enVerid
Energy savings. Air quality.

HLR Indoor Module

HVAC Load Reduction Module

The HLR 14M Indoor Module is an all-inclusive air scrubbing solution containing regenerative sorbent cartridges, along with embedded web-accessible controls and sensors. Individual or multiple HLR modules can be used depending on the building size. The HLR modules can be retrofitted into an existing HVAC infrastructure or installed in new construction or renovation.
The HLR 14M Module is designed for indoor use.
The HLR 15R Module (not shown) is an outdoor model designed for rooftop installations.

HLR 14M Indoor Module

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 contaminants from indoor air, thereby decreasing the required volume of outside air ventilation while providing the most cost-effective, safe and reliable solution for indoor air quality.

enVerid Cloud™

The HLR 14M Indoor Module supports IoT connectivity and is linked to the enVerid Cloud using a secure cellular connection. End-to-end encryption and system hardening provide additional layers of security. Facility managers and engineers have 24/7 access to a dashboard with IAQ measurements with a secure login to the enVerid Cloud, HLR module status and the energy savings.

ASHRAE Standard Compliance

62.1
The HLR 14M Indoor Module is compliant with ASHRAE 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 and air cleaning capacity to stay below recommended contaminant concentration limits.

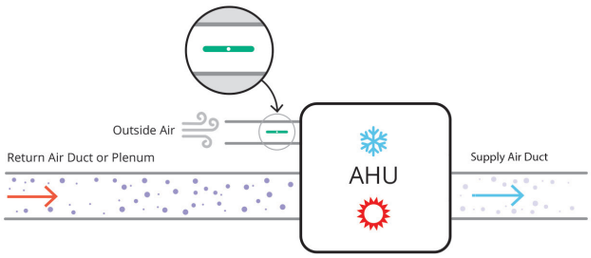
The ASHRAE 62.1 Standard recognizes that "The IAQP may allow for a more cost-effective solution to providing good air quality." Additionally, "The IAQP may also be used to achieve better air quality than VRP."

145.2
The cleaning efficiency for HLR modules was tested by a third-party lab in accordance with ASHRAE Standard 145.2 – Laboratory Test Method for Assessing the Performance of Air-Cleaning Systems.

How it Works

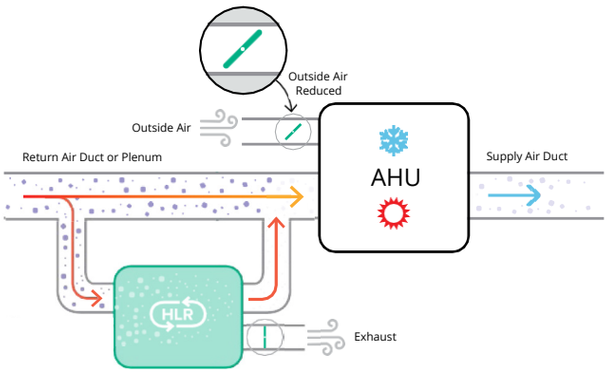
The diagram below illustrates the HVAC operation using ventilation only and ventilation and scrubbing.

Ventilation Only



The outside airflow based on ASHRAE 62.1 Ventilation Rate Procedure (VRP).

Ventilation and Scrubbing



Outside airflow decreased using ASHRAE Standard 62.1 IAQP[1] calculations and maintaining positive building pressure.

HLR 14M Indoor Module Has Four Integrated Capabilities

Indoor Air Scrubbing (Adsorption Mode)

A fraction of the return air stream is directed through the HLR 14M Module to remove indoor-generated contaminants using a blend of sorbents that capture carbon dioxide (CO_2) along with a wide range of volatile organic compounds (VOCs), aldehydes, ozone, acids and particulate matter ($PM_{2.5}$) resulting in cleaned air that flows back into circulation.

Outside Air Intake Reduction

Outside air reduction leads to lower cooling and heating energy consumption[2] and reduces the intake of outdoor-generated pollutants. By following ASHRAE Standard 62.1 IAQP, HLR Technology enables significant outside air reduction relative to the typically prescribed amounts, while maintaining indoor air quality.

Automatic Self-Cleaning (Regeneration Mode)

The sorbents are designed to release captured contaminants upon heating. The HLR 14M Module is equipped with a built-in heater and performs a periodic regeneration process to clean the sorbents and expel contaminants outside the building. Regeneration is managed for optimal performance and minimal energy use.

