



Cylon Controls  
is now **ABB**



CYLON

## Flexible Building Solutions

### The Fundamentals & Principles of Building Energy Management Systems

Seamus Mac Lughadha, Sales Manager , ABB Electrification, Building Automation Solutions



## Well positioned across global markets

**Employees**

~105,000

**Countries**

~100

**Revenues**

~\$26 bn

**Europe**

~\$9.6 bn

**Americas**

~\$7.9 bn

**AMEA**

~\$8.4 bn

ABB is a leading global technology company that energizes the transformation of society and industry to achieve a more productive, sustainable future.

By connecting software to its **electrification, motion, process automation and robotics & discrete automation** portfolio, ABB pushes the boundaries of technology to drive performance to new levels.

2020 figures

**ABB**



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# Our Business Areas

Electrification

Motion

Process Automation

Robotics & Discrete Automation



# Fully decentralized business model with 21 Divisions

**BUSINESS AREA**

## Electrification



**Distribution Solutions**

**Smart Power**

**Smart Buildings**

**Installation Products**

**Power Conversion**

**E-mobility**

## Motion



**IEC LV Motors**

**Large Motors & Generators**

**NEMA Motors**

**Drive Products**

**Systems Drives**

**Service**

**Traction**

**Mechanical Power Transmission**

## Process Automation



**Energy Industries**

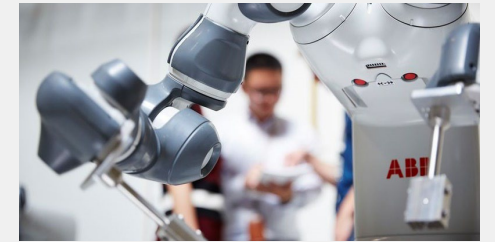
**Process Industries**

**Marine & Ports**

**Turbocharging**

**Measurement & Analytics**

## Robotics & Discrete Automation



**Robotics**

**Machine Automation**

**DIVISION**



# Electrification Ireland

## ELSP - Smart Power



Low voltage breakers & switches, enclosures, motor starter application, power protection, electric vehicle charging infrastructure & service

## ELDS -Distribution Solutions



Medium and low voltage control & protection products, systems & switchgear, automation & services

## ELSB -Smart Buildings



Miniature breakers, distribution enclosures, wiring accessories, building automation

# ELSB Building Automation

## Cylon



Cylon Controls  
is now **ABB**

ABB Cylon® Smart Building Solutions

System Integrator Network

- Unitron UC32 BMS
- CBX – BACnet MS/TP
- CBXi – BACnet IP
- FBXi – Flexeon BACnet IP
- ASPECT® - Building Control
- INTEGRA™ Building Control

## Emergency Lighting



Naveo® Pro



Emergency Lighting &  
Central Battery Systems

## KNX



Lighting, Shading  
and Natural Ventilation

- Door communication - ABB-Welcome IP
- Access Control - ABB-AccessControl
- Video Surveillance - ABB-VideoControl
- ABB ibus KNX Switch actuators - Commercial
- KNX visualisation – ABB-RoomTouch® 5“
- ABB-free@home® flex Sensor and ABB flexInserts

# Where Cylon Controls fits into the traditional project architecture:

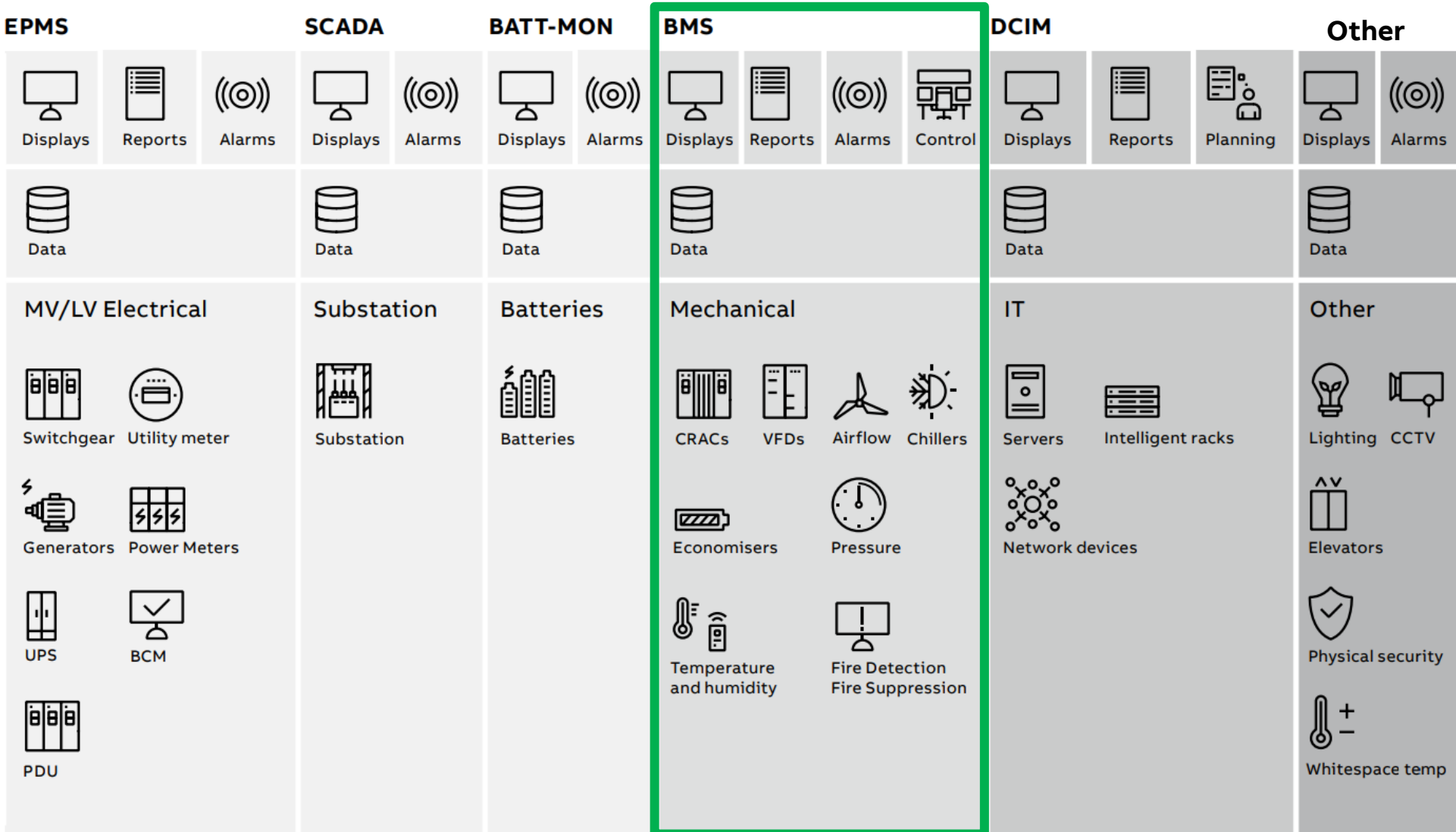
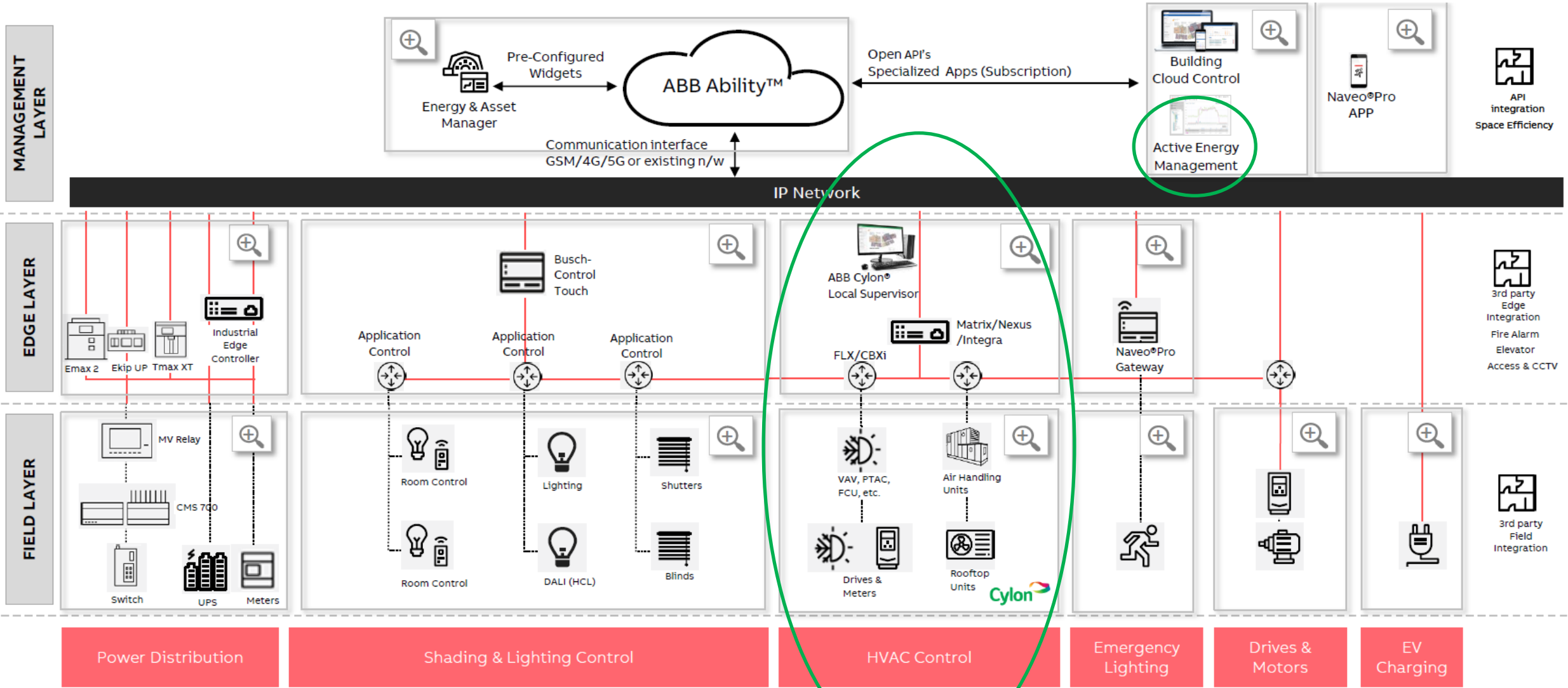


ABB Cylon Solution  
Channel System Integrators

# Where Cylon Controls fits into the ABB Smart Buildings portfolio





# About Cylon

Since 1985 Cylon has provided building energy control systems worldwide becoming one of the largest independent manufacturers of building controls in Europe. Cylon provides building energy management systems across all categories of buildings maximising comfort and efficiency.

Cylon's building energy management solutions have been installed in Europe, North America, Asia, the Middle East and Africa. From large and small commercial offices, retail centres, schools and colleges, industrial buildings, datacenters, health and leisure centres, hospitals and hotels, one word means building control - Cylon.

