Sustainable Solutions



Larry Kouma
Johnson Controls
Building Efficiency

YORK® BY JOHNSON CONTROLS

Johnson Controls

The Path to Sustainability …





"If you don't know where you want to go, any road will get you there"

- Lewis Carroll

Johnson Controls



Source: China Daily
Dec 2013



Johnson Controls Policy:

Minimizes adverse effects of our operations on the community and environment, **while safeguarding the health and safety** of the public.

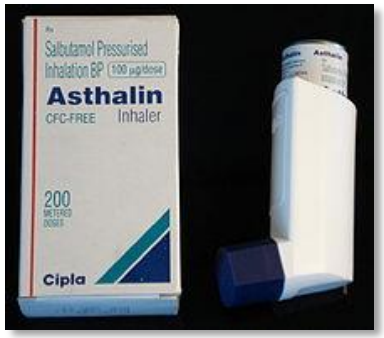


Sustainable Environment
Green Refrigerant

Green Refrigerant HFC-134a

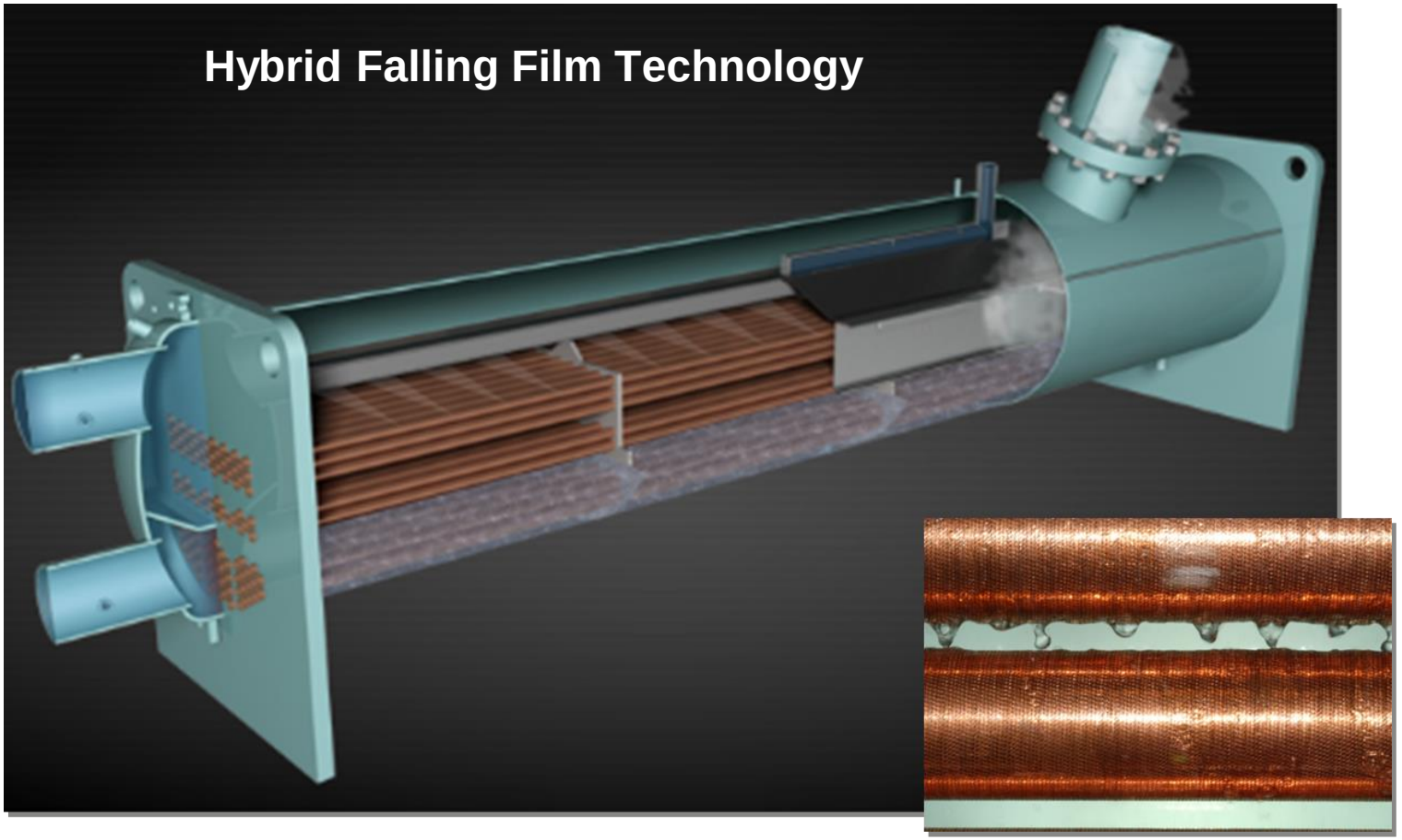
- Favorable Life Cycle Climate Performance [LCCP]
  - LCCP considers all warming impacts
  - Direct: Manufacture, transport, leakage risk
  - Indirect: CO_2 emissions related to energy consumption of the product.
- No Phase Out Date
- Second most widely used refrigerant
  - Behind only HCFC-22 with phase out date
- Non-toxic: Used as medicine propellant in MDIs [metered dose inhalers]