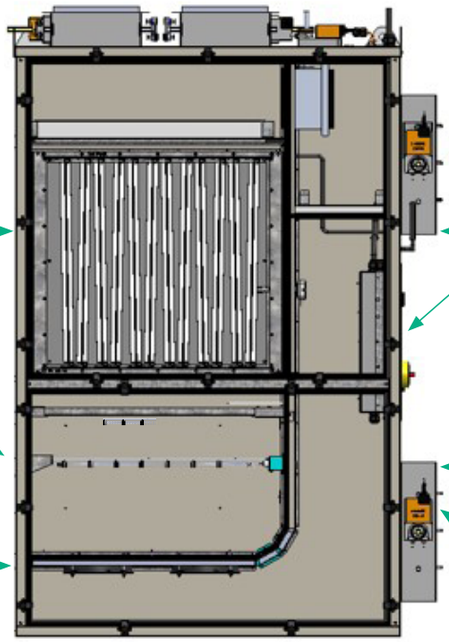
Monitoring and Reporting

HLR software communicates continuously with the onboard sensors to record, report and optimize all aspects of the HLR module's operation. The system provides 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.

[2] When economizer operation is favorable, outside air is increased and the HLR module is in standby.

What's Inside the HLR 14M Indoor Module?



Cartridge Bank
Houses a set of 12 air-permeable sorbent cartridges

Heater
Raises the internal temperature to release captured contaminants during regeneration

Fans (2)
Fans control airflow through the module

Control Board
Controls components integral to the HLR 14M Module

Actuators and Dampers (5)
Automatically control airflow paths during adsorption and regeneration

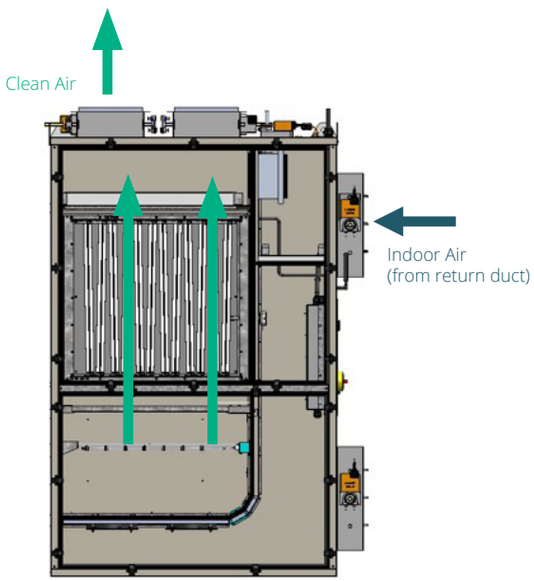
Sensors
Measure the indoor environmental air quality

HLR 14M Indoor Module Adsorption and Regeneration Modes

The diagrams below depict the "under-the-hood" view of HLR 14M Module operation during adsorption and regeneration modes.