ABB has acquired Cylon Controls Ltd. (Cylon). The acquisition enhances ABB Electrification business' position in the commercial buildings segment.



# About Cylon controls

## Cylon History

Established October **1985** in Ireland from a final year UCD Engineering project

**1985 – 1987** CC200 developed & launched (1<sup>st</sup> Gen)

**1993** Launch of first Unitron 2000 Controllers (2<sup>nd</sup> Gen)  
Entered German Market

**1997 – 2000** Entered US, Far East, and Middle East markets

**2003** launched first Unitron UC32 Controllers (3<sup>rd</sup> Gen)

**2006** Launched UC32.net/P Unitron to BACnet/IP Gateway

**2008** Cylon Active Energy established



CC200



Unitron 2000



Unitron UC32



BACnet  
Unitron UC32

BACnet CBX / FLX



BACnet IP  
CBXi / FLX



**2009** Developed active energy management SaaS Voya Xplor  
Launched Native BACnet MS/TP Controllers (4<sup>th</sup> Gen)

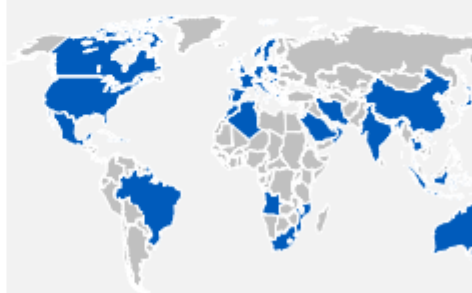
**2013** Acquired Philips Teletrol dealers

**2014** acquired American Auto-matrix

**2018** launched CBX/FLX BACnet MS/TP Controllers (5<sup>th</sup> Gen)  
Acquired Philips Teletrol Multi Site Retail Division

**2019** Launched CBXi range of BACnet IP controllers

**2020** Cylon acquired by ABB



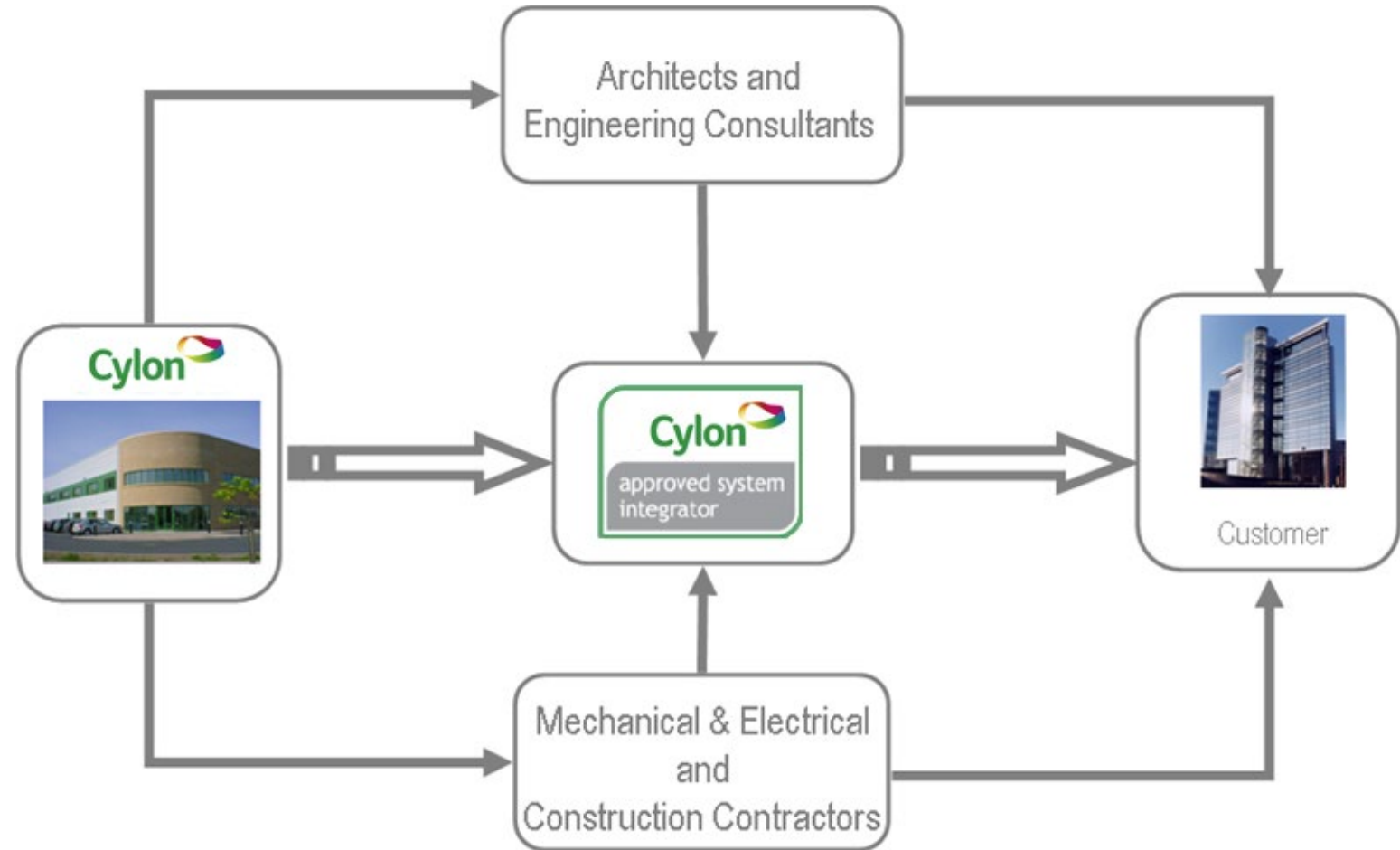
240 approved system integrators internationally  
11 approved system integrators in Ireland  
4 BEMS brands with open protocol  
– Cylon / AAM / Teletrol / Integra  
100 + employees (predominantly engineers)

flexible building solutions™

# Route to Market

Full List of Global System Integrators

<https://www.cylon.com/about/cylon-approved-system-integrators/>





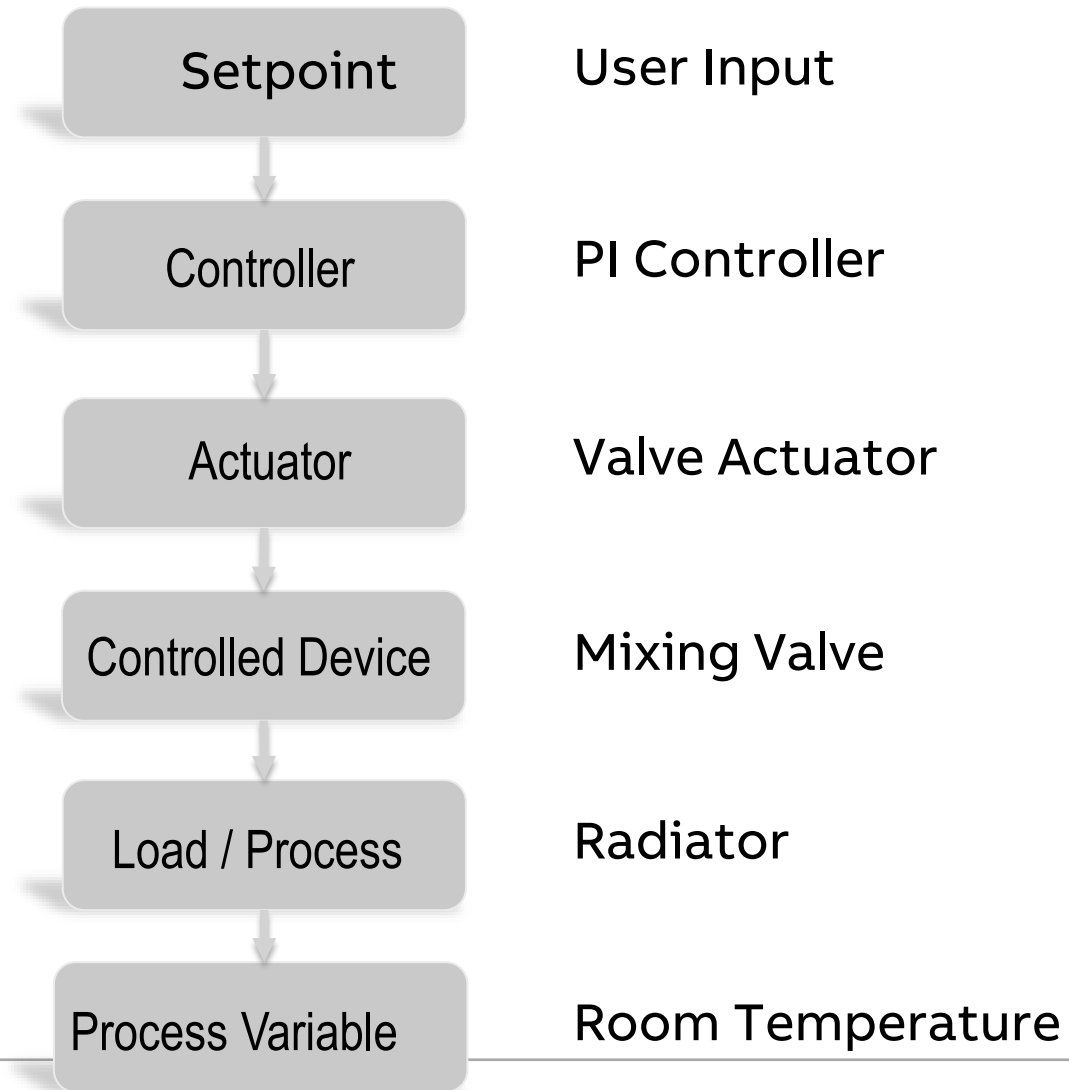
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# What will be covered

