

# CONVIRON GROUP OF COMPANIES



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# Convion Group of Companies

We contribute to feeding the world, improving human health and protecting the environment by providing technology that advances plant science and production.

Our controlled environment technology uniquely equips researchers and growers with solutions to meet global demands for plant-based food and health products.

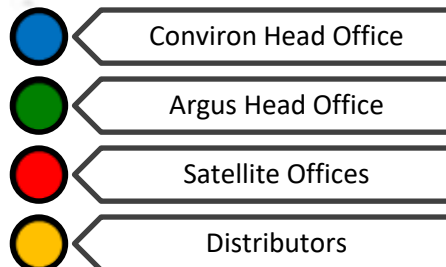


# Convion Group of Companies

- Established 1964
- Based in Winnipeg, Canada
- Owned by a single family since inception
- Acquired Argus Controls in 2013
- 400+ employees
- Offices: Canada, US, Australia, China, Germany & UK
- Global network of distributors & service partners



# Our Reach





# Our Offering

## Reach-In Chambers



## Walk-In Rooms



## Control Systems



## Fertigation Systems



# Our Clients (a selection)

## Researchers



## Ag-Bio/Phyto-Pharma



Dow AgroSciences

## Commercial Growers



Peace Tree Farm



GREEN VALLEY FLORAL

# Cannabis Clients (+200 production sites)



ABcann Global Stands Out with Its Cannabis Cultivation Technologies

APRIL 20, 2018 \*



SWEETGRASS

Canopy Growth Adds Alberta  
ACMPR Applicant Sweetgrass to  
Craftgrow

# Cannabis Clients (+200 production sites)



The company said that state-of-the-art, Conviron cannabis grow rooms and Argus Controls systems have been ordered for its Tasmanian facility.



To differentiate itself, Good & Green is harnessing the unique expertise of its extensive array of strategic partnerships. As Goldberg explains, “our strategic partners share a similar vision and discipline and are best-in-class companies in their respective sectors who will further strengthen our core competencies with industry leading capabilities.” Good & Green’s first partnership is with Conviron, a world leader in the design, manufacture and installation of controlled\*



# How Conviron Supports Cannabis Clients



- Argus Controls & Fertigation
- Conviron provides all cultivation spaces, integrated with Argus

# Our Solutions for Cannabis Production and Research

Mother Rooms



Propagation



Vegetative



Bloom Rooms



Drying Rooms



Convion provides a portfolio of pharmaceutical-grade controlled environments customizable for each stage of cannabis production.

Each room type is specifically designed to address airflow, light, CO<sub>2</sub>, humidity and space demands for each application.

# Cannabis: Conviron Solutions

Mother Rooms



Propagation



Vegetative



Bloom Rooms

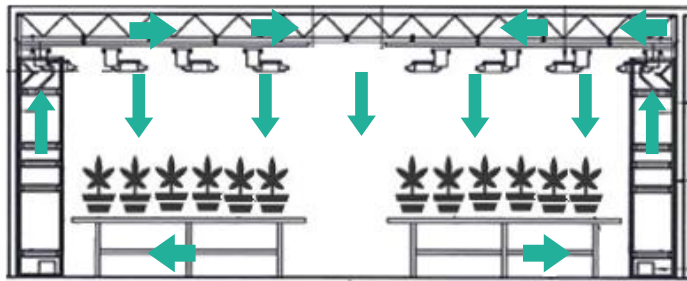


Drying Rooms



## Importance of airflow

- Vital for leaf temperature and gas exchange
- Inadequate air handling can lead to microclimates within your Growth Space
- Conviron's airflow design allows for higher plant loading and reduces opportunity for formation of mold and mildew



50-70% RH

65-80°F

400-500  $\mu\text{mol}$

↓ airflow



# Mothers



# The Conviron Solution

Mother Rooms



Propagation



Vegetative



Bloom Rooms



Drying Rooms



The clone is the most vulnerable stage of the cannabis plant's development, requiring high humidity and consistent temperatures to prevent excessive drying of young roots during propagation. Conviron offers high capacity, multi-tier growth chambers, which are well suited for numerous clone trays. Additive humidity systems provide high humidity levels with moderately low light.