Sustainable Environment
Refrigerant

30% refrigerant charge reduction

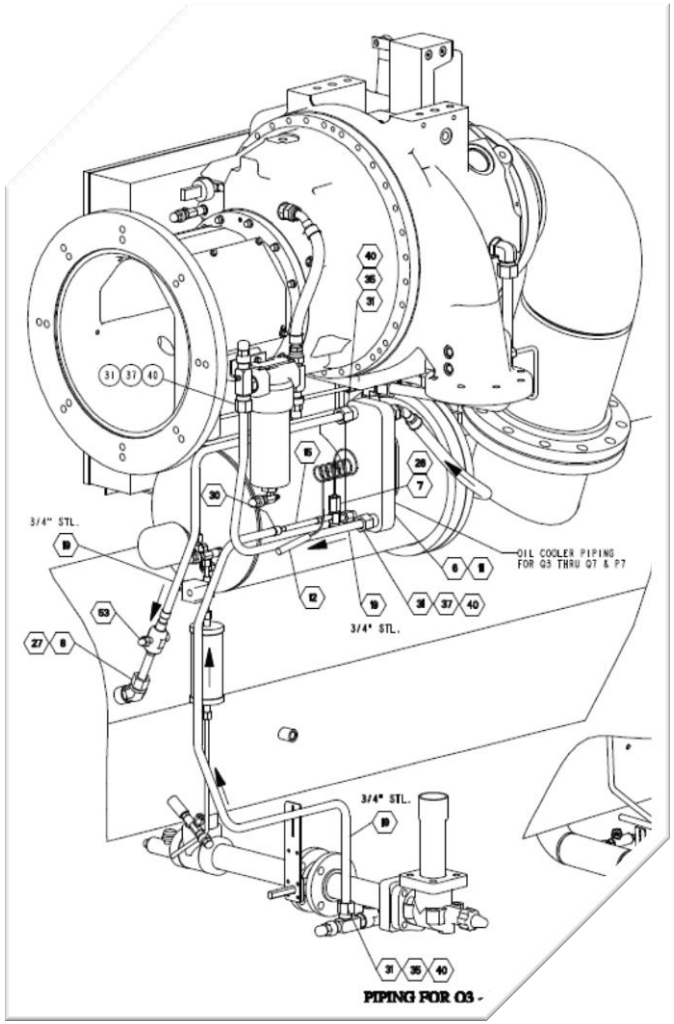


Sustainable Environment
Oil System Elimination

Eliminate Leak Potential, Eliminate Parasitic Losses

YMC² Oil Free Design

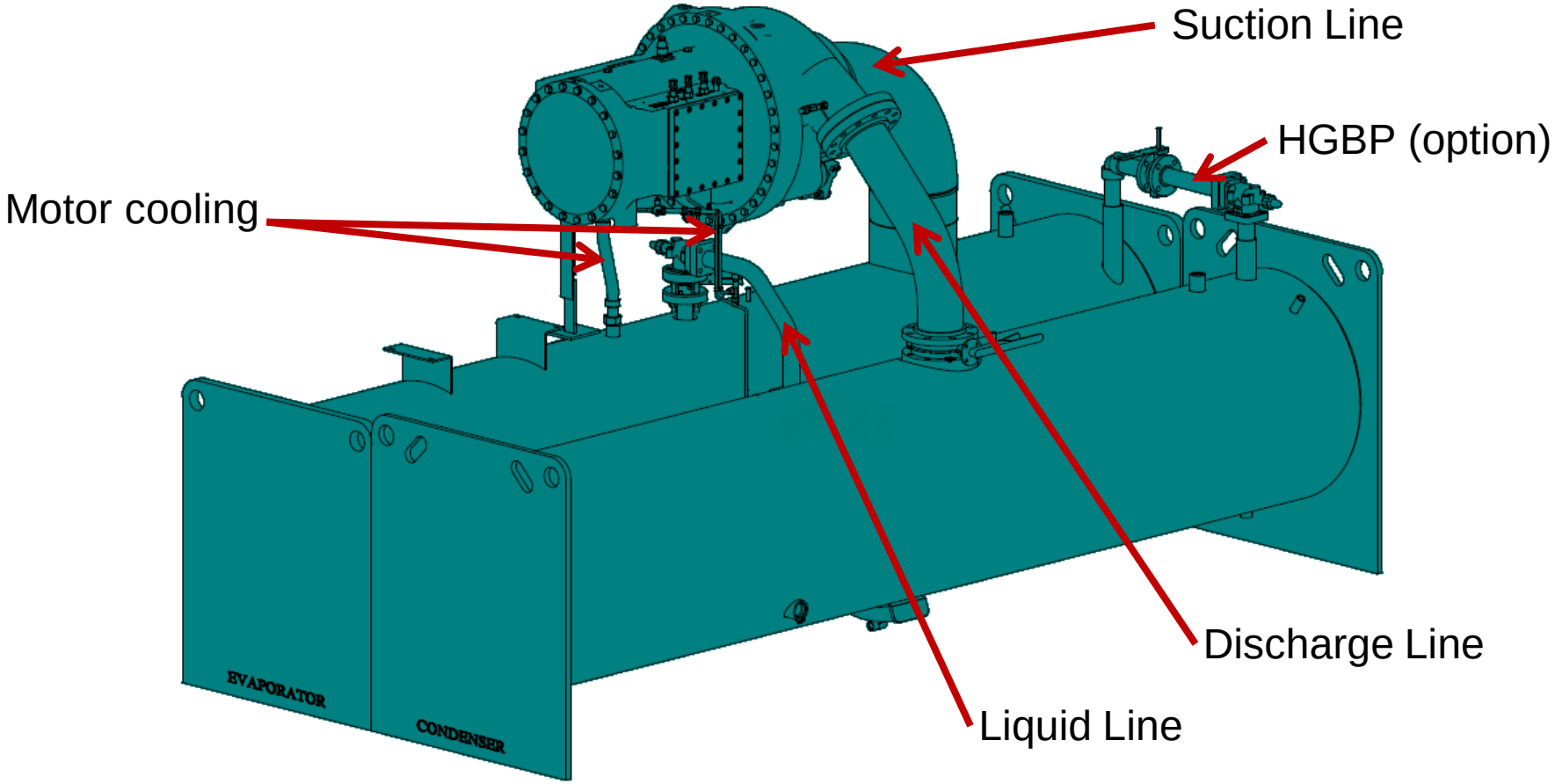
- No Gears
- No Oil
- No Oil Pump
- No Oil Heater
- No Oil Cooler
- No Oil Filters
- No Oil Piping
- No Oil Pump Housing
- No Oil Return Eductors
- No Variable Speed Oil Pump Drive