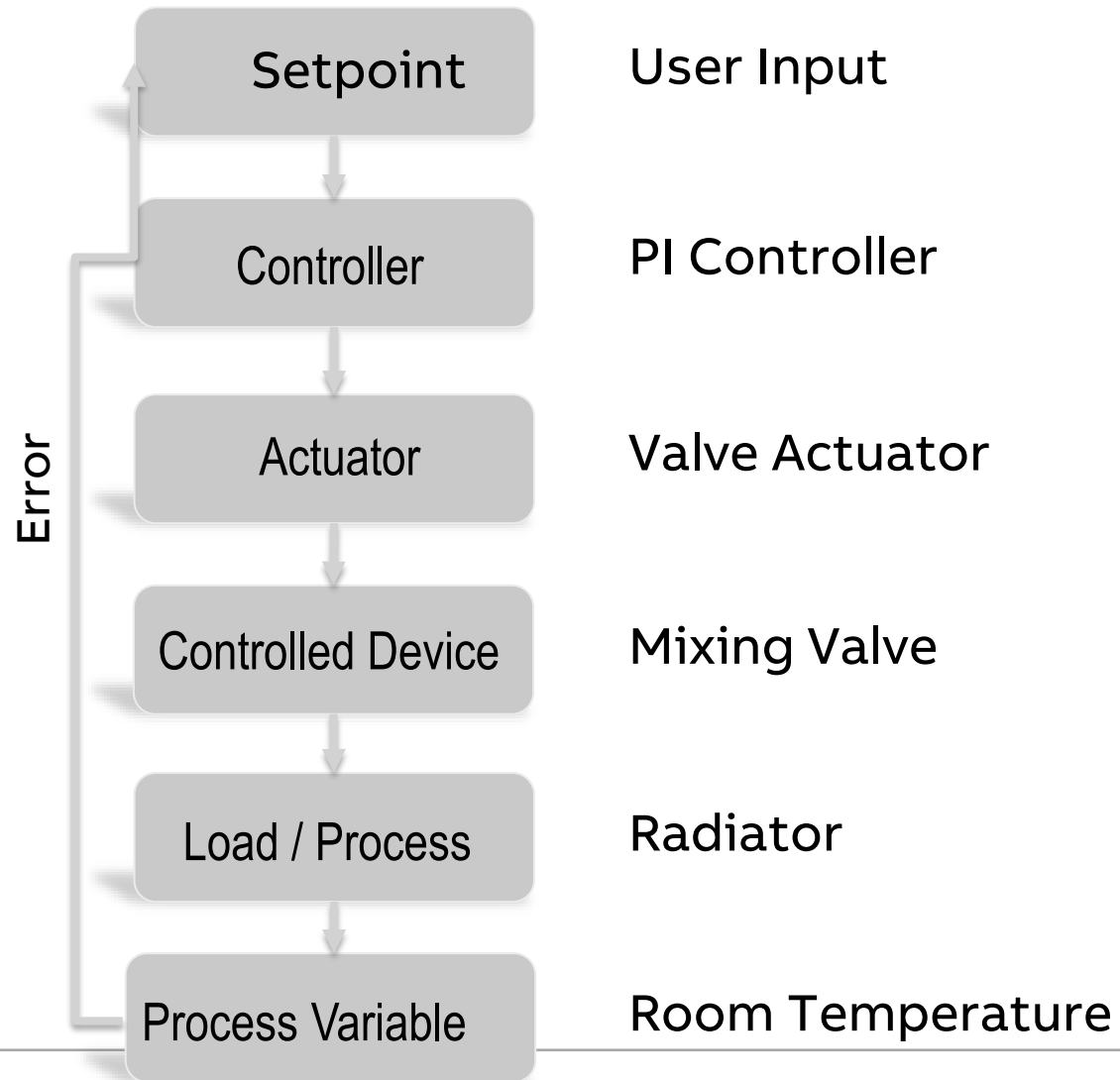
- Control Modes
- BEMS Points Lists
- Air Handling Unit's
- Heating / Cooling Systems
- Control Strategy Functions
- BEMS Networks
- Summary



# Open Loop Control

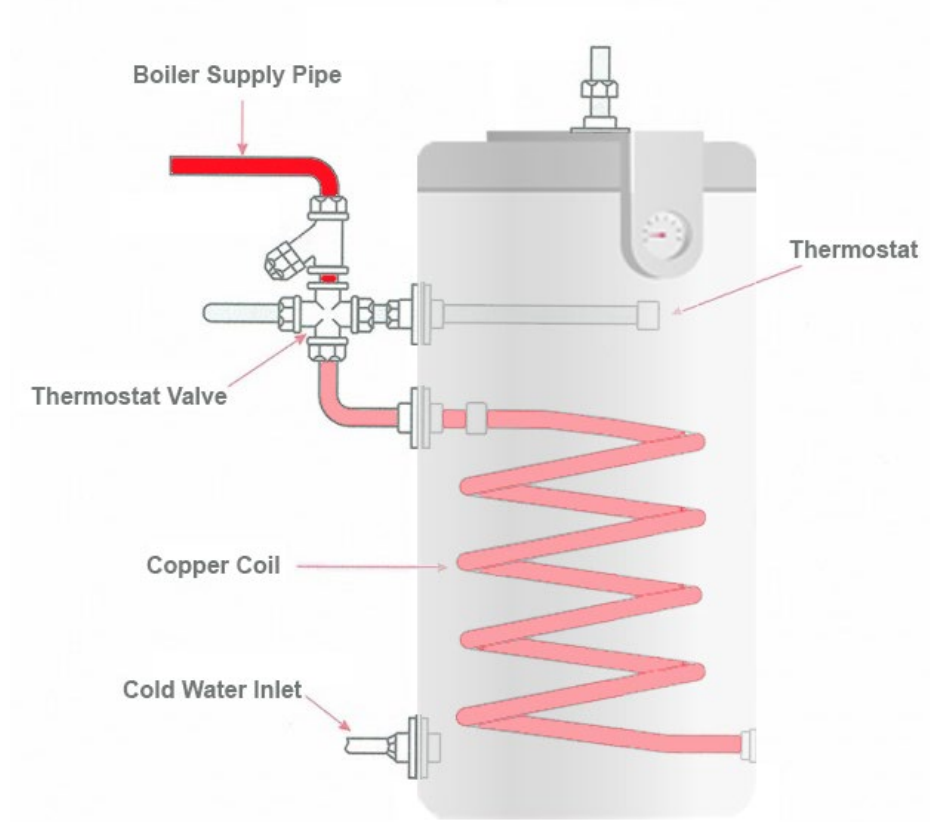
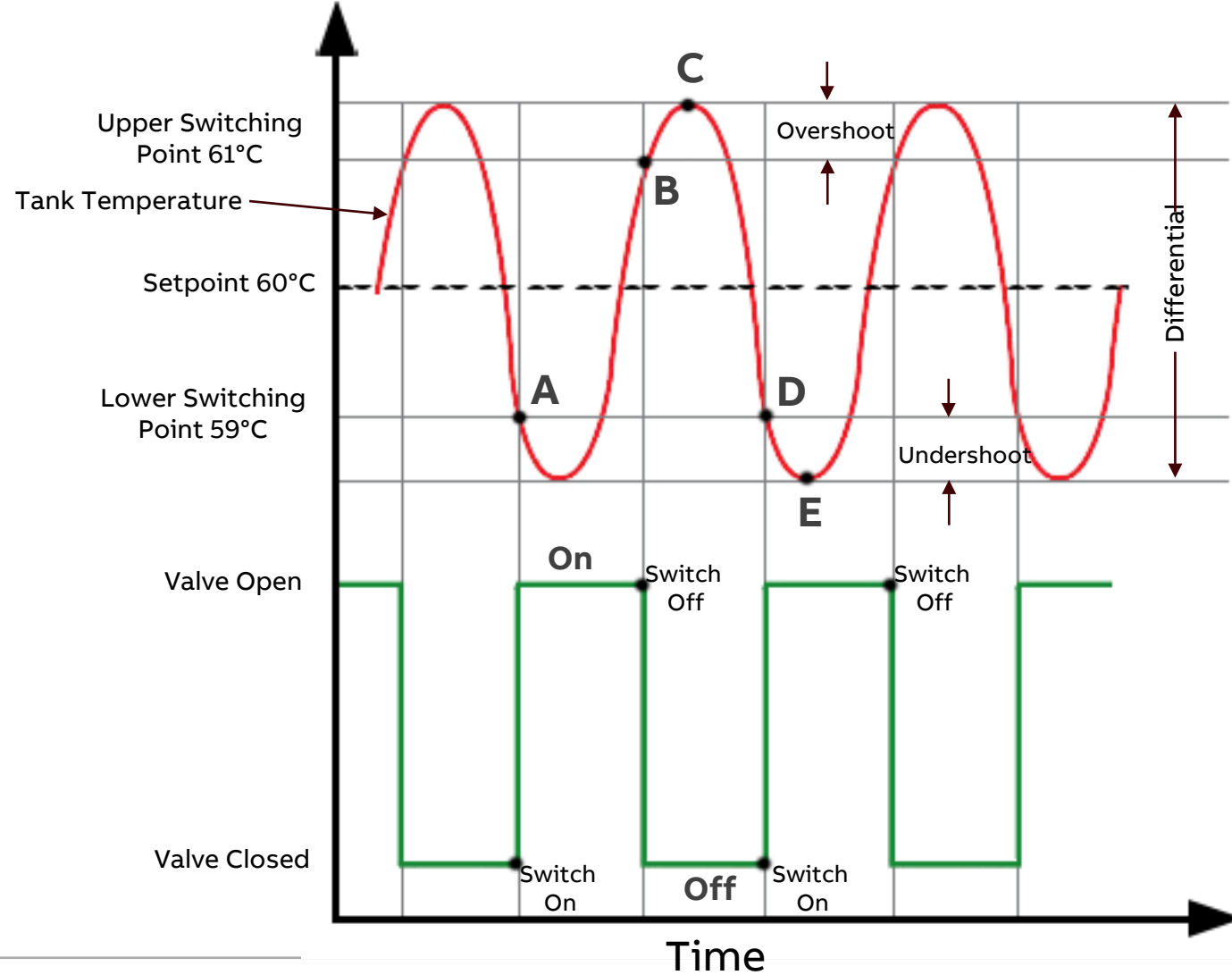