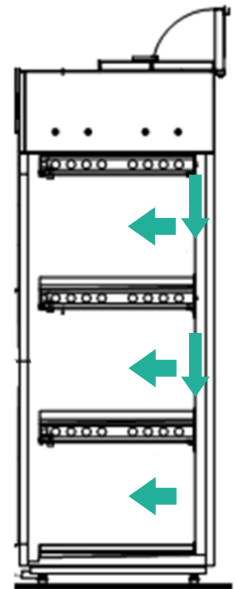
Airflow is distributed horizontally via a perforated back wall plenum across each shelf. This helps to establish uniform air distribution and a consistent temperature gradient around the growth area that is independent of plant loading.

70-80% RH

70-80°F

300  $\mu$ mol

→ airflow





# Propagation: Propagation Chambers



**A1000 MT – SINGLE DOOR CLONE CHAMBER**

Base Chamber Specifications		Performance (3-tier Set-up)	
Chamber size	41"W x 32½"D x 79"H	Capacity	650 clones
Controller	CMP6010	Light Intensity	180-580μmol/m²/s
Conditioning	Air-cooled DX	Temperature	15°C-30°C
Airflow	Horizontal	Control	± 1.0°C
Lighting	39W T5HO Fluorescent	Max RH lights on	70%-85%
Power (60 Hz)	120-1Ø-2 wire 20A	Max RH lights off	90%
Heat Rejection	8,000 BTU/hr	Clear shelf height	10"



**A2000 MT – DOUBLE DOOR CLONE CHAMBER**

Base Chamber Specifications		Performance (3-tier Set-up)	
Chamber size	82½" W x 33¼" D x 77½" H	Capacity	1300 clones
Controller	CMP6060	Light Intensity	180-580μmol/m²/s
Conditioning	Air-cooled DX	Temperature	15°C-30°C
Airflow	Horizontal	Control	± 1.0°C
Lighting	39W T5HO Fluorescent	Max RH lights on	70%-85%
Power (60 Hz)	240-3Ø-4 wire 30A	Max RH lights off	90%
Heat Rejection	27,600 BTU/hr	Clear shelf height	11"

# Propagation: Clone Rooms



## Cannabis One™ Clone Room

Controlled downward airflow flows uniformly across each shelf to return ducts

For larger-scale operations, Conviron's Cannabis One™ multipurpose grow rooms can be outfitted for clones to optimize floor space while providing high uniformity and control of the cloning environment. Typically integrated into a centralized Argus controls system, these rooms give cultivators greater throughput in the cloning stage.

## CANNABIS ONE™ – CLONE ROOM

Base Chamber Specifications		Performance (3-tier Set-up)	
Chamber size	12'Wx24'L nominal	Capacity	15,000 clones
Controller	Argus controls	Light Intensity	200µmol
Conditioning	Chilled water system	Temperature	15°C-30°C
Airflow	Horizontal	Control	± 1.0°C
Lighting	54W T5HO Fluorescent	Max RH lights on	70%-85%
Clear shelf height	22"	Max RH lights off	90%

## OPTIONS

- Nominal 8' incremental room lengths
- Air- or water-cooled DX systems
- LED lighting
- Dimmable lighting
- Carbon dioxide control
- Dehumidification



# Prop-Room Example



# Tissue Culture



**A1000 TC – SINGLE DOOR TISSUE CULTURE CHAMBER**

Base Chamber Specifications		Performance (4-tier Set-up)	
Chamber size	41"W x 32½"D x 79"H	Capacity (3" jars)	350
Controller	CMP6010	Light Intensity	225 µmol/m²/s
Conditioning	Air-cooled DX	Temperature	15°C-30°C
Airflow	Horizontal	Control	± 1.0°C
Lighting	21W T5 Fluorescent	Max RH lights on	75%
Power (60 Hz)	120-1Ø-2 wire 20A	Max RH lights off	90%
Heat Rejection	8,000 BTU/hr	Clear shelf height	6"



**A2000 TC – DOUBLE DOOR TISSUE CULTURE CHAMBER**

Base Chamber Specifications		Performance (4-tier Set-up)	
Chamber size	82½" W x 33¼" D x 77½" H	Capacity (3" jars)	700
Controller	CMP6060	Light Intensity	225 µmol/m²/s
Conditioning	Air-cooled DX	Temperature	15°C-30°C
Airflow	Horizontal	Control	± 1.0°C
Lighting	21W T5 Fluorescent	Max RH lights on	75%
Power (60 Hz)	240-3Ø-4 wire 30A	Max RH lights off	90%
Heat Rejection	27,600 BTU/hr	Clear shelf height	6"

