



Ætrium-2.1 SmartFarm

Data Sheet 04/2020



The Aetrium-2.1 SmartFarm

The Aetrium-2.1 is the cloner/vegger in the Aetrium System. Cuttings are placed foam collars in the Aetrium-2.1 where they root. After cloning and vegging in an Aetrium-2.1 the 12" (30cm) tall fully vegged plants can get transplanted into the either the Aetrium-4 or the Aetrium-4 Double Deck to complete their blooming cycle.

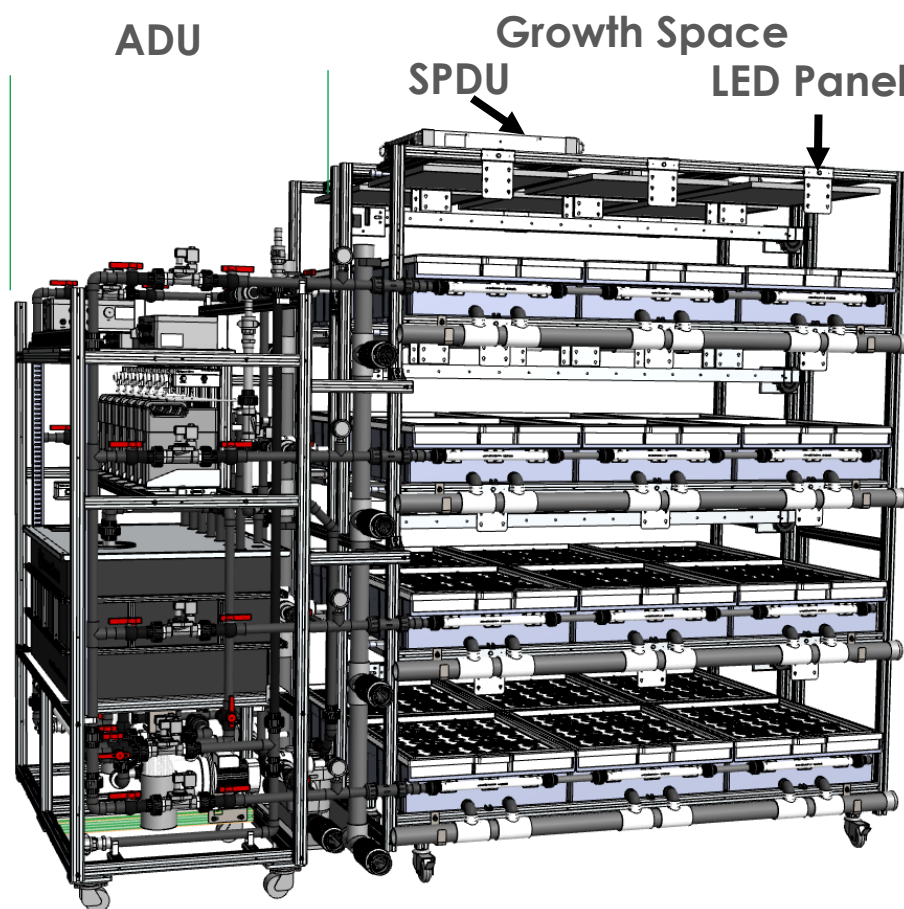
Aetrium-2.1 SmartFarm Components

The Aetrium Dosing Unit (**ADU**) is the main engine of the Aetrium-2.1 SmartFarm. Using our Guardian Grow Manager (GGM) as its main interface, it controls all water, air, and electrical operations.

Plants are cultivated in the **Growth Space**. This is where the growth trays with the spray manifold system are located. The Growth Space can be configured to have 24, 48 or 72 growth trays. Each tray can support up to 63 clone or seed cups.

Each growth tray is illuminated by one **LED Panel**.

The LED Panels are driven by the Sectional Power Distribution Units (**SPDUs**).



Power Distribution Unit (PDU)

The **PDU** links the Aetrium Dosing Unit (ADU) either wirelessly via an Access Point or via an ethernet connection to the server that runs the Guardian™ Grow Manager. It directly controls the Dosing Module, the ACU, the DCU, the WSE, the ASD, and the SPDUs in the Growth Space.



AC Relay Controller (ACU)

The **ACU** contains all AC relays that enable the Irrigation Pumps and Return Water Pump.



DC Relay Controller (DCU)

The **DCU** contains all DC relays that enable the 24V Valves.



Irrigation Pumps

The two Irrigation Pumps move water from the Reservoir through the pipes to the manifold spray heads in the Growth Space. They alternate their duty cycle and provide complete redundancy in case of failure. Each pump has a Sediment Filter attached to it.

Return Water Pump

The Return Water Pump moves water from the grow trays in the Growth Space back to the Reservoir.

Dosing Module

Driven by Guardian™ Grow Manager the Dosing Module adds a programmed ratio of fertilizer and amendments to the water in the Reservoir. It consists of Dosing Bottles and Peristaltic Doser Pumps controlled by Stepper Motor (doser) Controllers (**SMC**).

Reservoir

The Reservoir is the storage tank for nutrient rich water circulated through the Growth Space. To maintain optimal conditions of the nutrient solution to support healthy roots, a chiller is recommended to manage and control temperature. A separate mechanical chiller or an optional stainless steel loop of chilled liquid is recommended (part number 300-00188-01, including stainless steel cooling loop, solenoid valve and connections). Chilling can be controlled by the Guardian Grow Manager.

Valves

The automatically controlled 24 volt DC valves enable individual irrigation patterns for each layer in the Growth Space. The Pressure Relief Valves (PRV) are manually adjustable diaphragm valves for fine tuning pressure under the growth trays. The Manual Valves can be used to shut off water to certain parts of the Growth Space during servicing.