# Closed Loop Control

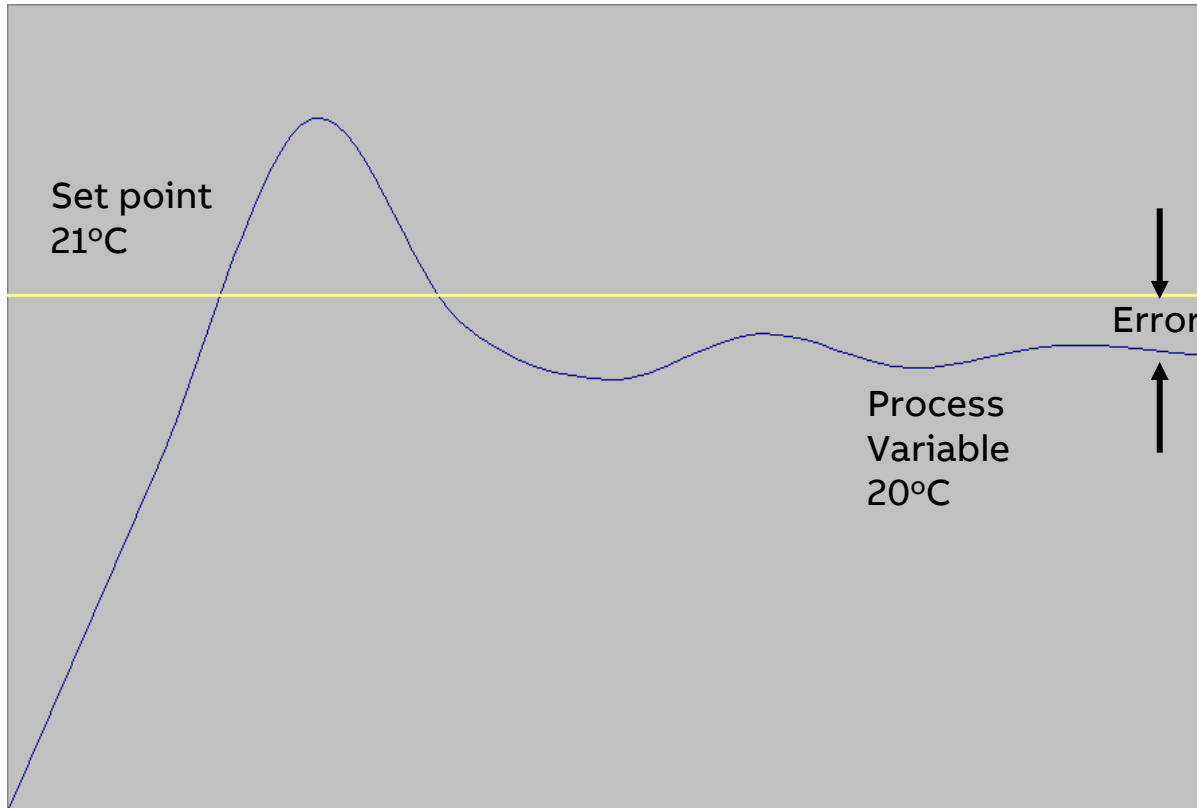




# On - Off Control

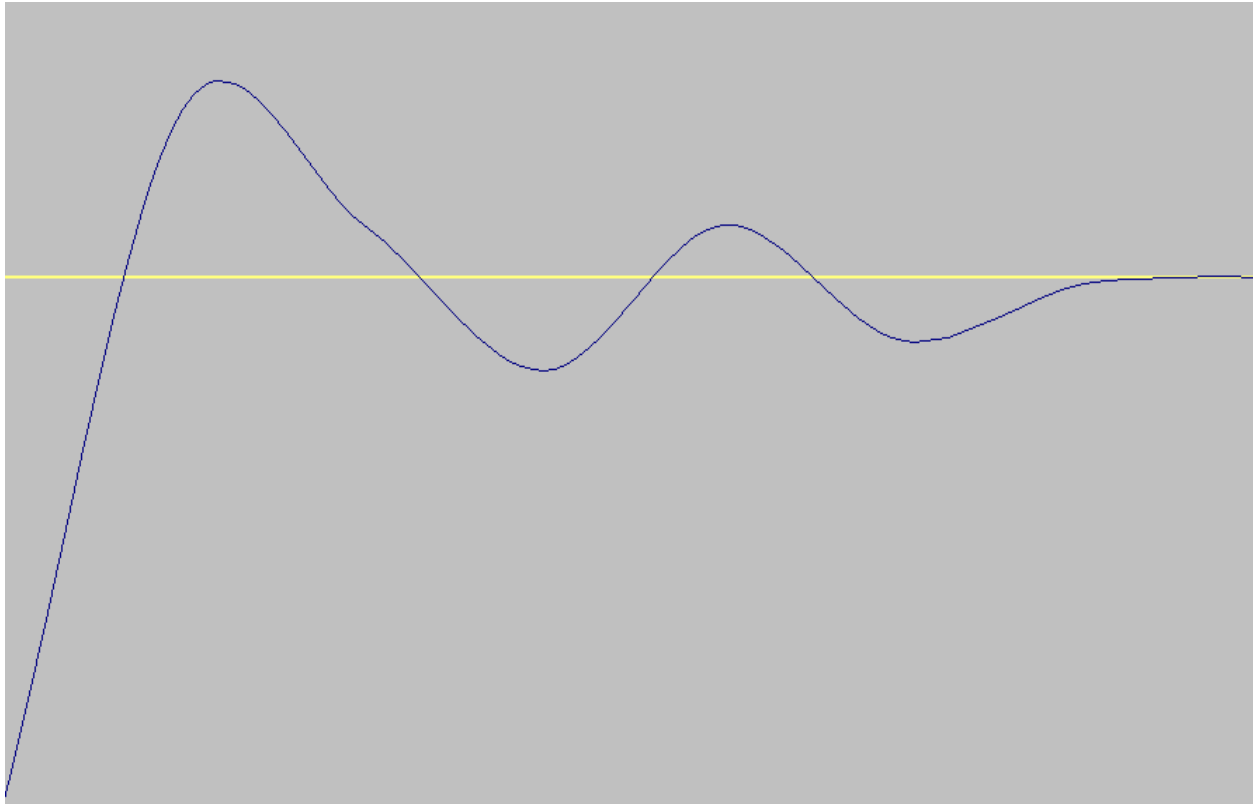


# Proportional Control



- Continuously variable output
- Output is proportional to the Error
- If in this example heating valve actuator is @ 50% open
- Always shows an Offset
- Used in Applications where the temperature is non-critical

# Proportional & Integral Control



- Corrects Load error
- Most Common in HVAC
- Makes it possible to get stable control with Zero Offset
- Can increase P gain for increased stability



## Choice of Control Modes

<b>Application</b>	<b>Mode of Control</b>
Space Temperature	Proportional Control
Mixed Air Temperature	Proportional & Integral Control
Coil Discharge Temperature	Proportional & Integral Control
Chillers Discharge Temperature	Proportional & Integral Control
Airflow	Proportional & Integral Control
Fan Static Air pressure	Proportional & Integral Control
Humidity	Proportional Control or Proportional & Integral Control where tight control is required
Dewpoint	Proportional Control or Proportional & Integral Control where tight control is required

# BEMS Points Lists

What are BEMS Points?

- Different types of measurable Inputs and Outputs wired directly from the mechanical and/or electrical plant.

Type	Abbreviation	Examples
Analog Inputs	AI	Pressure, Humidity
Thermistor Inputs	TI	Temperature
Digital Inputs	DI	Run, Fault, Status
Pulsed Inputs	PI	Meters, Counters
Analog Outputs (Modulating)	AO	Valves, Inverters, Electronically Commutated (EC) Motors
Digital Outputs	DO	Enable signals, Run Signals

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## BEMS Points Lists

- Why and how are Points Lists Used
  - Full Visibility into what is being controlled and what points are missing or duplicated
  - Full Visibility into how the plants will be controlled
    - Two pumps can be controlled in Various ways
      - 2 x Digital Outputs + 1 Digital Input
      - 1 x Digital Outputs + 2 Digital Input
      - 2 x Digital Outputs + 4 Digital Input
  - Gives an insight of the Communications needed between the BEMS Controllers and allows an easy way of calculating the “*trade-off*” between more controllers V’s wiring distances