Sustainable Environment
Leak Tight Design

Leak tight design – 57% reduction in piping and joints

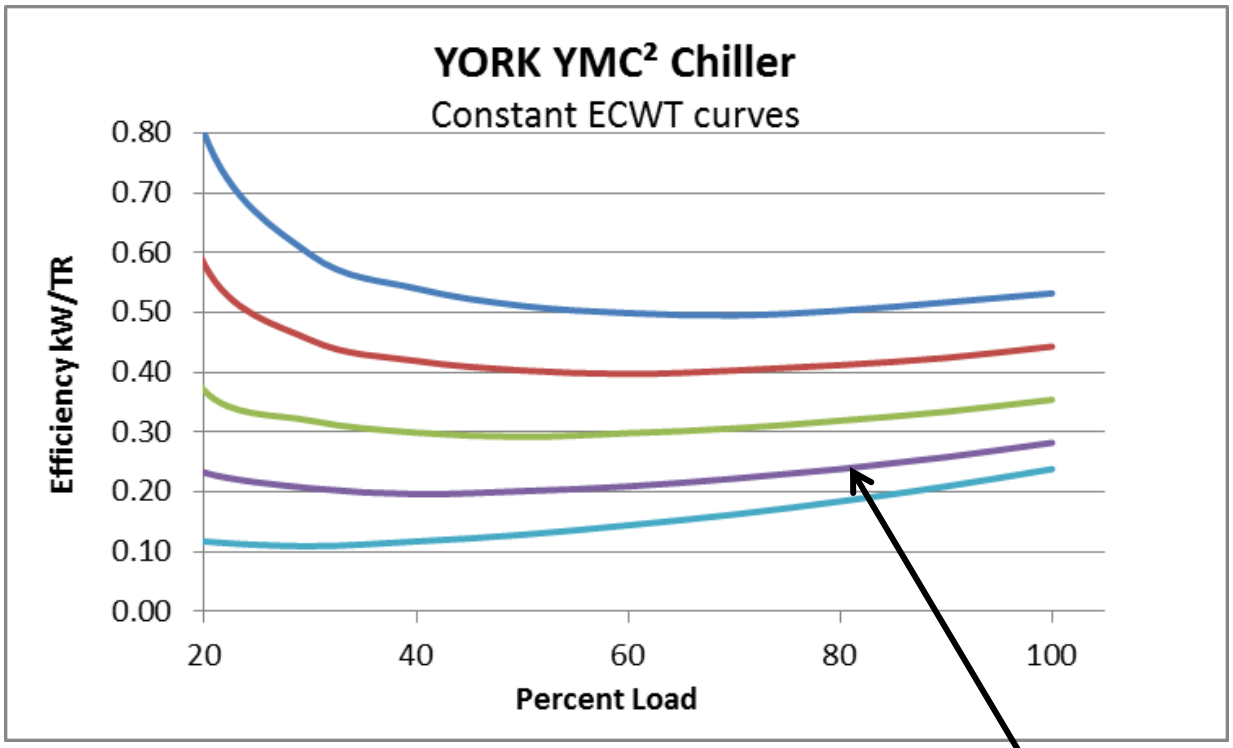


The Most Efficient Chiller on the Market!

0.110 kW/TR
32 COP [kW/kW]!
AHRI Certified rating output