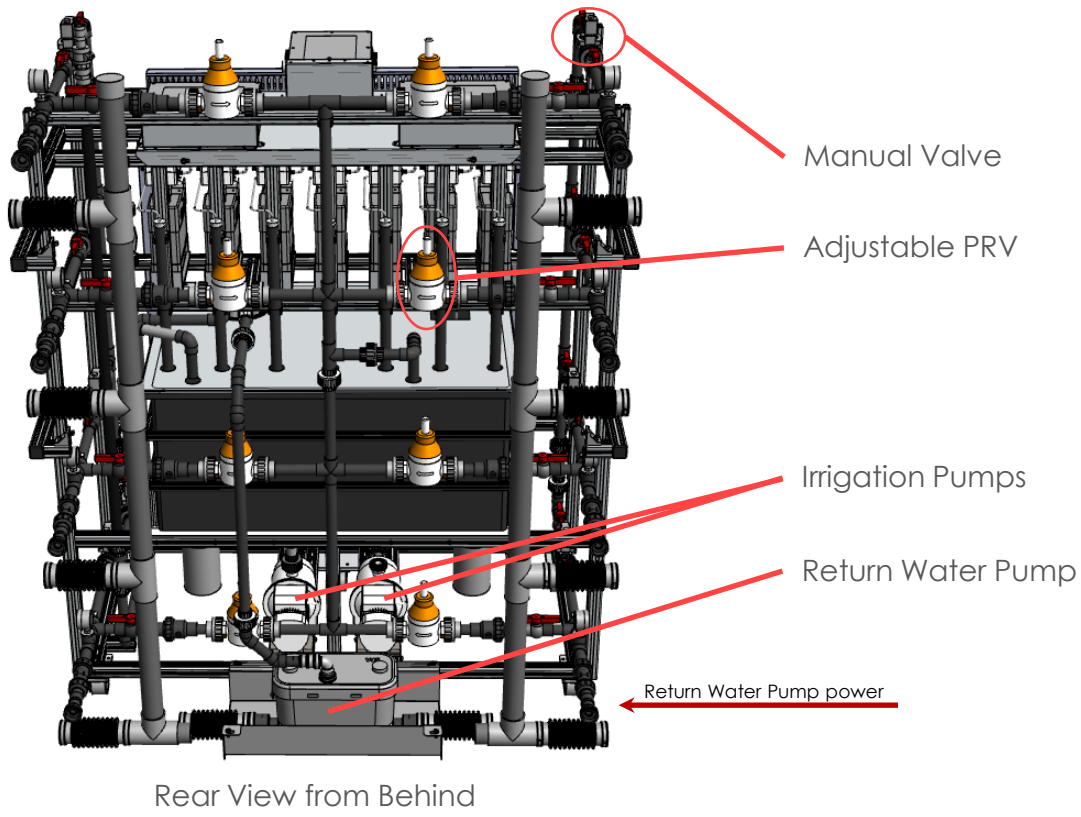
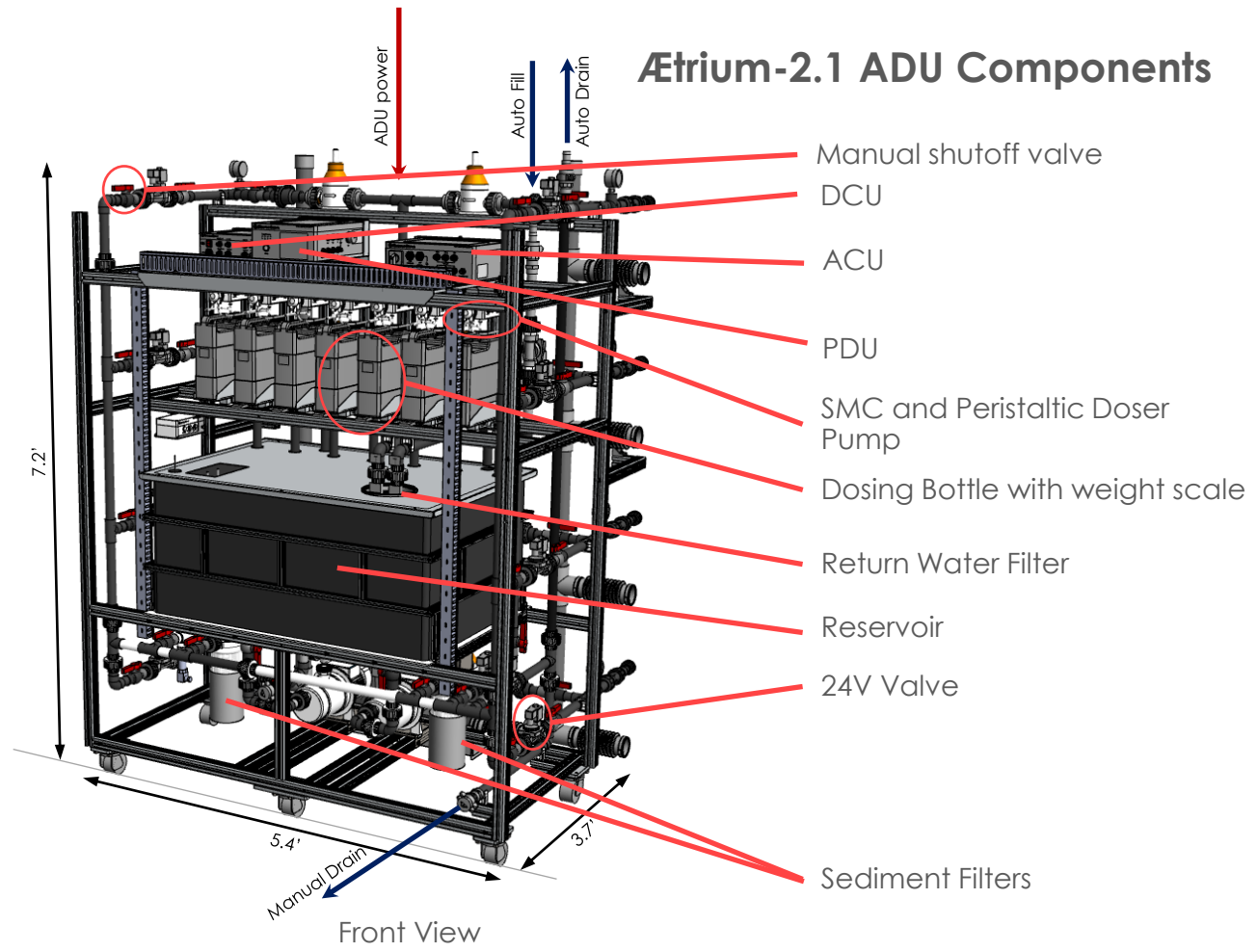
Sensors

The Water Pressure Sensors (**WTP**), the Water Sensing Module (**WSE**), and the Aetrium System Detector (**ASD**) provide accurate feedback to the Guardian™ Grow Manager on water pressure, level, pH, water temperature, electrical conductivity, air temperature, relative humidity, CO₂ level, and light intensity (ON/OFF).

Backup Power

In areas where one could suffer from loss of mains power it is highly recommended that the ADU be supplied with power from a backup source to assure that the plants continue to get fertigated. The control network, and its components, should also be on backup power.

Ætrium-2.1 ADU Components



Atrium-2.1 ADU Specs

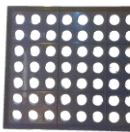
Description	Min	Typical	Max
ADU input voltage	100 V _{AC}	–	240 V _{AC}
ADU input frequency	47 Hz	–	63 Hz
ADU power draw 24-48 trays ²	–	1400W	–
ADU power draw 72 trays ²	–	1800W	–
Return Water Pump input voltage (US) ¹	114 V _{AC}	–	126 V _{AC}
Return Water Pump Input frequency (US)	–	60 Hz	–
Return Water Pump power draw 24-48 trays (US)	–	500W	–
Return Water Pump power draw 72 trays (US)	–	700W	–
Operating temperature	34 °F (1 °C)	–	104 °F (40 °C)
Storage temperature	-22 °F (-30 °C)	–	176 °F (80 °C)
UL/CSA Certification	reference E491725		
CE Certificate Number	8227170919		

Description	Value
Water temperature	Range: 32-122°F (0-50°C) Resolution: 1°F (0.1°C)
Water pH	Range: 0-14 pH Resolution: 0.01 pH
Water Electrical Conductivity (EC)	Range: 2–20,000 µS/cm
Supplied water (EC)	<250µS/cm ³
Irrigation Pump max flow rate	15.8 gal/min (60 lpm)
# of Irrigation Pumps	2
Return Water Pump max flow rate	18 gal/min (68 lpm)
# of Return Water Pumps	1
# of Dosing Pumps	7
Sediment Filters (2)	
Material	Polypropylene frame 304 Stainless mesh
Size	80 mesh (0.18mm)
Sediment Filter dimensions (L x W x H)	7.1" x 7.1" x 32.3" (180 mm x 180 mm x 820 mm)