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# Air Handling Units

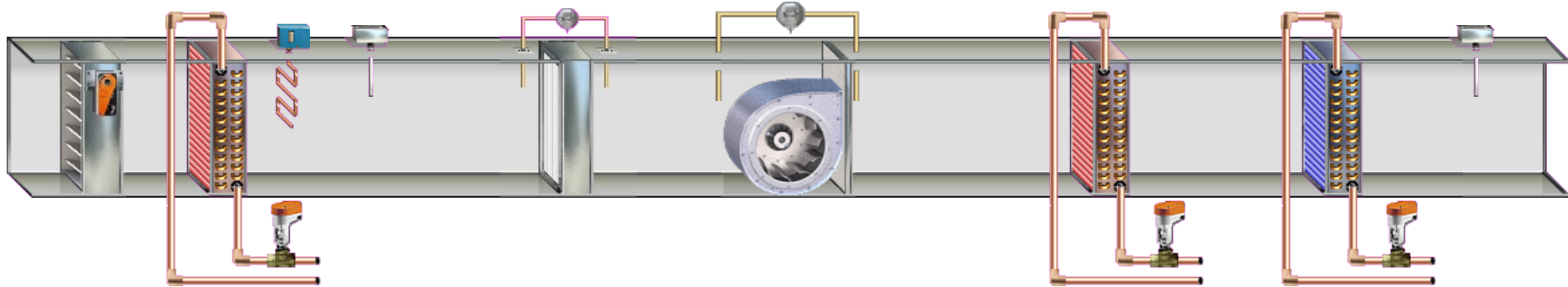
Supply Air Only

Supply & Extract Air Handling Unit

Re-Circulating Air Handling Unit

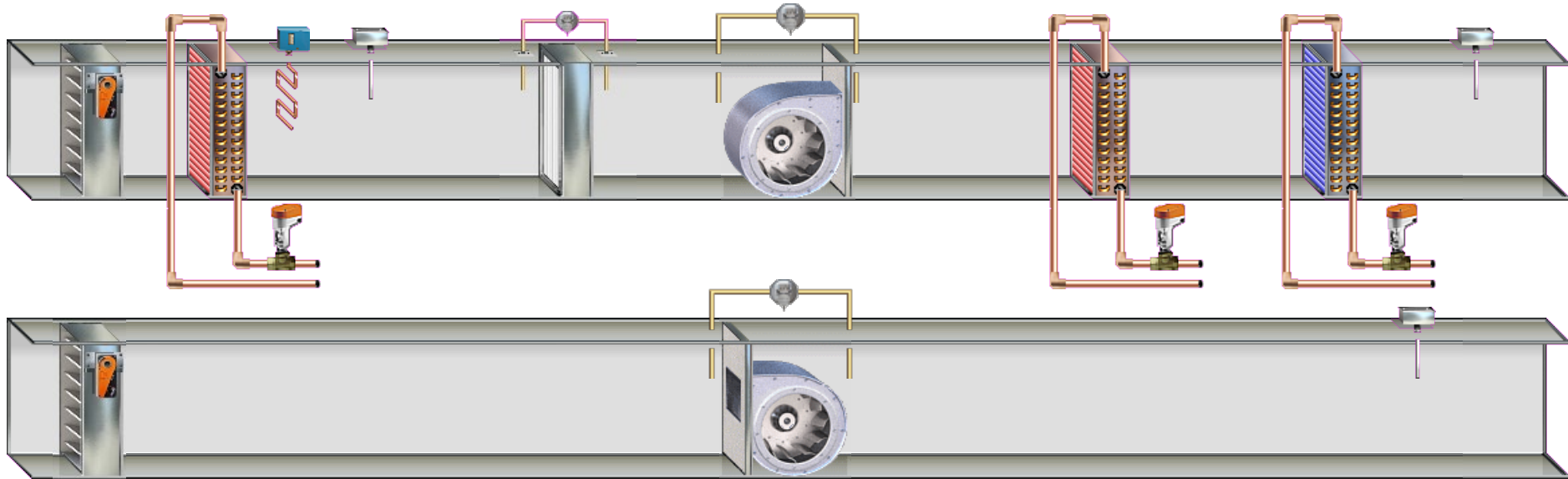


# Supply air only air handling unit



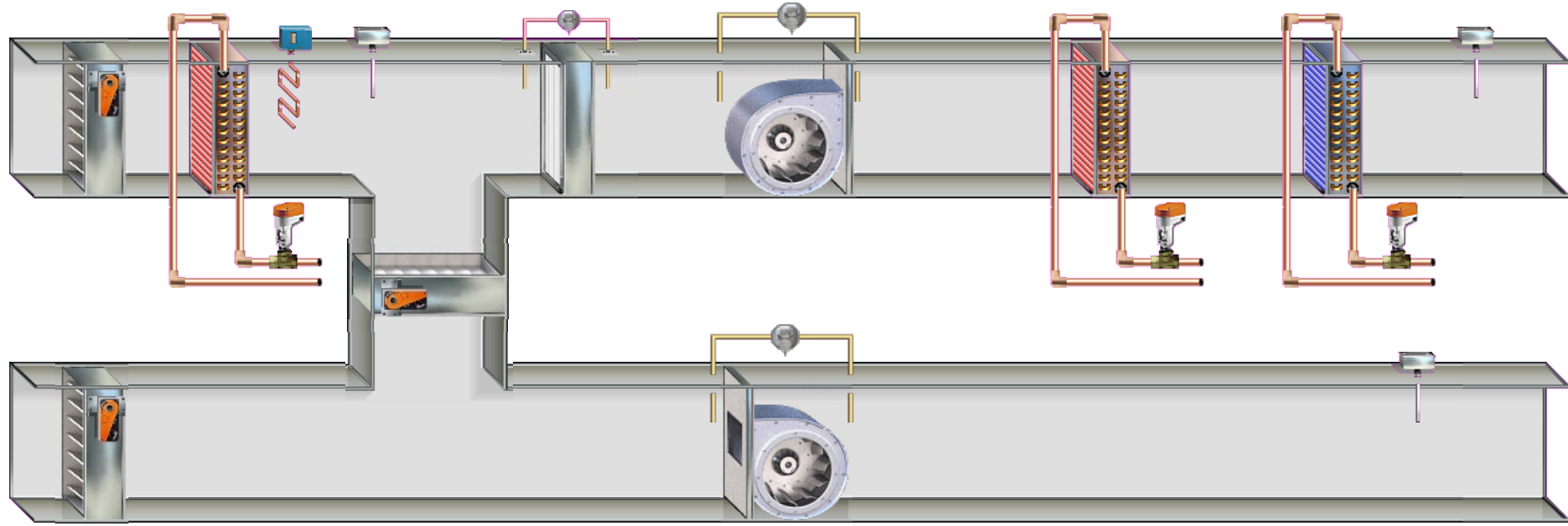
Point	TI	AI	PI	DI	AO	DO
Inlet Damper						1
Frost Coil					1	
Frost Stat				1		
Frost Off-Coil Temperature	1					
Filter				1		
Supply Fan Enable						1
Supply Fan Air Flow				1		
Heating Coil					1	
Cooling Coil					1	
Supply Air Temperature	1					
Space Temperature	1					
<b>Total</b>	<b>3</b>			<b>3</b>	<b>3</b>	<b>2</b>

# Supply & Extract air handling unit



Point	TI	AI	PI	DI	AO	DO
Supply Air Only Air Handling Unit	3			3	3	2
Exhaust Damper						1
Extract Fan Enable						1
Extract Fan Air Flow				1		
Extract Air Temperature	1					
<b>Total</b>	<b>4</b>			<b>4</b>	<b>3</b>	<b>4</b>

# Re-Circulating air handling unit



Point	TI	AI	PI	DI	AO	DO
Supply & Extract Air Handling Unit	4			4	3	4
Re-Circulating Damper					1	
<b>Total</b>	<b>4</b>			<b>4</b>	<b>4</b>	<b>4</b>



# AHU – Additional Components

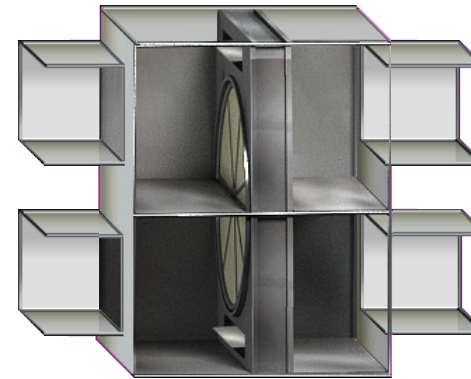
- **Humidifiers**
  - Allows Humidification / Dehumidification to be Controlled
- **Inverters or Electronically Commutated (EC) motors**
  - Allows the Fan Speeds to be adjusted to satisfy environmental conditions
- **Re-Heat Batteries**
  - Allowing separate room control from One Main Air Handling Plant
- **Heat Recovery**
  - Thermal Wheels
  - Run-Around Coils
- **Dew Point Control**
  - Controlling the water vapour in the air