# Tissue Culture



**Cannabis One™ Tissue Culture Room**  
Controlled downward airflow returning uniformly across each shelf

## CANNABIS ONE™ – TISSUE CULTURE ROOM

Base Chamber Specifications		Performance (4-tier Set-up)	
Chamber size	12"Wx24"L nominal	Capacity (3" jars)	9,000
Controller	Argus controls	Light Intensity	200 $\mu\text{mol}/\text{m}^2/\text{s}$
Conditioning	Chilled water system	Temperature	+15°C to +30°C
Airflow	Horizontal	Control	$\pm 1.0^\circ\text{C}$
Lighting	54 W T5HO Fluorescent	Max RH lights on	75%
Clear shelf height	20"	Max RH lights off	90%

For larger-scale operations, Convirion's Cannabis One™ multipurpose grow rooms can be outfitted for tissue culture to optimize floor space while providing high uniformity and control of the cloning environment. Typically integrated into a centralized Argus controls system, these rooms give cultivators greater throughput in the propagation stage.

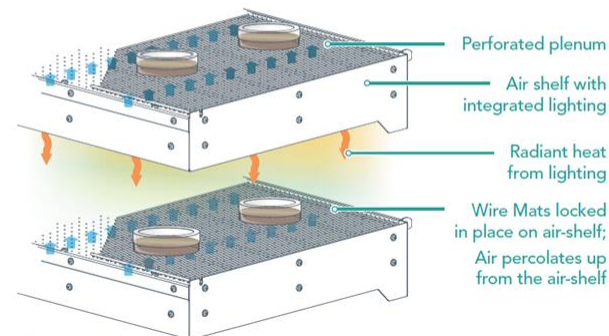
## OPTIONS FOR CANNABIS ONE™

- Nominal 8' incremental room lengths
- Dimmable lighting
- Air- or water-cooled DX
- Carbon dioxide control
- LED lighting
- Dehumidification

## ADVANCED SOLUTIONS

For advanced environmental performance and research applications, Convirion offers a range of configurable and custom research-grade rooms that deliver the highest level of control and uniformity.

Our advanced tissue culture rooms are designed specifically to minimize the formation of condensation inside the jars or petri dishes used for tissue culture. Airflow is directed through a channel in each shelf and then discharged upward at the underside of the jar. This design maintains the lower zone inside the jar cooler than the upper zone, which prevents condensation on the underside of the lid and ensures uniformity of light to the developing tissues.





# Cannabis: Conviron Solutions

Mother Rooms



Propagation



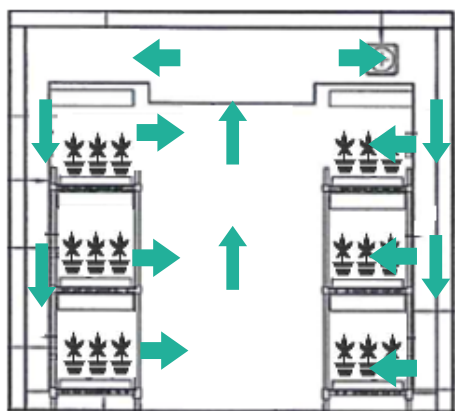
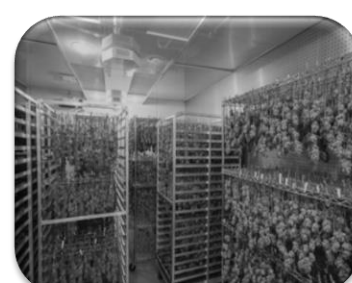
Vegetative



Bloom Rooms



Drying Rooms



To establish a healthy root zone and sustain vegetative growth, consistent temperature, humidity and watering are required. Conviron's MTPS walk-in room with additive humidity provides a larger scale room for short plants in pots or flats on multiple tiers. Lighting over each shelf and horizontal airflow provide uniform growth conditions while optional irrigation and nutrient systems nurture young plants

During the transition from vegetative growth to flowering the nutrient cycle changes, this can be programmed by the Argus Fertigation system.