Description	Value
Return Water Filter	
Material:	Polypropylene frame Polyamide mesh
Size	60 mesh (0.25mm)
Automatic Drain pump: the ADU can automatically complete a change out of the fertigation solution	
Max. drain pumping height	14.7' (4.5 m)
Flow rate	15.8 gal/min (59.8 lpm)
Connection Hose Barb (uses 5/8" garden hose)	5/8" OD (16mm OD)
Automatic Water Fill: the ADU automatically senses water level and will add water using a provided solenoid when water levels slip below allowable levels	
Input Flow/pressure	30-50psi @2.2gpm (2-3bar, 8.3lpm)
Connection Hose Barb (uses 5/8" garden hose)	5/8" OD (16mm OD)
Reservoir Capacity	80 gal (302 L)
Reservoir Cooling Coil (PN 300-00188-01): OPTIONAL, user must supply chilled liquid	
Coil Material	304 Stainless Steel
Coil Length	25' (7600mm)
Coil Diameter	10" (250mm)
Coil Connection Hose Barb	5/8" OD (16mm OD)
Dosing Bottle capacity	1.06 gal (4 L)
# of Dosing Bottles	7
# of 24V Valves	11
# of Pressure Relief Valves	8
# of Manual Valves	32
ADU dimensions (L x W x H)	43.6" x 63.9" x 86.1" (1105 mm x 1622 mm x 2185 mm)
ADU dry weight	574 lbs (260 kg)

1. North America only (A03-Axxxx-2x and A03-Axxxx-4x)
2. Not including power drawn by the Return Water Pump
3. It is highly recommended that one do a complete analysis of the supplied water prior to commencing cultivation. One may need to condition the water to reduce the conductivity of it for best cultivation results.

Aetrium-2.1 Shared Specs

Description	Min	Typ	Max
Grow tray grow sites (May be customized by using caps to block unused holes)		63	
			
Grow tray size	22" x 27" (559 mm x 686 mm)		
Grow tray area	4.13 ft ² (0.38M ²)		
Hole Spacing	3" hole center to hole center, 1" hole edge to edge		
Recommended Ceiling Height	9' (2743mm)	10' (3048mm)	Unlimited
Offset from walls (front back sides)	30" (762mm)	36" (914mm)	Unlimited
Floor Slope	Floor must not be more than ¼" out of level over 10'		

24-Tray Aetrium-2.1 Specs

Description	Min	Typ	Max
Average daytime wattage ^{1,2}	–	3,550 W	–
Peak hourly heat output ^{1,2}	–	12,100 BTU/h	–
Total daily energy consumption ^{1,2,3}	–	73 kWh	–
Total daily heat generation ^{1,2,3}	–	250,000 BTU	–
Average daily water consumption (0.2-0.3 gal./day/tray ⁵)	4.8 gal. (18L)		7.2 gal. (27L)
Square Feet of Canopy	101 ft ² (9.4M ²)		
# of SPDUs	2		
# of LED Panels	24		
Aetrium-2.1 dimensions (L x W x H)	9' 11" x 5' 4" x 8' 4" (3012 mm x 1622 mm x 2539 mm)		
Aetrium-2.1 dry weight	1,720 lbs (780 kg)		
Recommended chiller (an optional liquid loop chiller can be controlled by the Guardian Grow Manager)	½ HP		

48-Tray Aetrium-2.1 Specs

Description	Min	Typ	Max
Average daytime wattage ^{1,2}	–	5,660 W	–
Peak hourly heat output ^{1,2}	–	19,300 BTU/h	–
Total daily energy consumption ^{1,2,3}	–	111 kWh	–
Total daily heat generation ^{1,2,3}	–	379,000 BTU	–
Average daily water consumption (0.2-0.3 gal./day/tray ⁵)	9.6 gal. (36L)		14.4 gal. (55L)
Square Feet of Canopy	202 ft ² (18.7 M ²)		
# of SPDUs	4		
# of LED Panels	48		
Aetrium-2.1 dimensions (L x W x H)	16' 6" x 5' 4" x 8' 4" (5017 mm x 1622 mm x 2539 mm)		
Aetrium-2.1 dry weight	2,867 lbs (1300 kg)		
Recommended chiller (an optional liquid loop chiller can be controlled by the Guardian Grow Manager)	1 HP		

72-Tray Aetrium-2.1 Specs

Description	Min	Typ	Max
Average daytime wattage ^{1,2}	–	7,780 W	–
Peak hourly heat output ^{1,2}	–	26,500 BTU/h	–
Total daily energy consumption ^{3,4}	–	149 kWh	–
Total daily heat generation ^{1,2,3}	–	508,000 BTU	–
Average daily water consumption (0.2-0.3 gal./day/tray ⁵)	14.4 gal. (55L)		21.6 gal. (82L)
Square Feet of Canopy	302 ft ² (28.1 M ²)		
# of SPDUs	6		
# of LED Panels	72		
Aetrium-2.1 dimensions (L x W x H)	23' 1" x 5' 4" x 8' 4" (7022 mm x 1622 mm x 2539 mm)		
Aetrium-2.1 dry weight	4,013 lbs (1820 kg)		
Recommended chiller (an optional liquid loop chiller can be controlled by the Guardian Grow Manager)	1 HP		

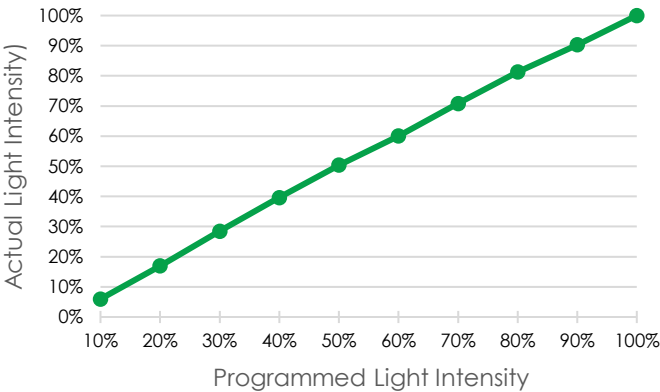
- @ 100% light intensity with all fans running
- ADU and SPDU @ 208 V_{AC}, Return Water Pump @ 120 V_{AC}
- All 4 layers irrigated in a round robin manner without pause, fans on 24 hours, lights on 18 hours, lights off 6 hours, 208 V_{AC} input to ADU and SPDUs, 110 V_{AC} input to Return Water Pump
- Average Photosynthetically Active Photon Flux Density (PPFD) over each 24"x30" grow tray at 100% intensity
- Dependent on the crop, density, cultural practices, and environmental conditions