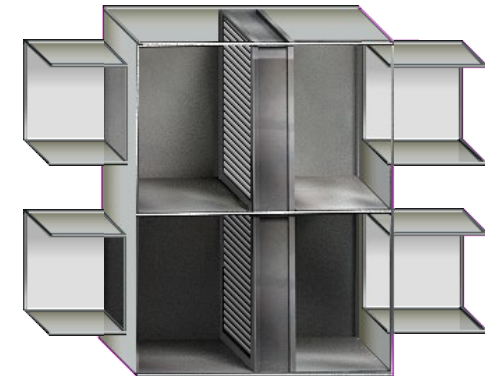
Ultrasonic Humidifier



ABB Inverter



Thermal Wheel



Run-Around Coils

# Heating / Cooling Systems

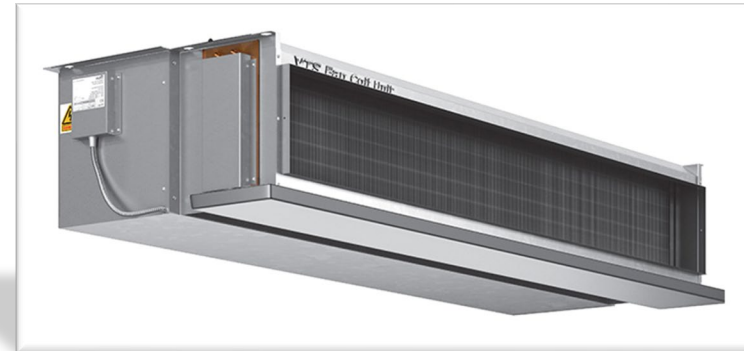
Boiler Control

VT Circuit

Under Floor heating

Chillers

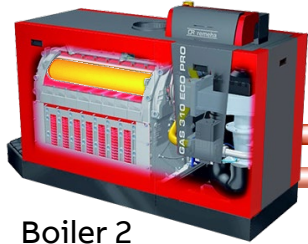
Fan Coil Units



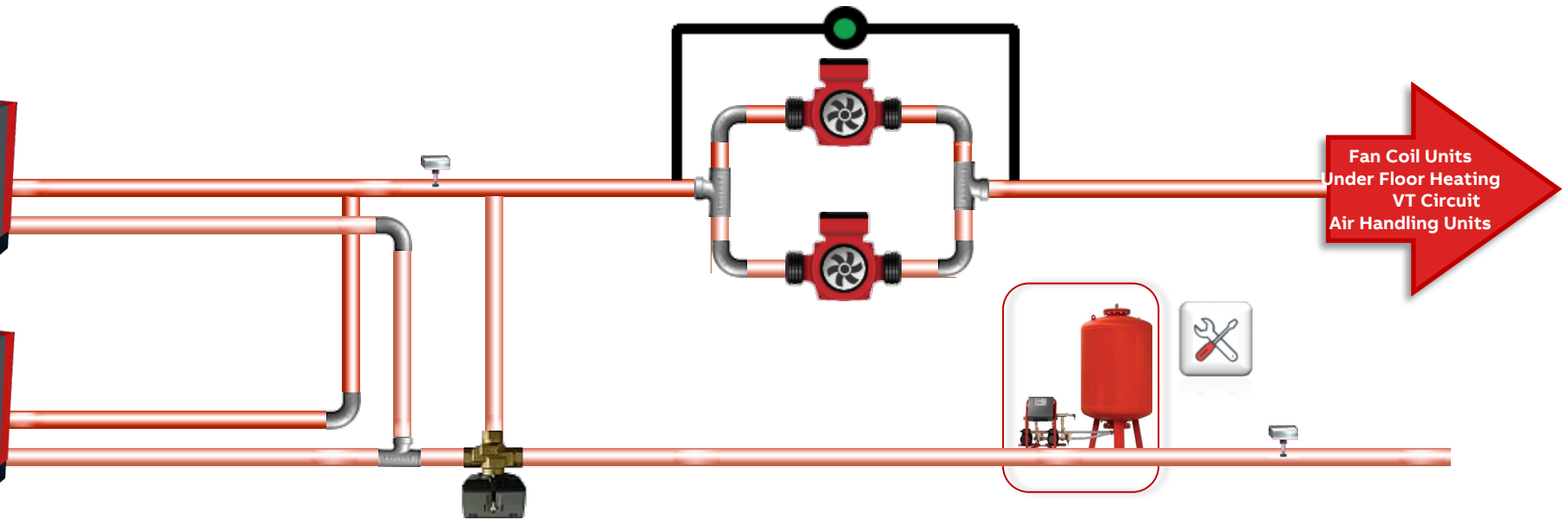
# Boilers



Boiler 1

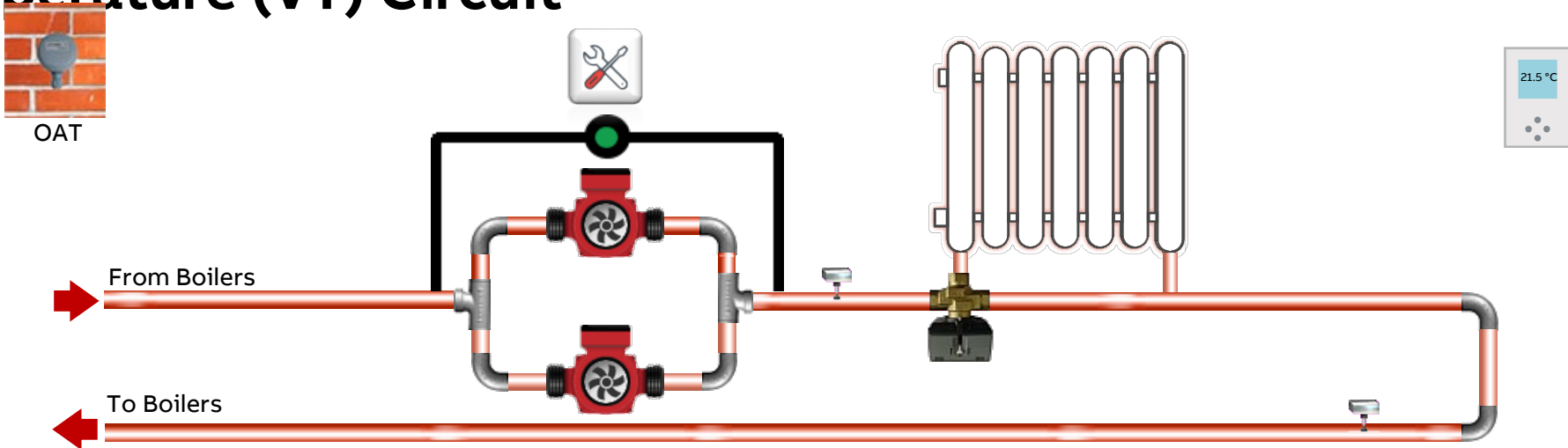


Boiler 2



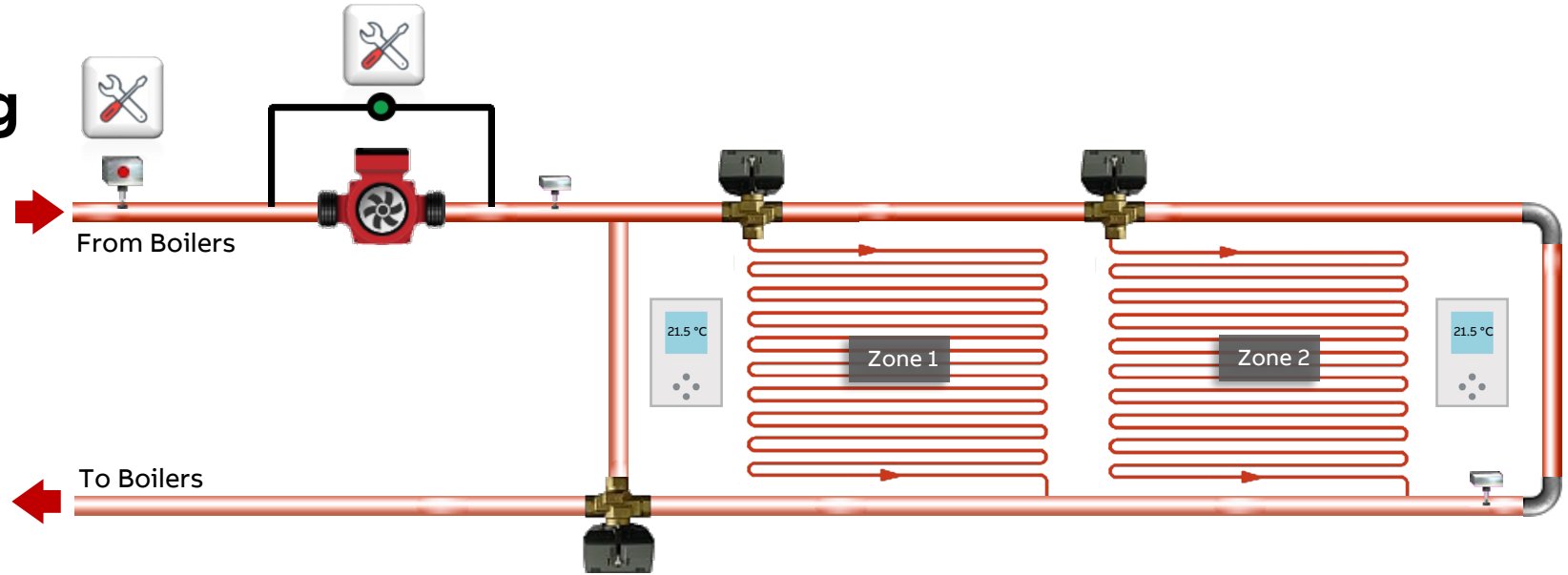
Point	TI	AI	PI	DI	AO	DO
Boiler 1 Enable						1
Boiler 1 Fault				1		
Boiler 2 Enable						1
Boiler 2 Fault				1		
Boiler Flow Temperature	1					
Boiler Return Temperature	1					
Heating Valve (Mixing)					1	
Pump 1 Enable						1
Pump 2 Enable						1
Common Flow Switch				1		
Pressurisation Unit Fault				1		
<b>Total</b>	<b>2</b>			<b>4</b>	<b>1</b>	<b>4</b>

# Variable Temperature (VT) Circuit



Point	TI	AI	PI	DI	AO	DO
Outside Air Temperature (OAT)	1					
Space Temperature	1					
VT Flow Temperature	1					
VT Return Temperature	1					
Heating Valve					1	
Pump 1 Enable						1
Pump 2 Enable						1
Common Flow Switch				1		
<b>Total</b>	<b>4</b>			<b>1</b>	<b>1</b>	<b>2</b>

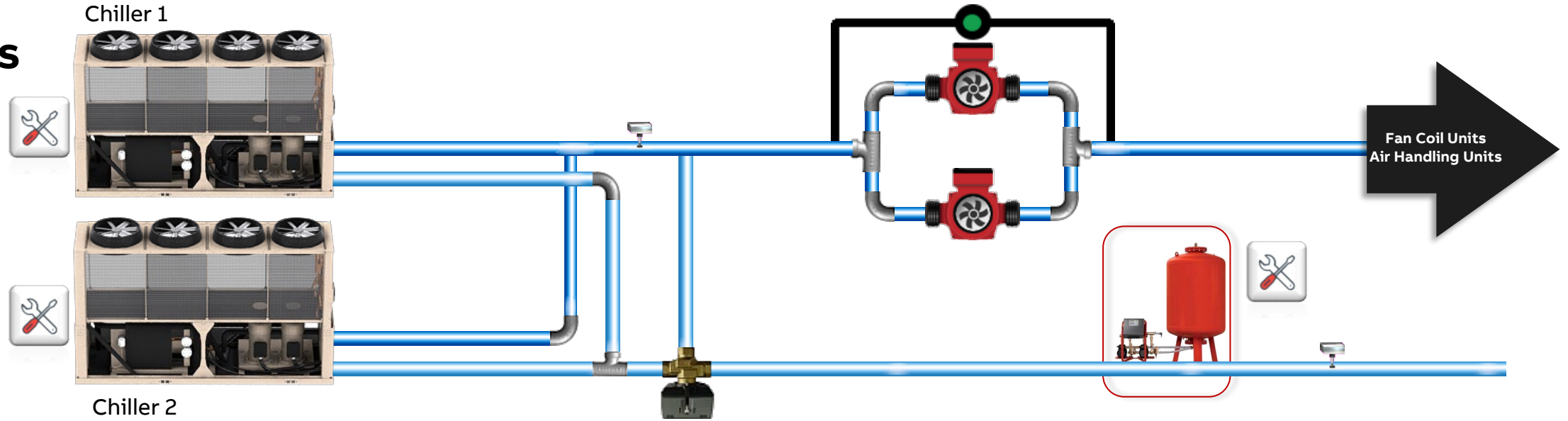
# Underfloor Heating



Point	TI	AI	PI	DI	AO	DO
High Limit Stat Status				1		
Pump Enable						1
Pump Flow Switch				1		
Main Modulating Valve					1	
Flow Temperature	1					
Return Temperature	1					
Zone 1 Valve						1
Zone 1 Space Temperature	1					
Zone 2 Valve						1
Zone 2 Space Temperature	1					
<b>Total</b>	<b>4</b>			<b>2</b>	<b>1</b>	<b>3</b>

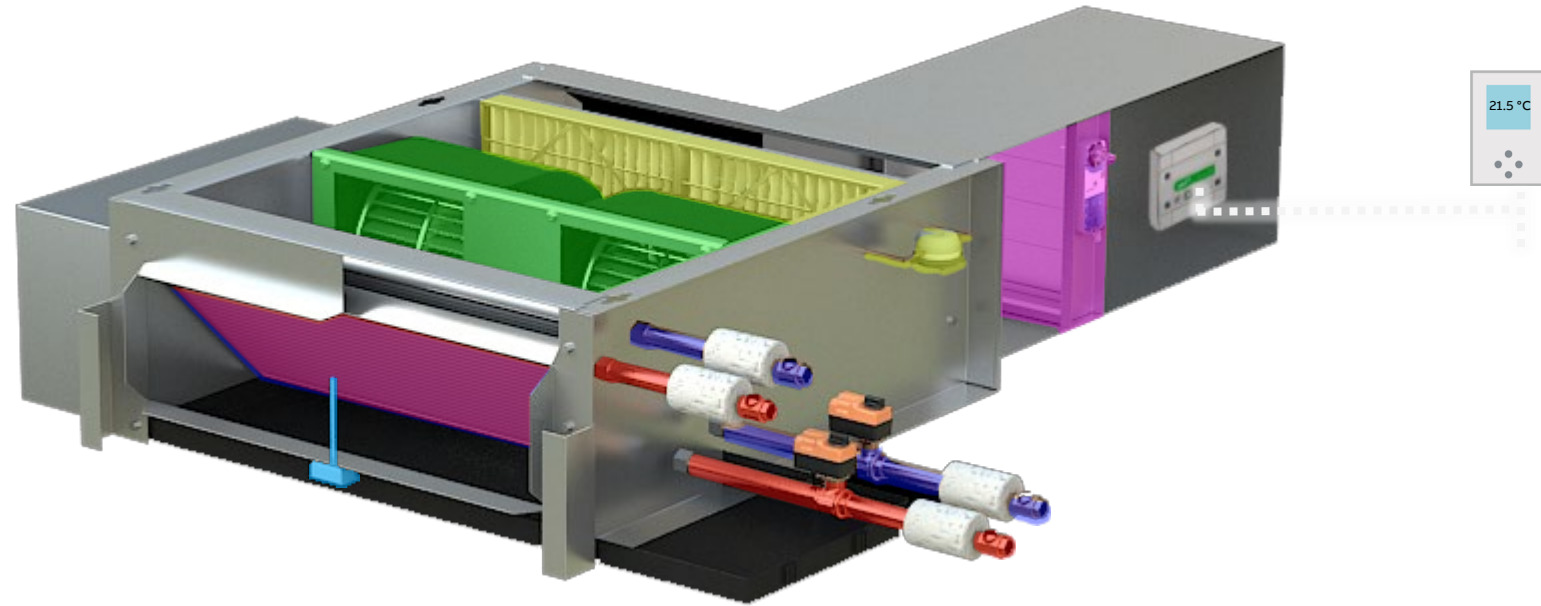


# Chillers



Point	TI	AI	PI	DI	AO	DO
Chiller 1 Enable						1
Chiller 1 Fault				1		
Chiller 2 Enable						1
Chiller 2 Fault				1		
Chiller Flow Temperature	1					
Chiller Return Temperature	1					
Cooling Valve (Mixing)					1	
Pump 1 Enable						1
Pump 2 Enable						1
Common Flow Switch				1		
Pressurisation Unit Fault				1		
<b>Total</b>	<b>2</b>			<b>4</b>	<b>1</b>	<b>4</b>

# Fan Coil Units (FCU)



Point	TI	AI	PI	DI	AO	DO
Fan Enable (Relay)						1
Fan Speed (EC Motor)					1	
Space Temperature	1					
Space Setpoint		1				
Supply Air Temperature	1					
Heating Valve					1	
Cooling Valve					1	
Damper Control					1	
Filter				1		
<b>Total</b>	<b>2</b>	<b>1</b>		<b>1</b>	<b>4</b>	<b>1</b>

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# Control Strategy Functions