50-70% RH

70-80°F

300  $\mu$ mol

→ airflow

# The Conviron Solution

Mother Rooms



Propagation



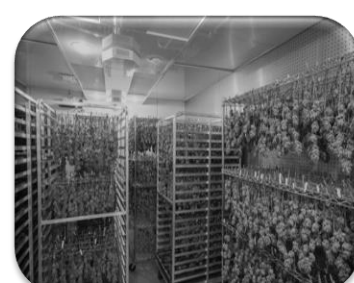
Vegetative



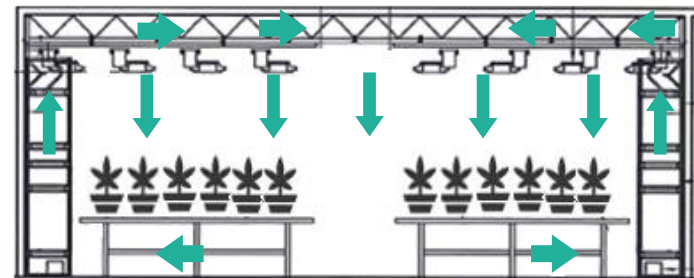
Bloom Rooms



Drying Rooms



During the final vegetative growth stage, cannabis plants require high light intensities and longer daylight cycles to establish desired plant mass and root base prior to blooming. Once flowering is triggered by shortening the light cycle and reducing temperature, flowers start to develop resins containing THC and CBD, during which time humidity must be kept low to prevent mould from forming on the bud.



50-70% RH

65-80°F

800  $\mu$ mol

↓ airflow

# The Conviron Solution

Mother Rooms



Propagation



Vegetative



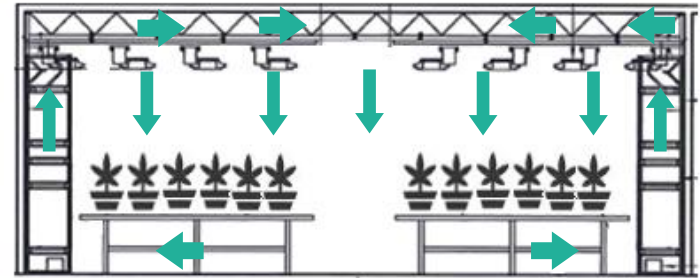
Bloom Rooms



Drying Rooms



Near harvest, cultivators often look to strip the plant of its Nitrogen but not the Phosphorus, Potassium & Magnesium. The Argus Fertigation system allows this to be programmed, as well as the subsequent flushing stage prior to harvesting.



50-70% RH

65-80°F

800  $\mu$ mol

↓ airflow



# Flowering



# Cannabis: Conviron Solutions

Mother Rooms



Propagation



Vegetative



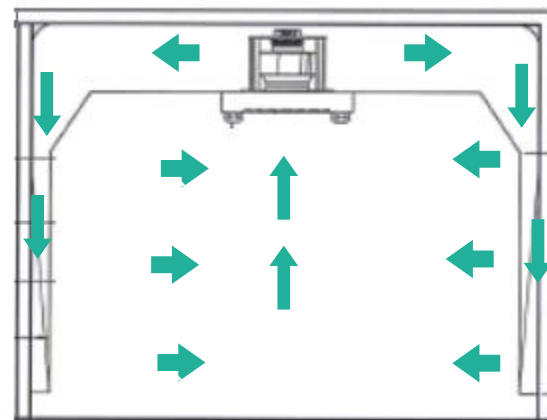
Bloom Rooms



Drying Rooms



Convion's line of walk-in rooms equipped with active dehumidification offer precise control of the drying environment, which is especially important for growers that adjust the rate of drying over time. With horizontal airflow for effective circulation and controlled drying, these mid-sized rooms can be configured for a variety of drying rack systems.



45-55% RH

65-70°F

Low light

→ airflow



# Cannabis: Conviron Solutions

Mother Rooms



Propagation



Vegetative



Bloom Rooms



Drying Rooms



Convion's line of walk-in rooms equipped with active dehumidification offer precise control of the drying environment, which is especially important for growers that adjust the rate of drying over time. With horizontal airflow for effective circulation and controlled drying, these mid-sized rooms can be configured for a variety of drying rack systems.