Ætrium-2.1 LED Specs

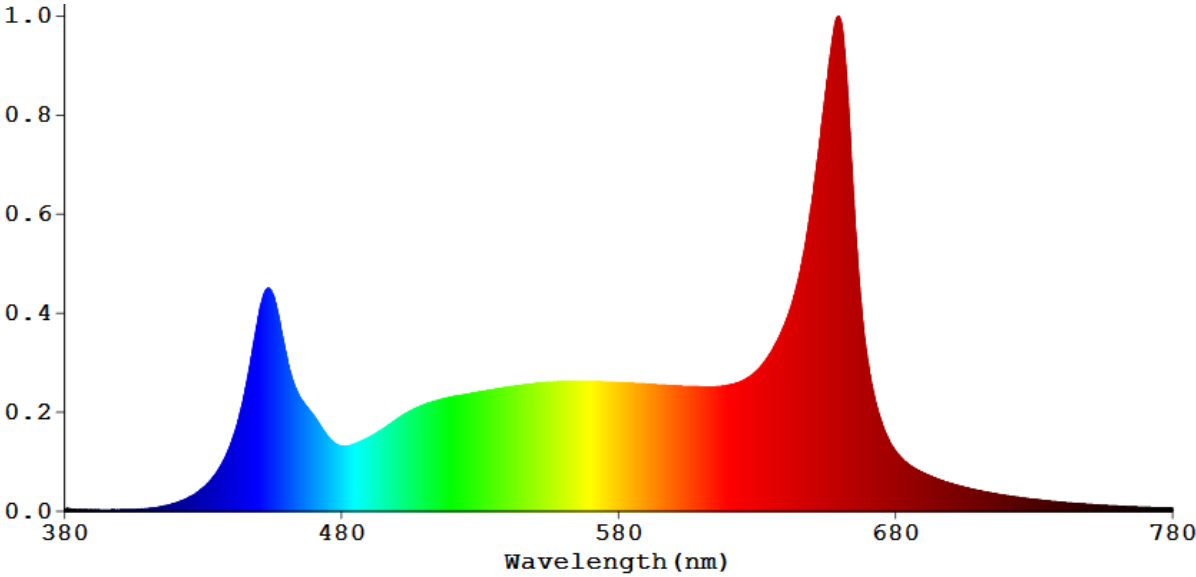
Description	Min	Typ	Max
SPDU input voltage	100 V _{AC}	–	120 V _{AC}
SPDU input frequency	47 Hz	–	63 Hz
SPDU AC power draw each (2 on 24 tray, 4 on 48 tray, 6 on 72 tray)		1,260 W ^{1, 2}	
LED panel voltage	–	33.3 V ¹	38.5 V
Continuous dimming range	10%	–	100%
Fan channel voltage	–	24 V ²	27 V

Description	Value
LED Panel PPF	120 µmol/s ¹
Average PPFD 4" above tray ¹	300 µmol/m ² /s
Average PPFD 8" above tray ¹	380 µmol/m ² /s
SPDU dimensions (L x W x H)	24.4" x 16.9" x 2.4" (620 mm x 428 mm x 60 mm)
SPDU weight	23.2 lbs. (10.5 kg)
LED Panel dimensions (L x W x H)	24.8" x 20.5" x 1" (630 mm x 520 mm x 25 mm)
LED Panel weight	9.8 lbs. (4.4 kg)

LED Lighting Dimming Curve



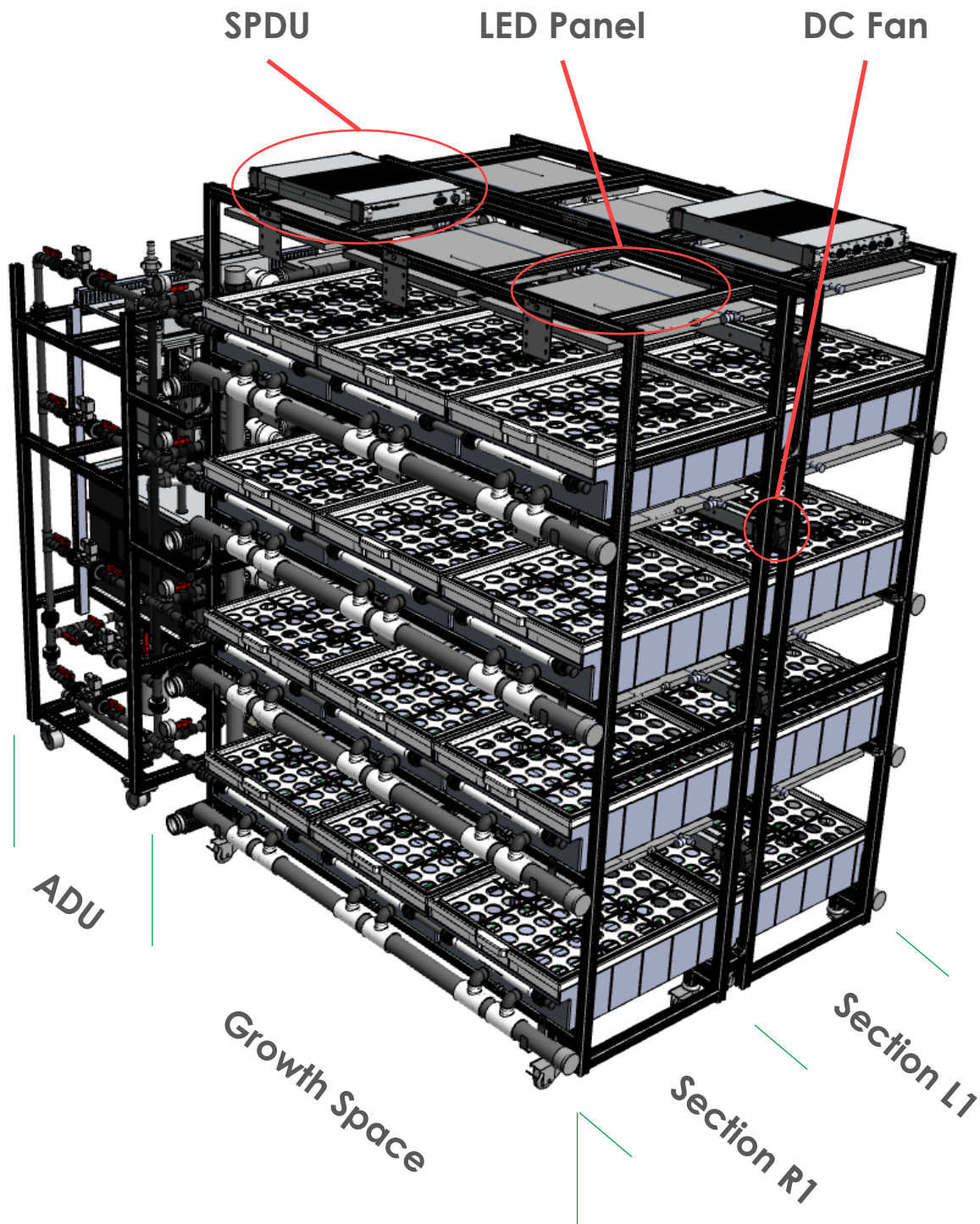
LED Lighting Spectrum



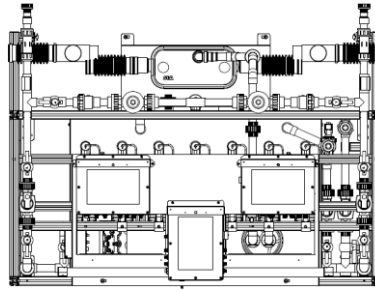
1. @ 100% light intensity in the Ætrium-2.1
2. With all fans running in the Ætrium-2.1

