC (optional)	
Multi Sensor: measure outgoing air	HLR Module Interior	T, RH, CO ₂	
Pressure Sensor	HLR Module Interior	P	
Sorbent Temperature	HLR Module Interior	T	
Optional Sensors to calculate energy use	Supply Air Duct	T, RH	
	Outside Air Duct	T, RH	

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enVerid is committed to improving energy efficiency and indoor air quality in buildings worldwide through its innovative, award-winning HVAC Load Reduction® (HLR®) solutions. HLR technology enables immediate capital cost savings on new HVAC systems and provides up to 40% energy savings and superior indoor air quality. Deployed in nearly 10 million ft² of commercial, academic, and government buildings, enVerid's HLR technology is ASHRAE-compliant, LEED-compliant, and eligible for utility rebates. For more information, please visit www.enverid.com.