## Optimum Start – Stop

- Reach Comfort conditions at Start-up and Shut-Down in shortest time
  - Using the external & Internal Temperatures, the BEMS controller calculates the time in which the heating / cooling should be enabled to achieve an occupancy temperature neither before nor after people arrive.
  - Using the external & Internal Temperatures, the BEMS controller calculates the time in which the heating / cooling should be disabled to achieve an occupancy temperature neither before nor after people leave.
  - CIBSE recommends for heating systems >30kW. Required for heating systems >100kW

## Duty – Standby Change Over (see next slide)

- Automatically Monitors & Changes dual items of plant
  - Monitoring dual items of plant to automatically Change over the operation on a periodic basis
  - Monitoring dual items of plant to automatically Change over the operation on a fault basis, avoiding “down-time”

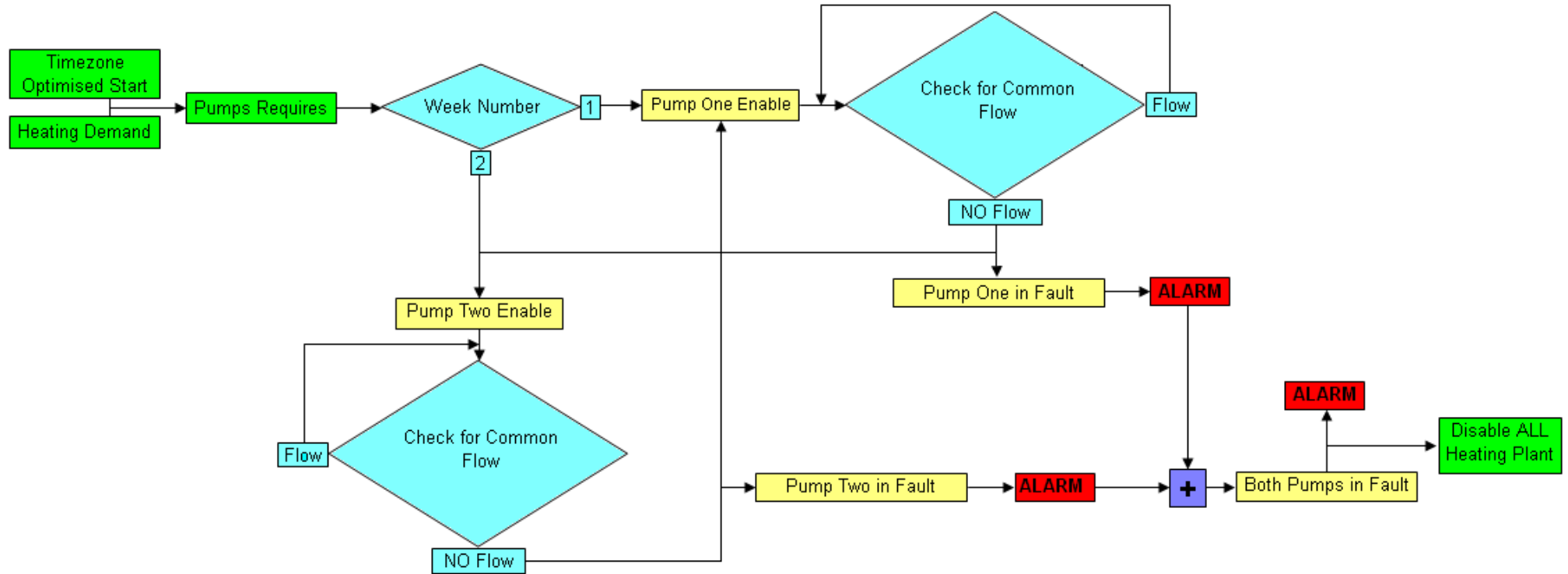
## Alarm Handling

- Allow the mechanical and/or electrical plants functions to be monitored and alerts the uses to problems before the environmental conditions are affected.

## Trending

- Logging point values at specific intervals to record analog and digital valves over time.

# BEMS Strategy– Pump Change Over





# Summary

## CYLON Equipment

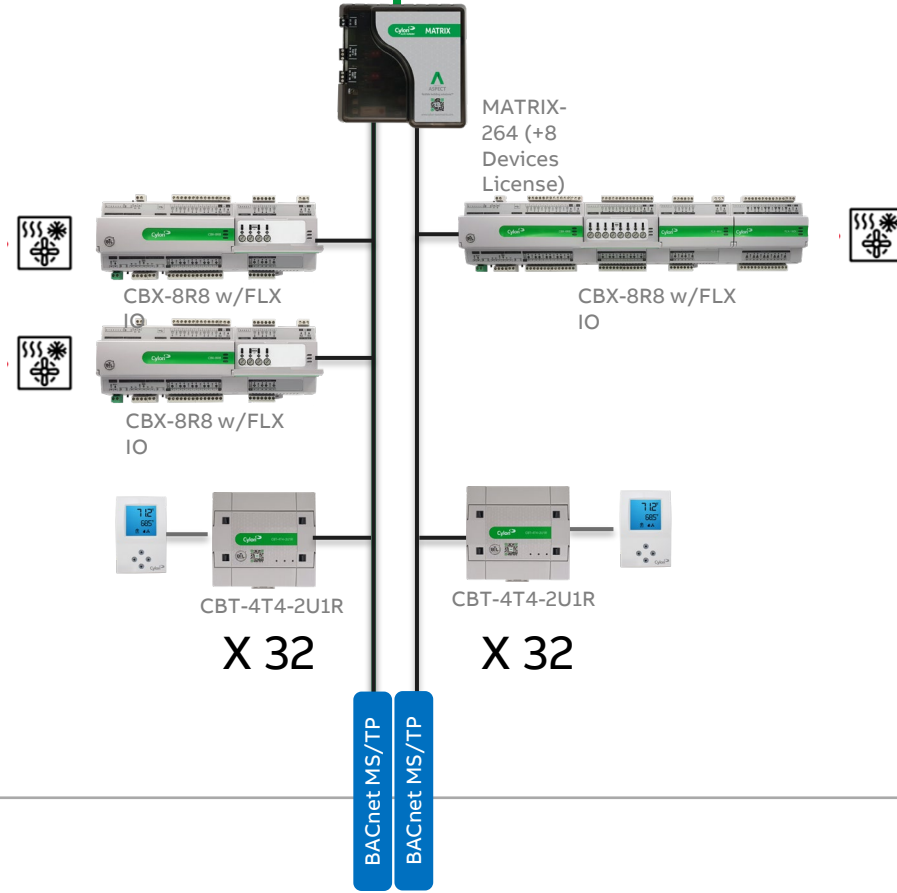
- 3 x CBX-8R8
- 1 x FLX-16DI
- 1 x FLX-4R4
- 4 x FLX-8R8
- 64 x CBT-4T4-2U1R
- 1 x Matrix-264
- 1 x MAT-LP-8  
(Add 8 devices license)

DESCRIPTION	POINTS TYPE					
	TI	AI	PI	DI	AO	DO
Boilers	2	0	0	4	1	4
VT Circuit	4	0	0	1	1	2
Under Floor Heating	4	0	0	2	1	3
Chillers	2	0	0	4	1	4
Supply Air Only Air Handling Unit 1	3	0	0	3	3	2
Supply Air Only Air Handling Unit 2	3	0	0	3	3	2
Supply & Extract Air Handling Unit 1	4	0	0	4	3	5
Supply & Extract Air Handling Unit 2	4	0	0	4	3	5
Re-Circulating Air Handling Unit 1	4	0	0	4	4	3
Re-Circulating Air Handling Unit 2	4	0	0	4	4	3
Various Meters	0	0	12	0	0	0
<b>Total Plant Hardware</b>	<b>34</b>	<b>0</b>	<b>12</b>	<b>33</b>	<b>24</b>	<b>33</b>
Add Virtual Points (x4)	136	0	48	132	96	132
Fan Coil Units x 64	128	64	0	64	256	64
<b>Points</b>	<b>298</b>	<b>64</b>	<b>60</b>	<b>229</b>	<b>376</b>	<b>229</b>
<b>Total Points</b>	<b>1256</b>					

# System architecture required



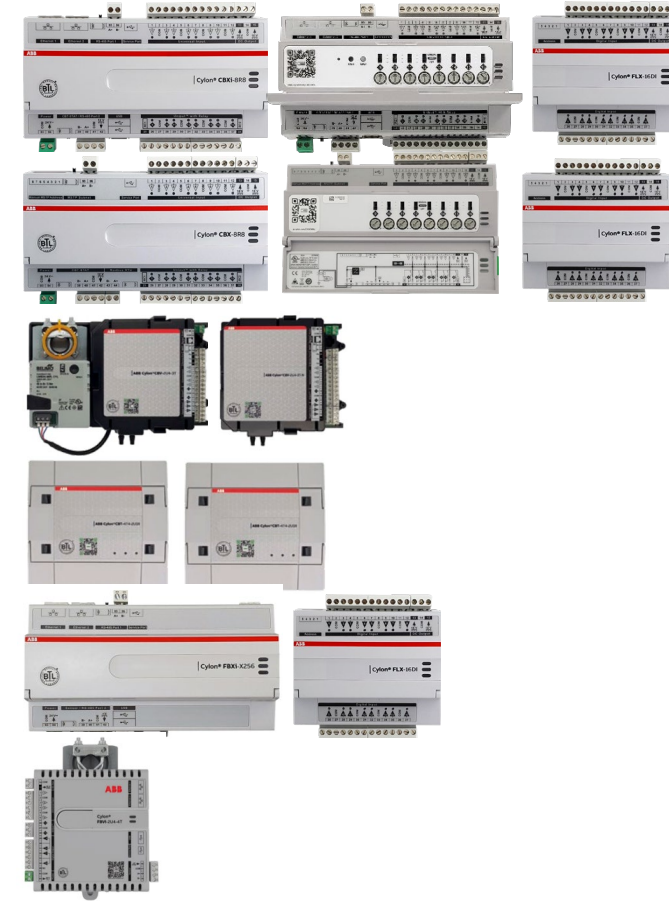
Site IP Network



# ABB Cylon® Smart Building Solutions

## Range Overview

Main Plant Controller Digital/Analogue IO's	<b>CBXi FLX</b>	CBXi-8R8(-H) FLX-4R4(-H), FLX-8R8(-H) FLX-16DI, FLX-PS24
	<b>CBX FLX</b>	CBX-8R8(-H) FLX-4R4(-H), FLX-8R8(-H) FLX-16DI, FLX-PS24
Variable Air Volume Controller	<b>CBV</b>	CBV-2U4-3T/-N
Terminal Controller	<b>CBT</b>	CBT-3T6-5R CBT-4T4-2U1R
Main Plant Controller Digital/Analogue IO's	<b>FLXeon</b>	FBXi-X256 FLX-4R4(-H), FLX-8R8(-H) FLX-16DI, FLX-PS24
Variable Air Volume Controller	<b>FLXeon</b>	FBVi-2U4-4T