SmartFarm LED Lights in the Atrium-2.1

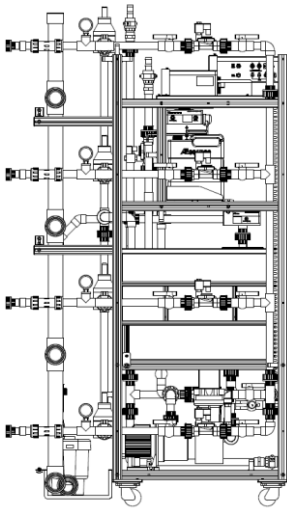
Each SmartFarm sectional grow space contains one Sectional Power Distribution Unit (**SPDU**) and 12 LED panels. The SPDUs are able to drive 12 LED lists and four 24V DC fans. Each SmartFarm LED light serves one Atrium-2.1 tray.



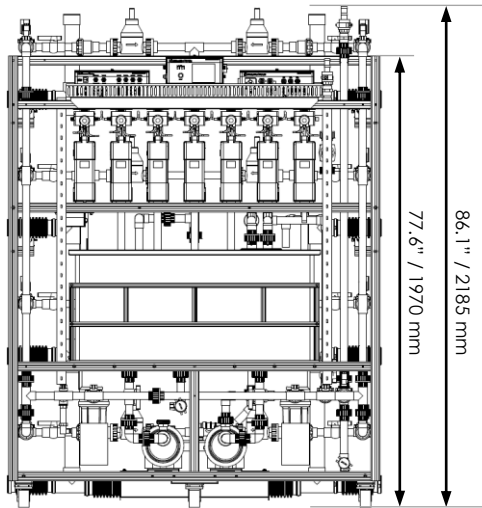
Ætrium-2.1 ADU Mechanical Design



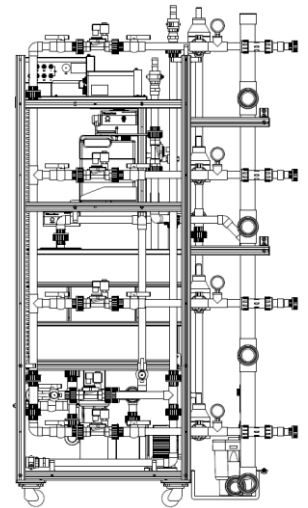
Top View



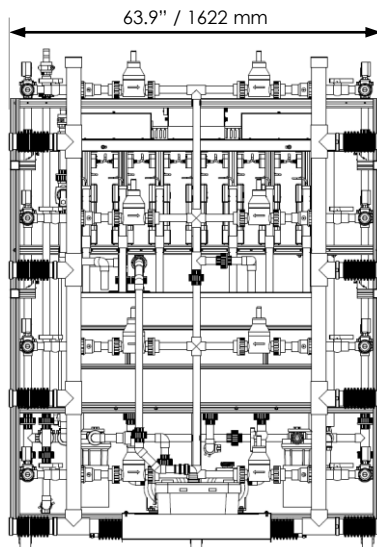
Left Side View



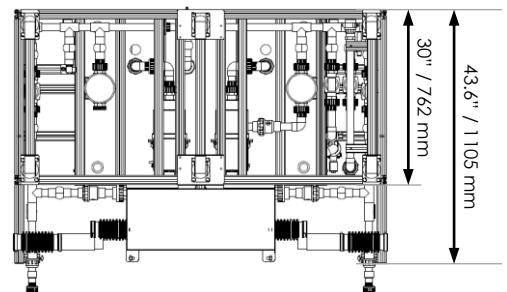
Front View



Right Side View

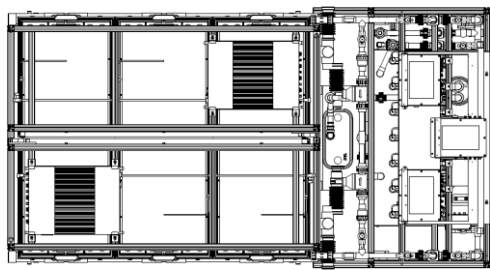


Rear View

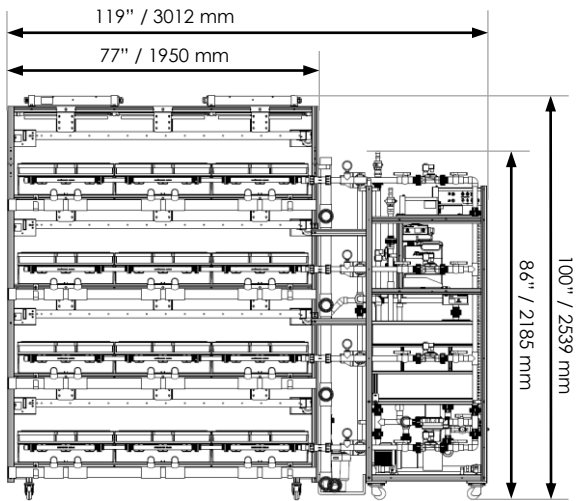


Bottom View

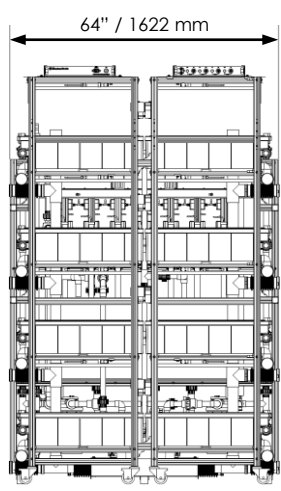
24-Tray Atrium-2.1 Mechanical Design



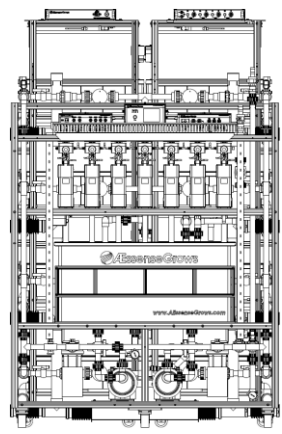
Top View



Side View

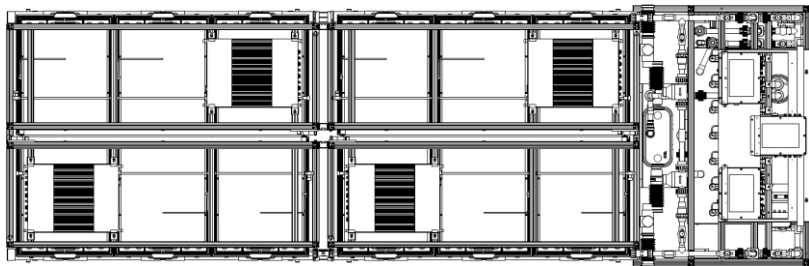