45-55% RH

65-70°F

Low light

→ airflow

# The Convicon Solution

Mother Rooms



Propagation



Vegetative



Bloom Rooms



Drying Rooms



Convicon's line of walk-in rooms equipped with active dehumidification offer precise control of the drying environment, which is especially important for growers that adjust the rate of drying over time. With horizontal airflow for effective circulation and controlled drying, these mid-sized rooms can be configured for a variety of drying rack systems.

50-70% RH

65-80°F

800  $\mu$ mol

↓ airflow

# Drying





# Drying



# The Argus Titan System

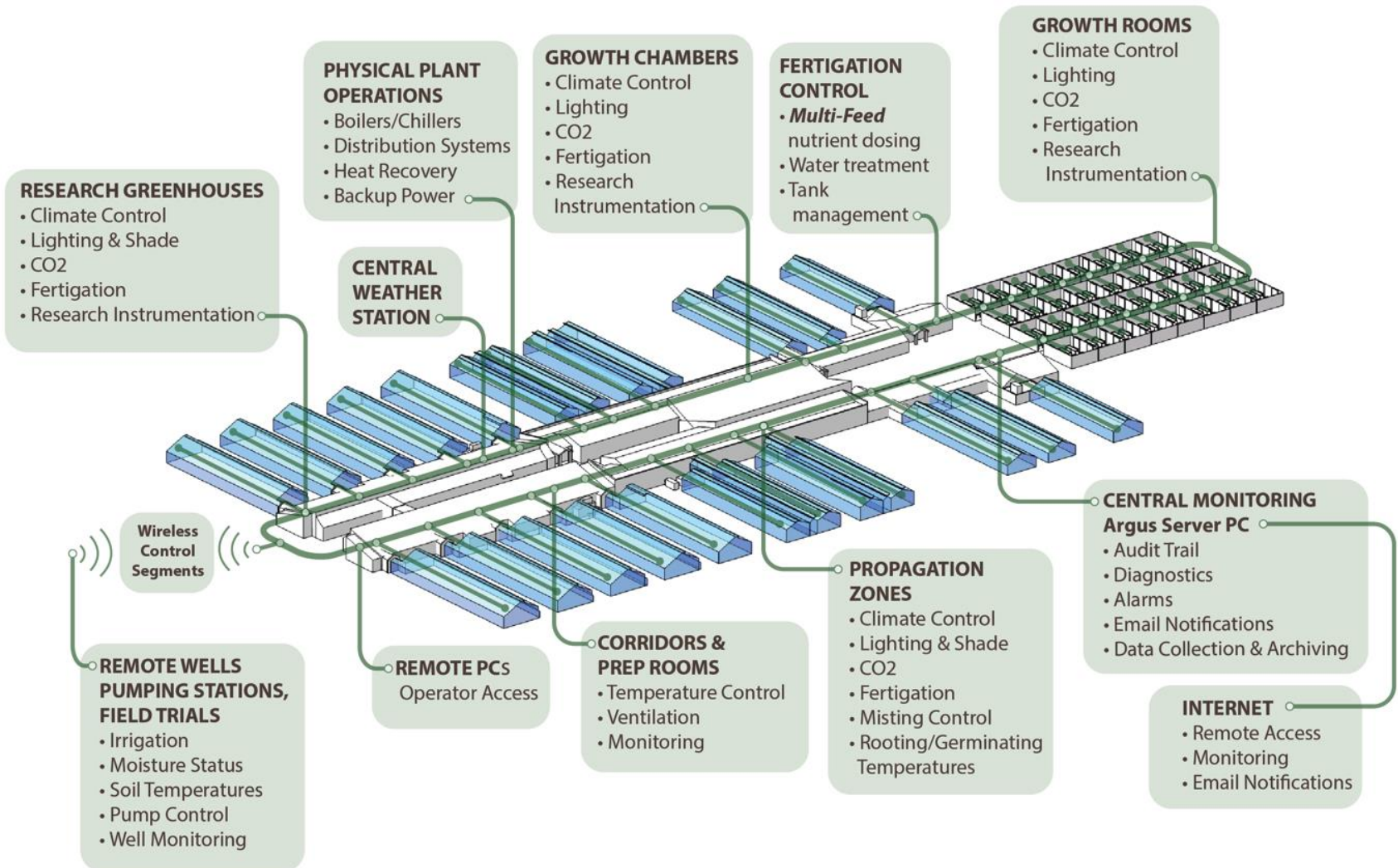
The Titan system is a comprehensive hardware and software control solution. It is three systems in one:

