



- ARTEMIS has developed and patented the tubular membrane VHU® module, for the continuous harvesting of viral vectors and VLPs.
- VHU® modules are single use.
- VHU® modules are connected to a bioreactor by sterile connections which comply with all pharmaceutical requirements.
- Retraceability of installed materials
- PS/PP: USPVI quality polysulfone and polypropylene.

- A variety of module sizes accommodates a wide variety of applications for the production of viral vectors.
- The VHU® module is provided as sterile by gamma radiation (25kGa-40kGa).
- The VHU® module is also provided with CPC connectors (e.g. AQG 33012) for “plug&play”.
- All fluid path materials of construction meet USP Class VI biosafety requirements and do not contain any substances derived from animal products or are compliant with EMEA 410/01.
- All materials of construction are 100% lot traceable.

Operating Conditions

Type	VHU® 1	VHU® 2	VHU® 3
Membrane Surface Area (cm ²)	60	527	4740
Length (cm)	20	60	60
Diameter (cm)	1.85	2.85	10
Pump Rate (Recommended Nominal Max-Min (LPM)	0.1-0.3	0.3-1	1-10
Permeate Flowrate (mL/min)	0.1-1	1-20	10-100
Pressure Drop (TMP)	<2 psi	<4 psi	<8 psi



Parameter	Specification		
Scalable	0.25L-1000L		
Preferred	Single Use and Sterile Connectors		
Pump	Any Low-Shear Pump		
Bioreactor	Bioreactor with a bottom port		
Range of Operation	1x10 ⁶ -80x10 ⁶ cells/mL		
Robust	Continuous Operation for 1 week		
Cell Retention	>99%		
LV Recovery	>99%		
Parameter	Results		
Pool Volume VHU [®] 2	2L		
Yield	>99%		
Titer	1.3 x 10 ⁸ TU/mL		
Turbidity	<16 NTU		
NTU reduction	96.8%		
Process Time	1.5 hours		
Process Mode	Turbidity (NTU)		
	Broth	Post-Harvest	Clarified
Batch	50-90	N/A	Target: ~5
VHU [®] Perfusion	~500	<16	N/A

Type	VHU1	VHU2	VHU3
Hydraulic Connections			
Retentate (in)	¼"	3/8"	1"
Permeate (in)	1/8"	¼"	½"
Recommended Length of tubing return to SUB	<10"	<28"	<40"