Rear View

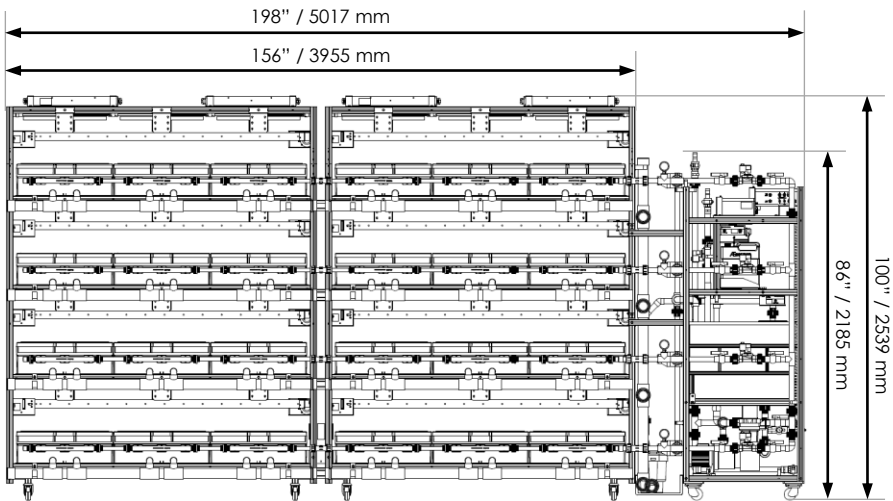


Front View

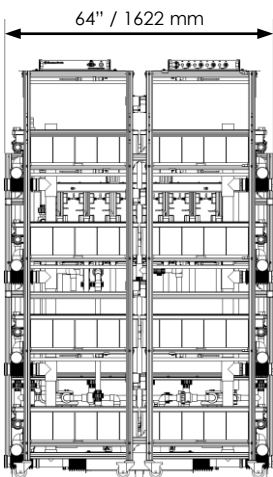
48-Tray Atrium-2.1 Mechanical Design



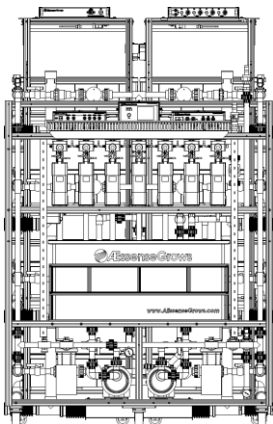
Top View



Side View

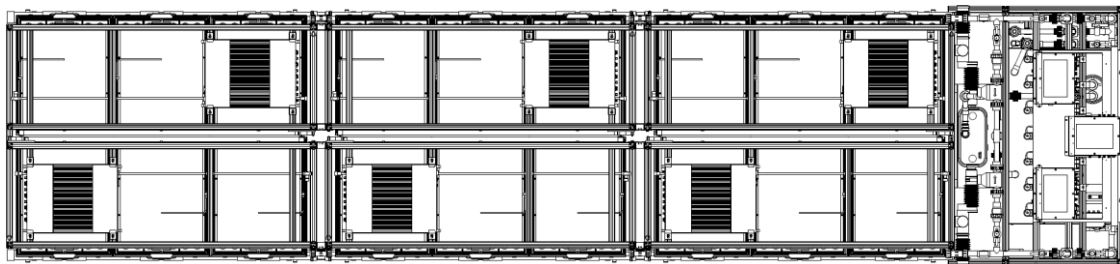


Rear View

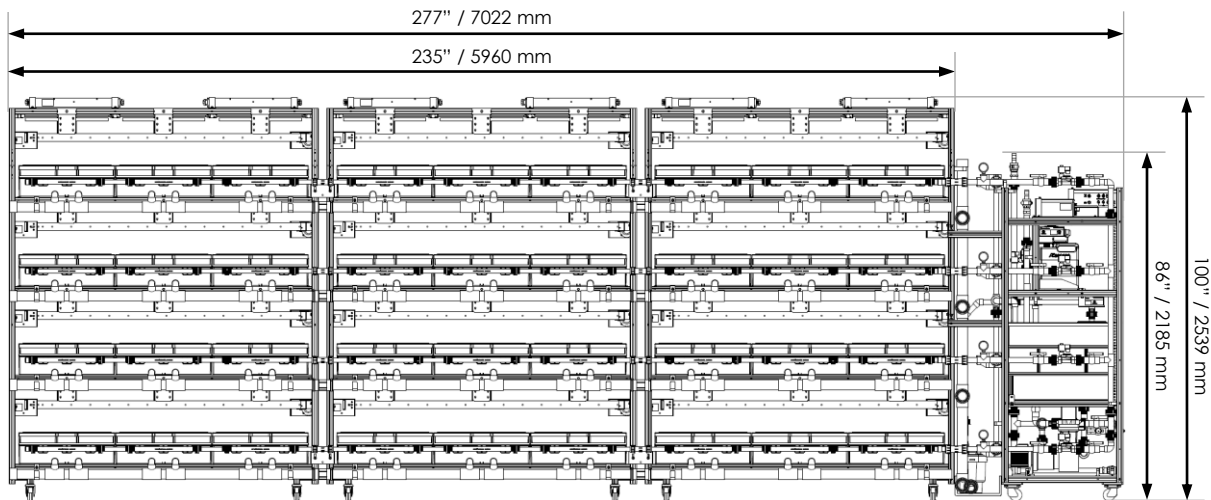


Front View

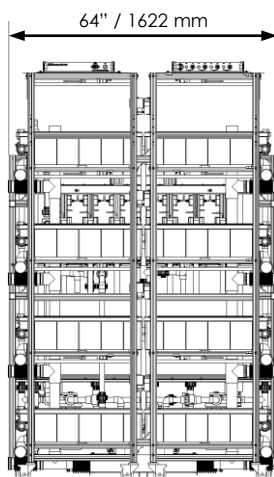
72-Tray Atrium-2.1 Mechanical Design



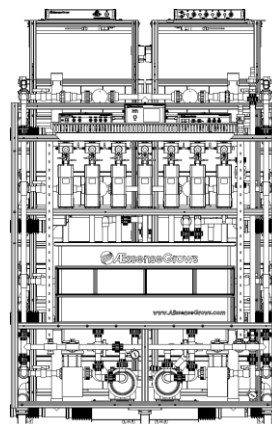
Top View



Side View

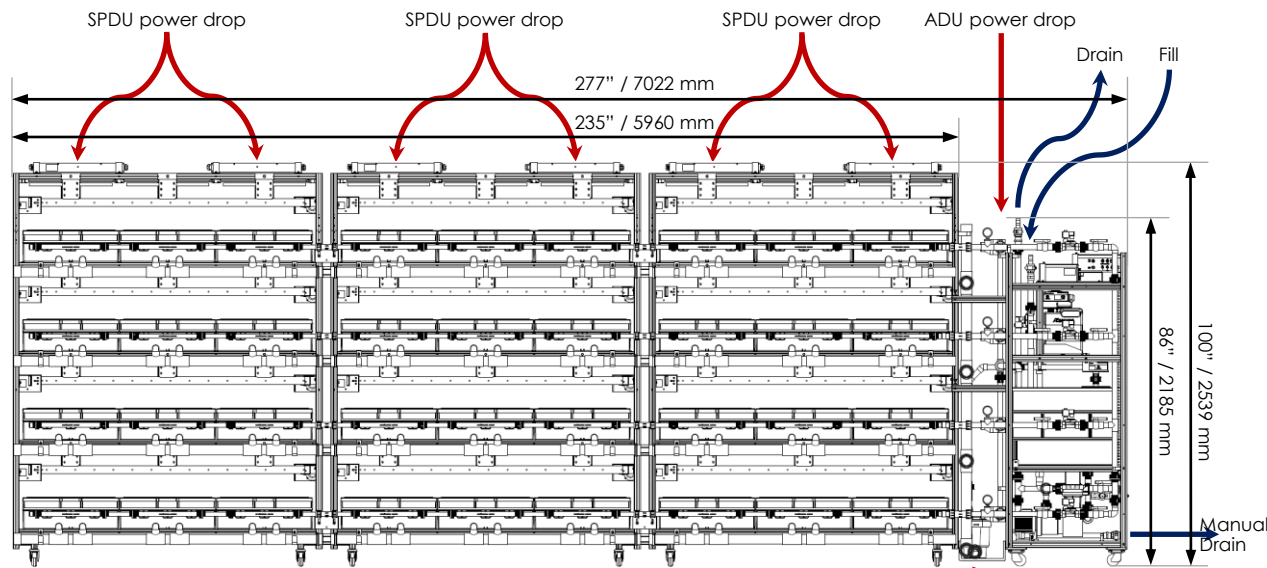


Rear View

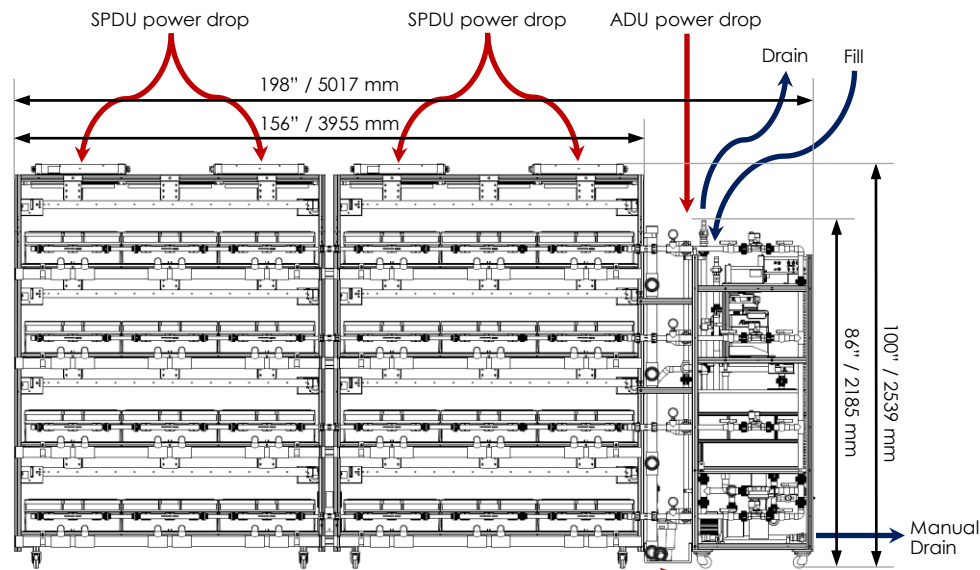


Front View

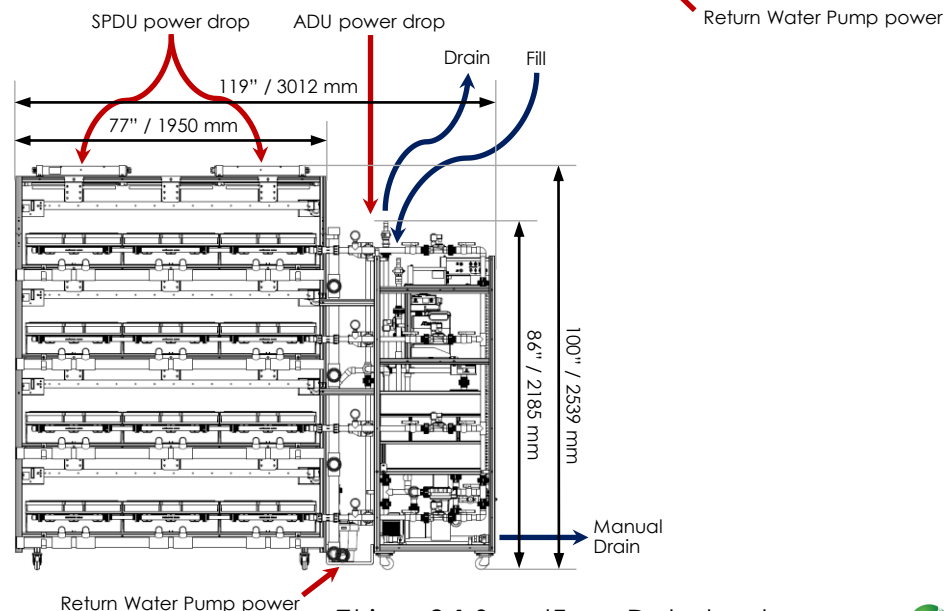
72-Tray Ætrium-2.1



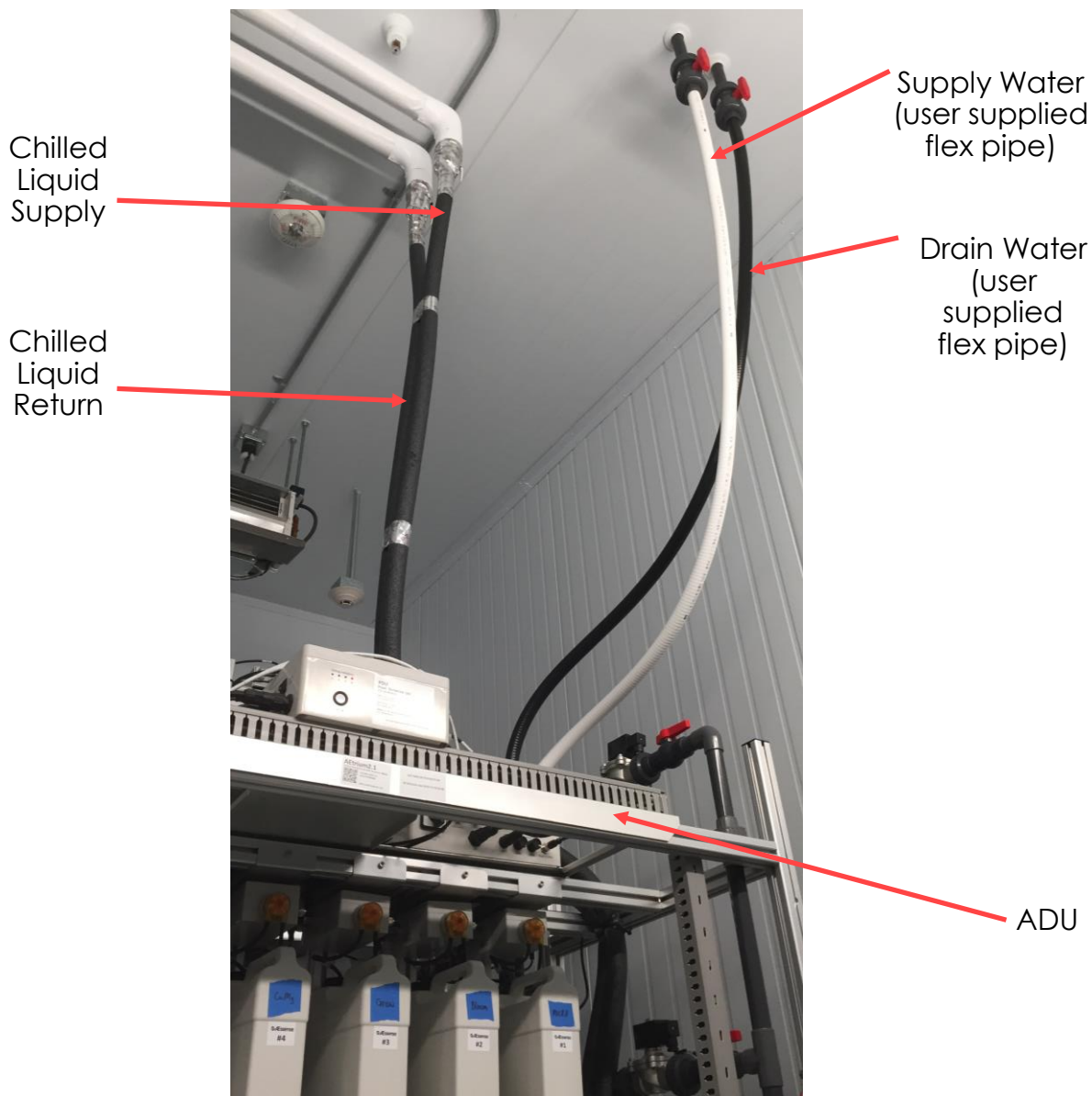
48-Tray Ætrium-2.1



24-Tray Ætrium-2.1



Ætrium-2.1 Liquid Line Connections

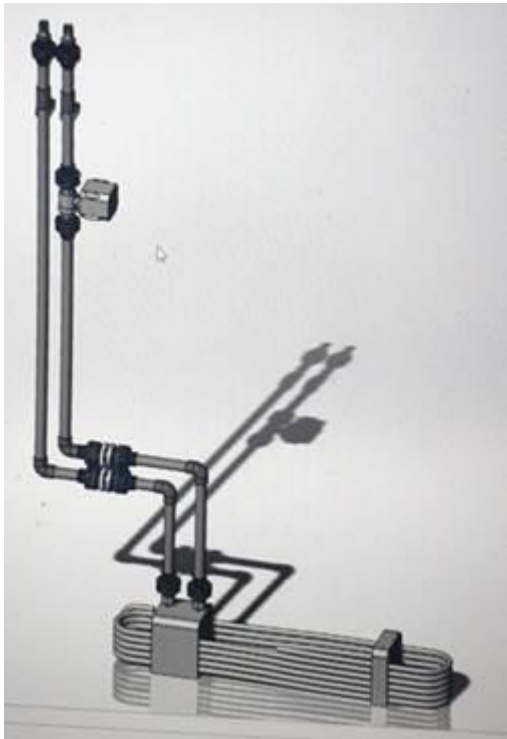


- Flexible lines allow the Ætrium-2.1 rows to move