- An advanced **automated equipment control** system
- A comprehensive **monitoring and alarm** system
- A powerful **data acquisition** system (data recording, archiving, tabular and graphical trend analysis, data export)



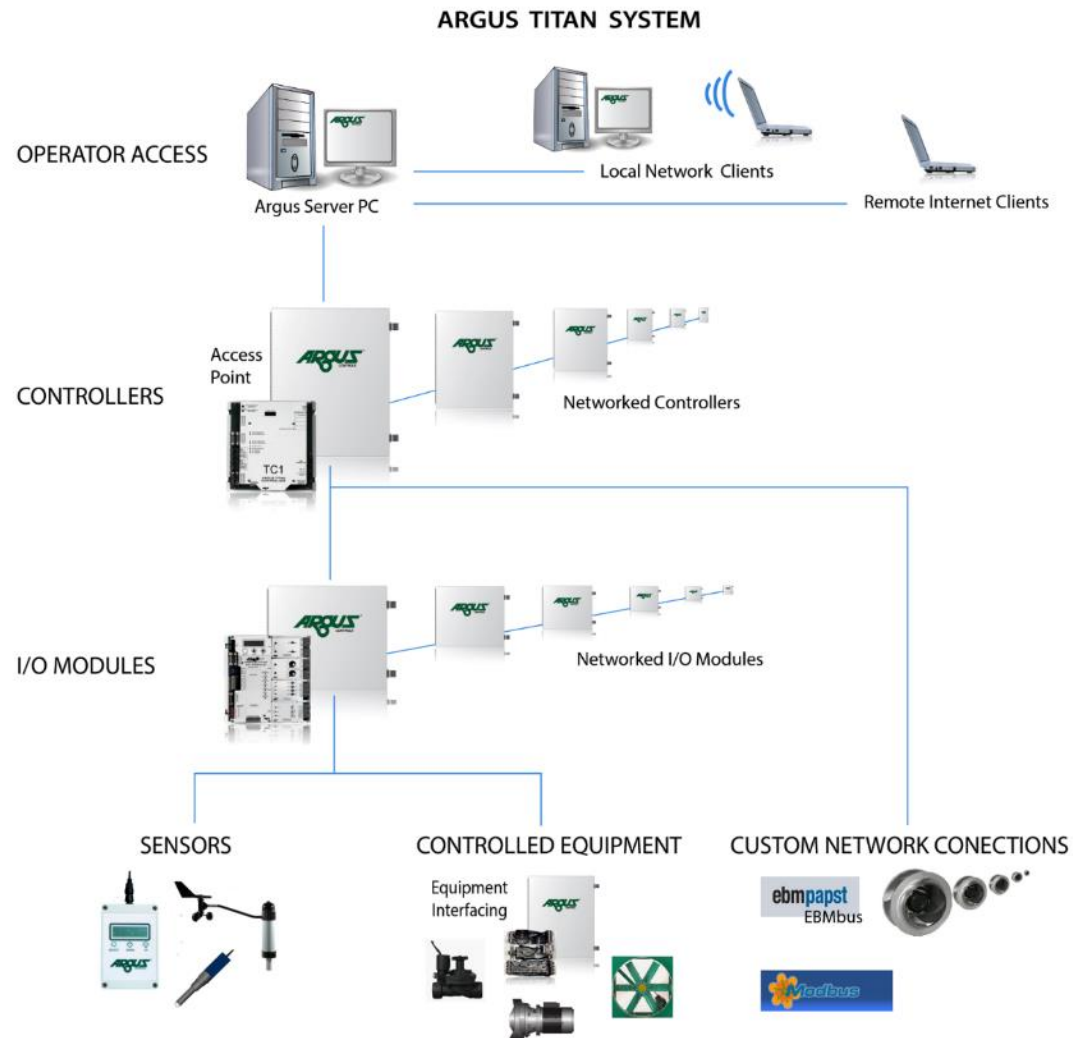


# Facility-Wide Controls Integration



# The Argus Titan System

- Powerful controllers
- High resolution I/O
- Extreme programmability
- Modular components
- Legacy hardware support