# ABB Cylon® Smart Building Solutions

## Range Overview

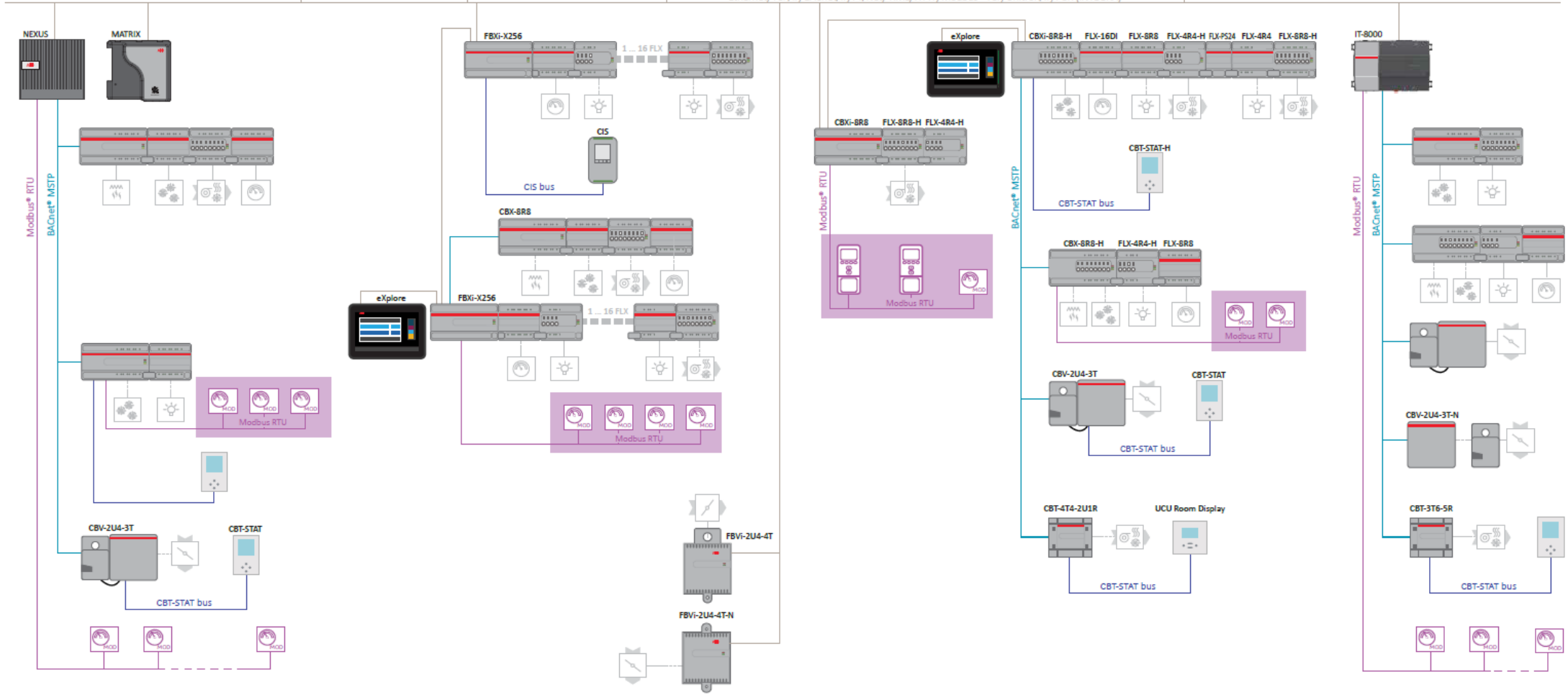
Room and Panel Displays	Room Sensors/ Displays	CBT-STAT (Room Sensor) UCU (Room Display) eXplore
Engineering	Software	CXpro <sup>HD</sup>
Visualization	Software/ Hardware	Nexus Matrix Aspect-Studio and Enterprise
Visualization	App	AeroBT (for CBV devices, view, edit, and configure operating parameters of VAV)
Engineering	INTEGRA <sup>TM</sup>	IT-8000 INTEGRA-Supervisor INTEGRA-ProPack
Sensors	Wired/ Wireless	Temperature Humidity Air Quality



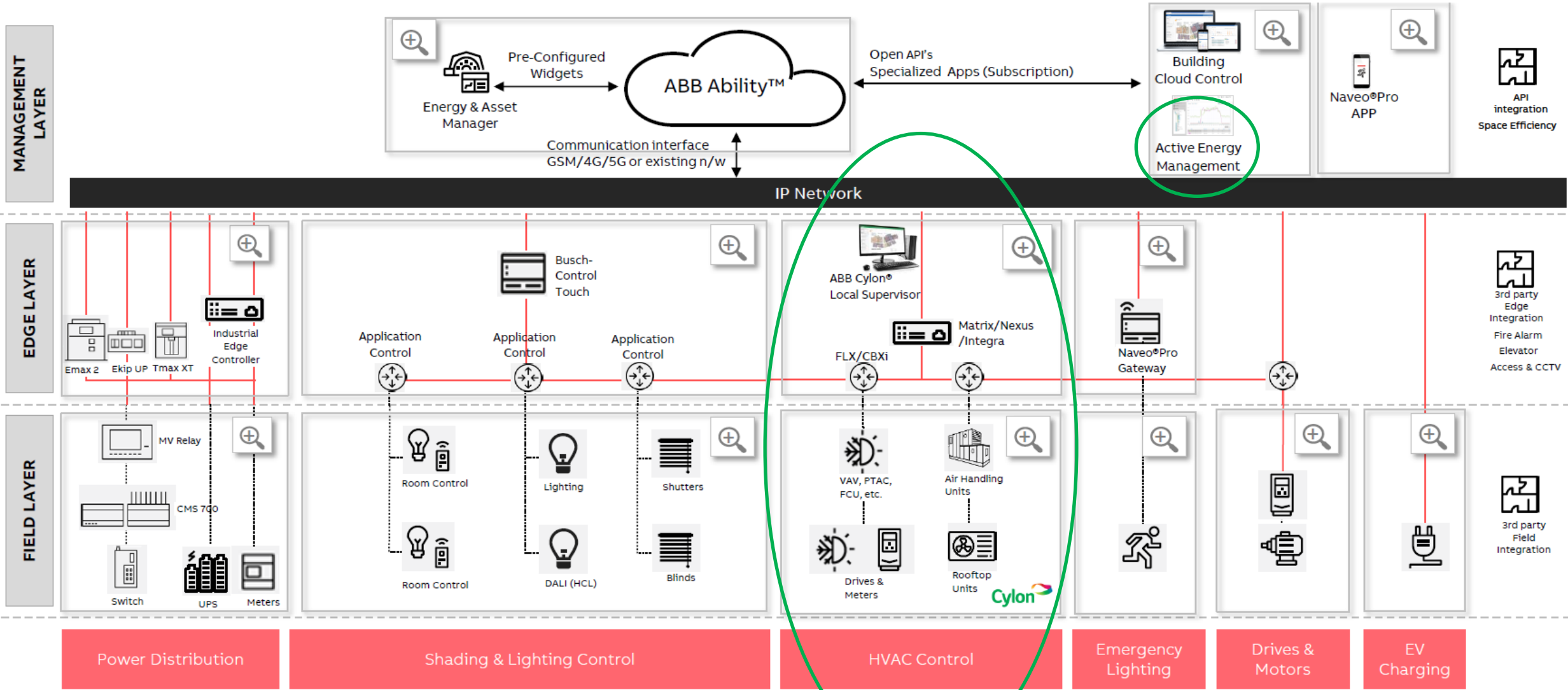




Ethernet, TCP/IP, BACnet/IP, FT/Net, XML, HTTP, Modbus<sup>®</sup> TCP, Unifron/IP, FOX (INTEGRA)

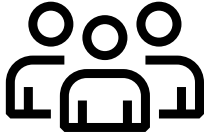


# Where Cylon Controls fits into the ABB Smart Buildings portfolio



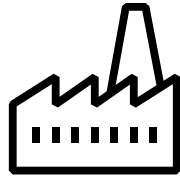
# ABB in Ireland

At a glance



**180**

People work for ABB in Ireland



**5**

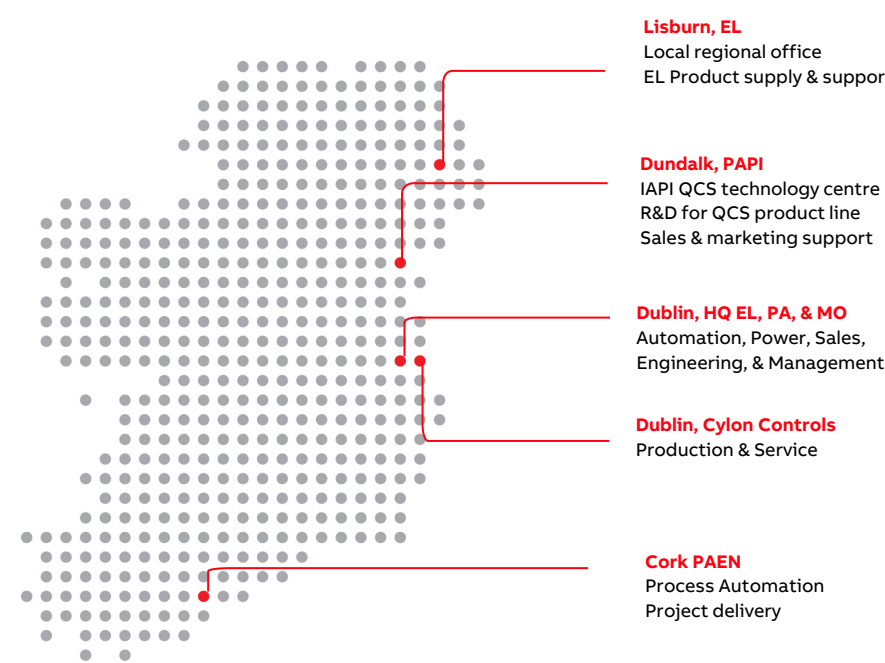
Sites where products are sold, serviced or engineered



**Want to know more?**

[marketing@ie.abb.com](mailto:marketing@ie.abb.com)

[www.abb.ie](http://www.abb.ie)



Skilled and experienced Irish team, backed by global networks

# ABB Ireland

Registered Training Provider with Engineers Ireland



## ABB Electrification

1. Technical overview of LV Switchgear and Panel Selection.
2. LV Selectivity / Discrimination
3. IEC61439 Standard for Circuit Breakers & Assemblies
4. Arc Fault Detection Devices (New MCBs & RCBOs)
5. Electric Vehicle Charging Infrastructure
6. The Fundamentals & Principles of Building Energy Management Systems
7. Introduction to MV Switchgear
8. Building Services Integration BACnet and other options
9. IIoT for Electrical installations
10. Building Automation – KNX universal protocol & DALI

## ABB Motion

1. Harmonics, VSDs & Mitigation technologies
2. IE5 Synchronous Reluctance Drive and Motor Package

[Click here to view ABB offering on Engineers Ireland](#)



—  
Cylon Controls  
**is now ABB**



[seamus.maclughadha@ie.abb.com](mailto:seamus.maclughadha@ie.abb.com)