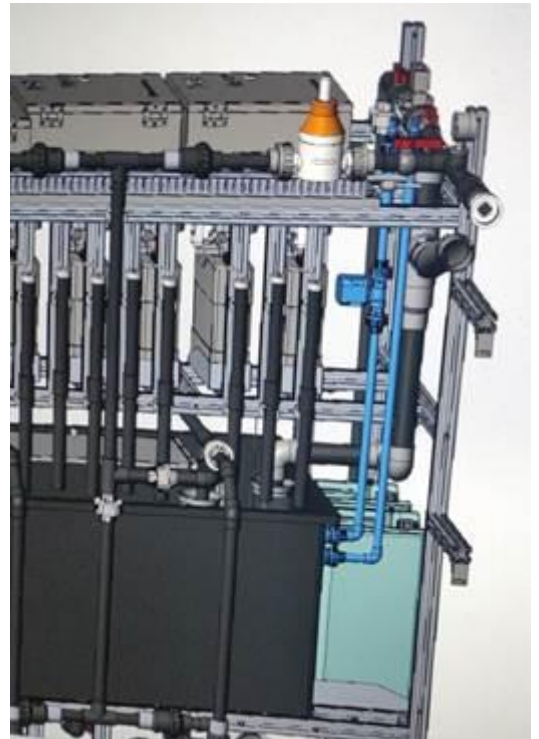


Stainless
Steel
Cooling Coil
installed in
reservoir

Cooling Coil Piping Detail



Rear View of Reservoir



Typical Ætrium-2.1 Shipping Configuration

Major Ætrium-2.1 components	Dimensions (L x W x H)	Weight
ADU on pallet	64.5" x 31.25" x 83.5" (1638 x 794 x 2121mm)	525 lbs (238 kg)
ADU off of pallet (shipping configuration)	64.5" x 31.25" x 77.5" (1638 x 794 x 1969mm)	
Growth Space Module (with top layer broken down) on pallet	78.25" x 31" x 88.5" (1988 x 787 x 2247mm)	705 lbs (320 kg)
Growth Space Module (with top layer broken down) off pallet	78.25" x 31" x 83" (1988 x 787 x 2108mm)	
Wood Crate of Parts on pallet	50" x 36" x 54" (1270 x 914 x 1372mm)	655 lbs (297 kg)

Ætrium-2.1 Shipping and installation

The ADU ships on a pallet and each of the Growth Space modules ship on a pallet. A 24 tray unit ships on 3 pallets and a 48 tray units ships on 5 pallets. It is recommended to unload the Ætrium-2.1 components from their pallets using a forklift. Once unloaded from the pallets the ADU and growth space modules will roll on pre-installed casters. The Growth Space modules are shipped with the top layer broken down so that they are not too tall to fit in shipping containers. It's easily lifted to its final position using two people during assembly.

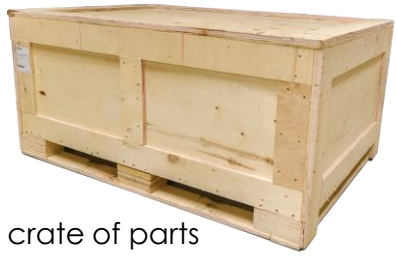
- **Door size for installation:** Grow room doors are recommended to be at least 84" x 36" (2286 x 914mm) to accommodate moving in the Ætrium-2.1 when it is depalletized.



ADU on pallet



One Growth Space Module on pallet



Wood crate of parts

A 1281 Reamwood Ave.
Sunnyvale, CA 94089

P 1.800.369.8673

O 1.650.564.3058

E info@aessensegrows.com