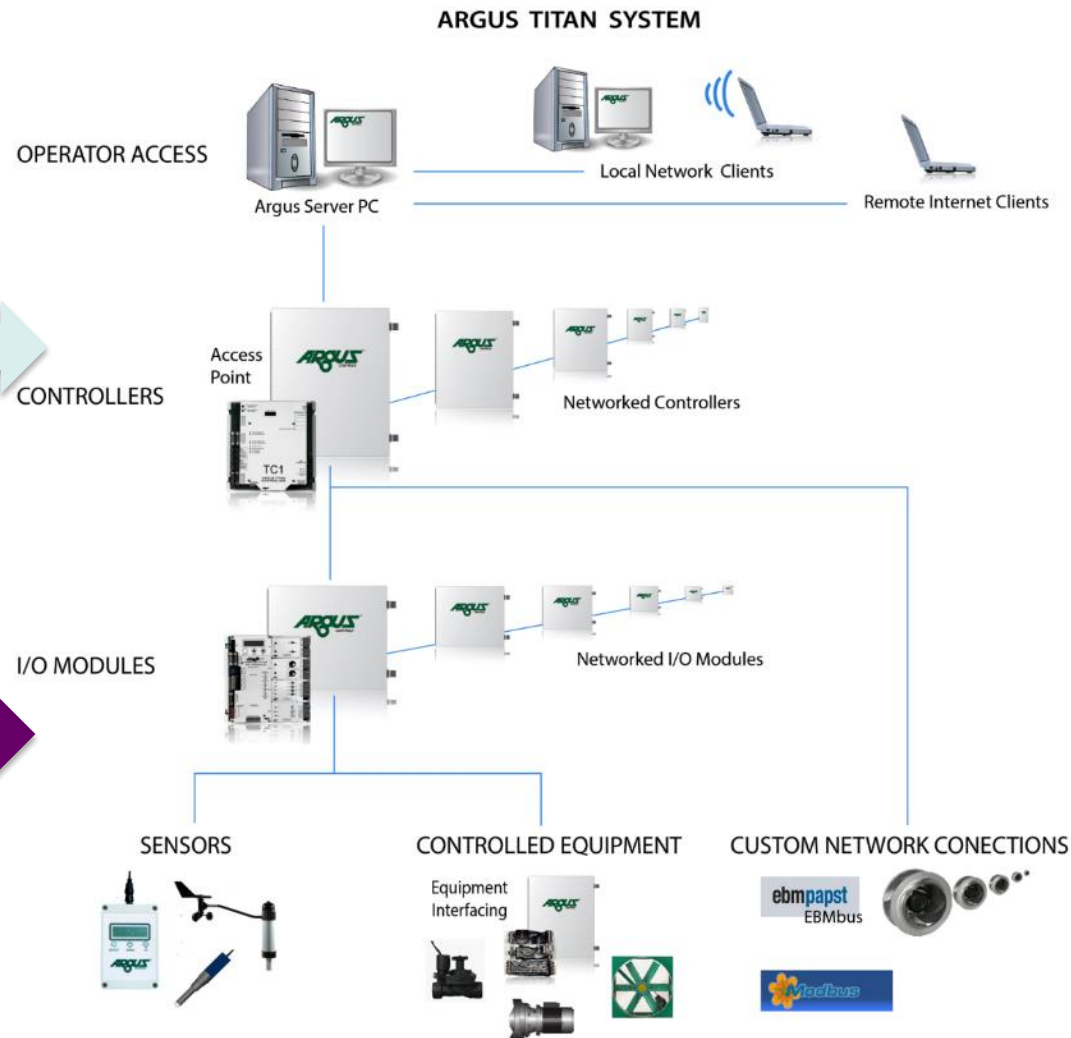
# Hardware

## Titan Controllers

- Maximum 255 controllers per site (system)
- Simple applications – One controller can manage several climate zones or chambers
- Complex applications - one controller per climate zone or chamber
- Communications:
  - Controller System network
  - Titan I/O Network
  - Legacy I/O and Modbus

## Titan I/O Modules

- Each controller can support up to 32 Titan I/O modules
- Each I/O module has
  - 7 analog inputs
  - 2 digital inputs