Sustainable Efficiency
Most Efficient Chiller on the Market

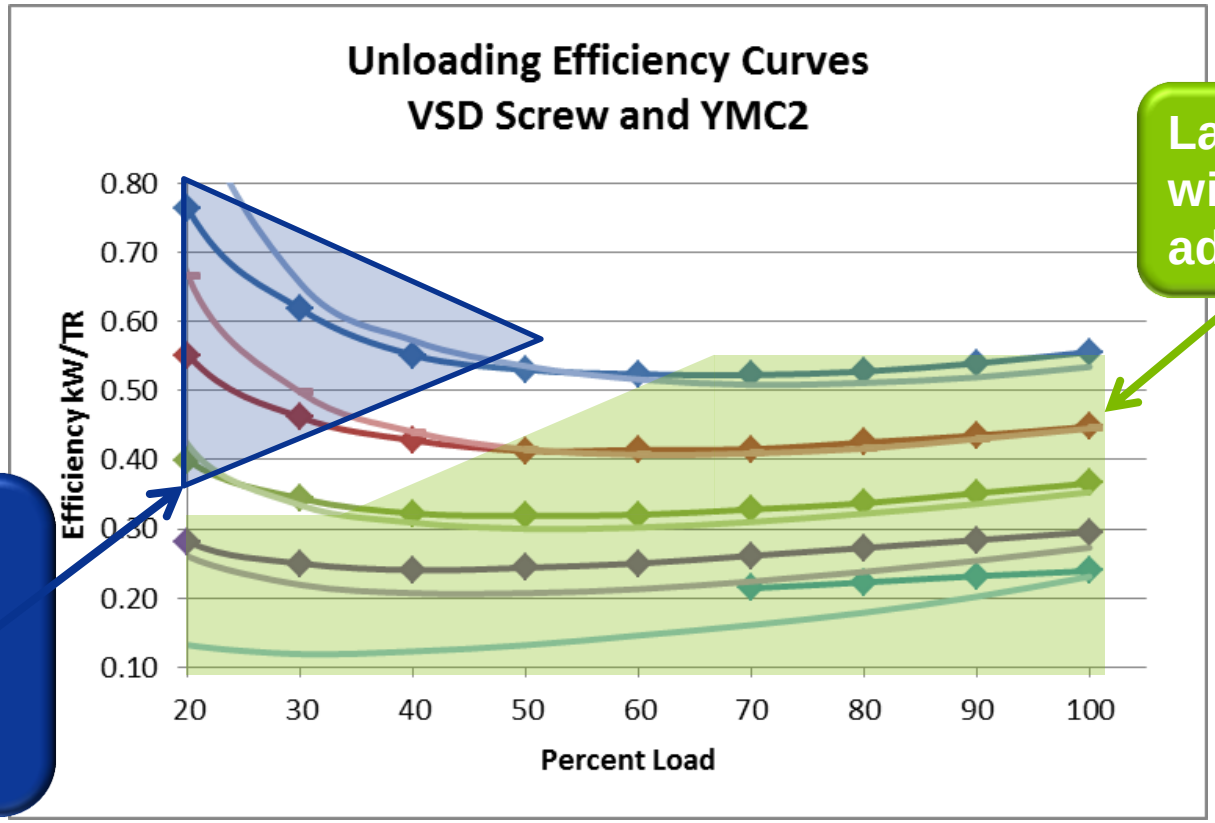


Extremely Flexible and Configurable product … Contact your local JCI sales professional to determine best solution for your project.