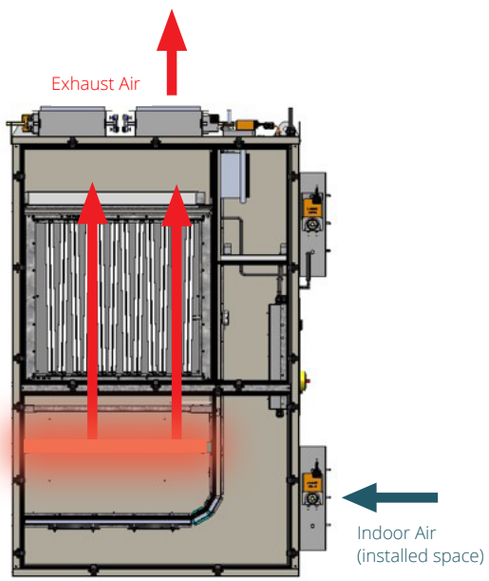
Adsorption Mode

Sorbents capture indoor air contaminants



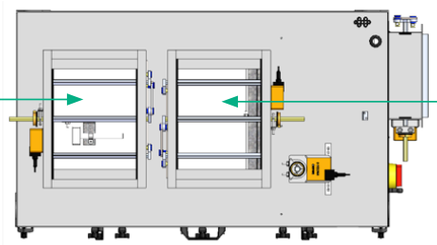
Regeneration Mode

Heat is used to expel contaminants outside

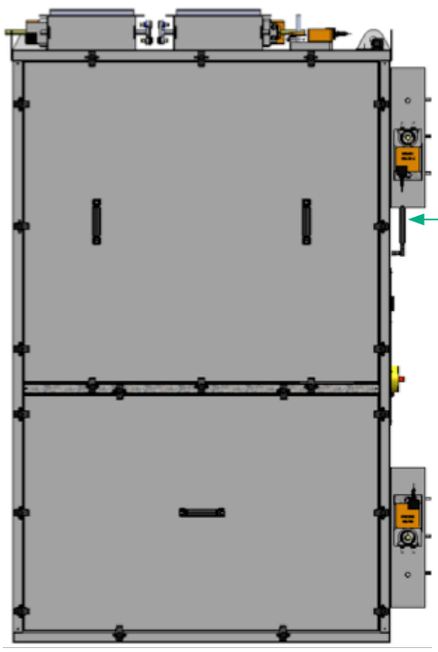


HLR 14M Indoor Module Drawings

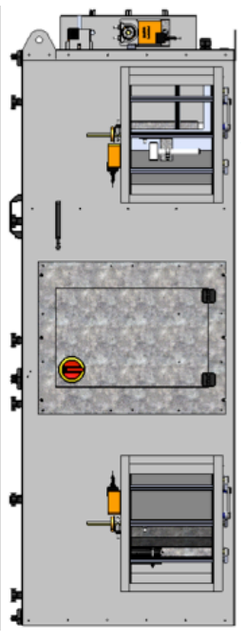
TOP VIEW



FRONT VIEW



SIDE VIEW



HLR 14M Indoor Module Specifications

GENERAL SPECS

Installation	Mechanical Room or Air Plenum	
Construction	Single wall, Insulated, Powder-coated Galvanized Steel	
Sorbent Cartridges per Set	12	
Typical Airflow (Adsorption)	700 - 800 SCFM	1,190 - 1,360 CMH
Typical Airflow (Regeneration)	250 - 300 SCFM	425 - 510 CMH
Static pressure added to AHU fan	None	
Sound Power Level	68 dB	
Maximum Allowed External Static Pressure	0.2" WG / 50 Pa	
Maintenance	Annual	
Operating Life	20+ years with scheduled maintenance	

COMMUNICATIONS

Cellular Link	3G / 4G
BMS Integration	BACnet over MSTP or Hardwire

POWER

Voltage (VAC)	Frequency (Hz)	MCA	MOCP
208 V	60 Hz	34.3 Amp	35 Amp
277 V	60 Hz	30.6 Amp	35 Amp
240 V	50 Hz	28.4 Amp	30 Amp

SYSTEM POWER CONSUMPTION

	208 V	277 V	240 V
Adsorption Mode	300 W	300 W	300 W
Regeneration Mode	5,800 W	6,800 W	5,540 W

REQUIRED CONTROL CONNECTIONS

Start/Stop	Binary Input to HLR Module

OPTIONAL CONNECTIONS

Fire Signal	Binary Input to HLR Module
HLR Status	Analog Output from HLR Module
Regeneration Booster Fan Start/Stop	Binary Output from HLR Module
Indoor Air CO_2 Sensor	Analog Output from HLR Module
Indoor Air TVOC Sensor	Analog Output from HLR Module

HLR 14M MODULE WEIGHTS

Module Shipping Weight	650 lbs	295 kg
Cartridge Shipping Weight	200 lbs	91 kg
Installation/Operating Weight	630 lbs	286 kg

HLR 14M MODULE DIMENSIONS (Front View)

Height (Allow Additional 21" Clearance for Elbow)	72" / 1,829 mm
Width (Allow Additional 36" Clearance for Control Panel Service)	48" / 1,219 mm
Depth (Allow Additional 36" Clearance for Cartridge Service)	27" / 686 mm
Ducts (Indoor Air Inlet and Regeneration Air Inlet)	10" x 14" w/ 1.0" flange 254 mm x 356 mm w/ 25 mm flange
Ducts (Clean Air Outlet and Regeneration Exhaust)	10" x 14" w/ 1.0" flange 254 mm x 356 mm w/ 25 mm flange

CERTIFICATIONS

HLR Module Safety	UL 1995:2015 Ed.5 CSA C22.2#236:2015 ed.5
Cartridge bank and cartridges	UL 900:2015 Ed.8
Air cleaning efficiency	ASHRAE 145.2

enVerid Systems, Inc. · 21 Southwest Park, Westwood, MA 02090 · 1.617.795.4000 · www.enverid.com · info@enverid.com

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 30% energy savings and superior indoor air quality. The HLR modules are deployed in commercial, academic and government buildings globally. enVerid's HLR Technology is ASHRAE Standard 62.1 and LEED compliant and eligible for utility rebates. Please visit www.enverid.com.

enVerid
Energy savings. Air quality.