# Software and Firmware

## Software:

PC based applications used for operator access and system utilities

### Argus Server PC (runs the Argus Server Application)

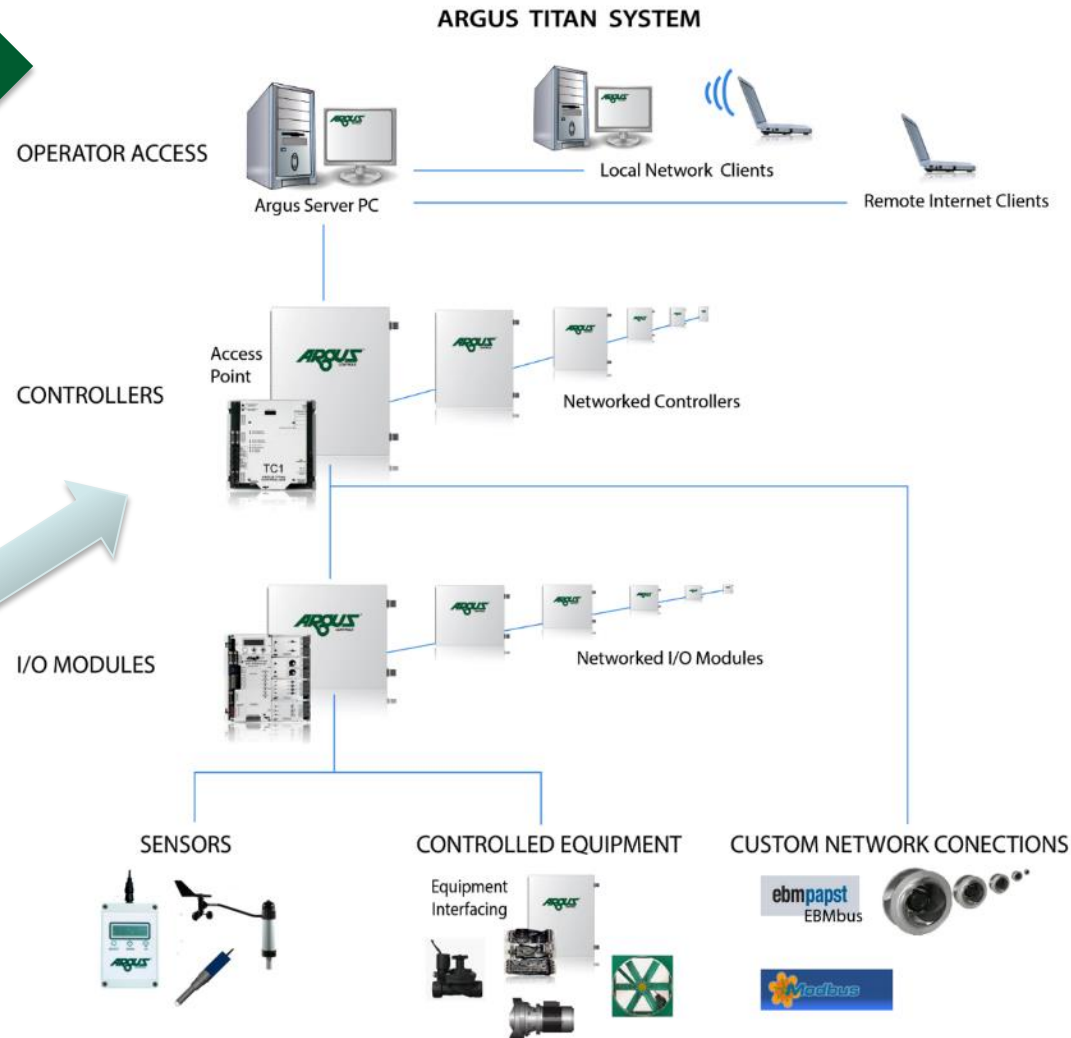
- Runs in the background (does not have a user interface)
- Communicates with a connected control system via Ethernet (older systems via USB)
- Provides secure access control for all clients
- Audits all control changes
- Long-term data storage, system backups, etc.

### Argus Operator Program (user interface)

- Local PC or remote client via LAN or Internet
- Communicates with one or more Argus Systems

## Firmware:

- All control functions run on the controllers
- Controllers keep running even when the Argus Server PC or network communications go down
- Discrete **control programs** are embedded in the controllers
- Control programs are custom configured at run-time by Argus to execute control, monitoring, and data acquisition tasks
- Control **applications** often use several linked control programs to accomplish complex control interactions and tasks





Thank You!