Low Lift Data Center Operation with Singapore Climate



Sustainable Efficiency
Most Efficient in multi-chiller installations



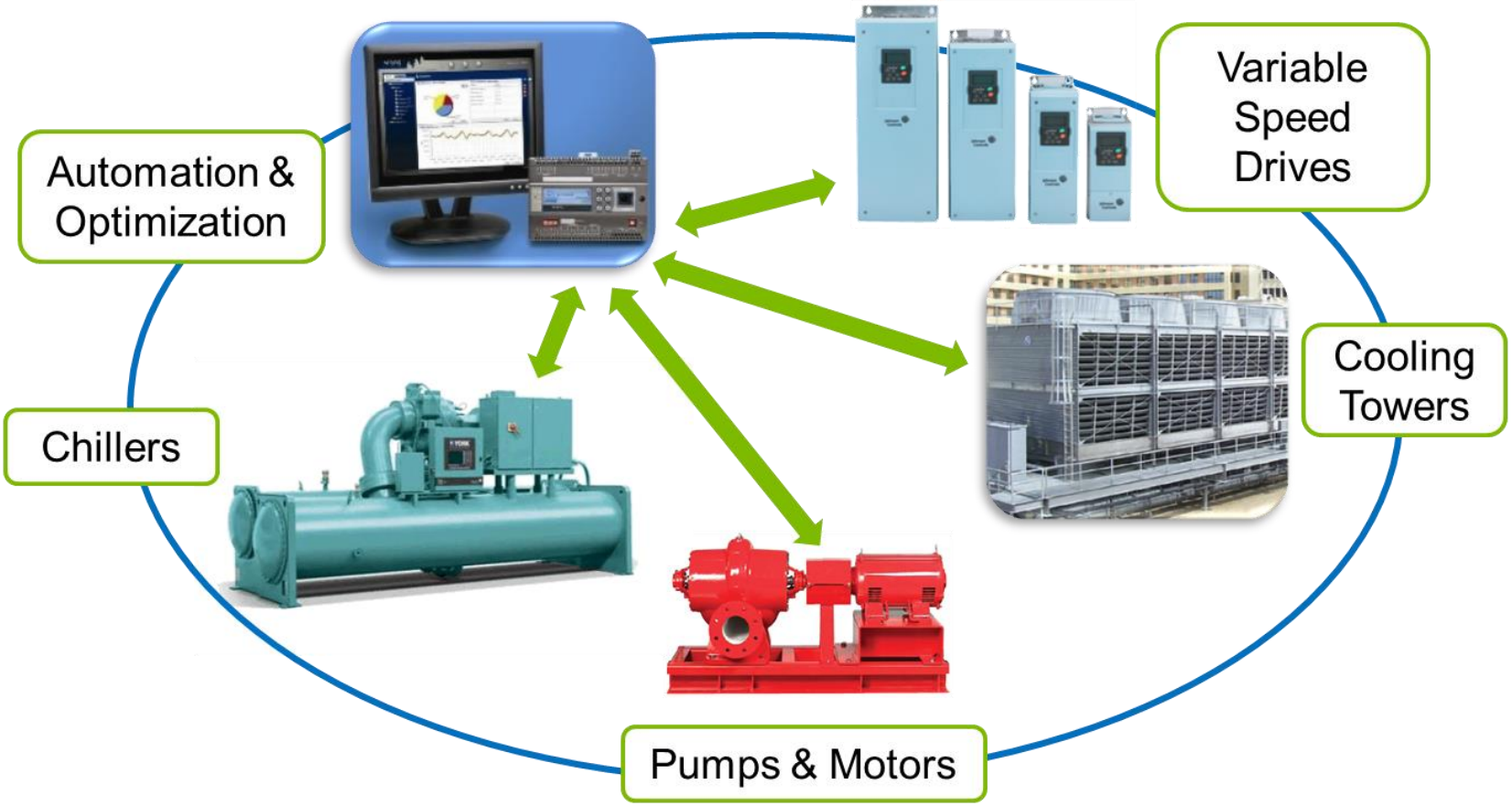
Small Window Where VSD Screw offers small efficiency advantage

Large Range with YMC_2 advantage




No Need for Sound Enclosure with YMC²
Old Chiller being replaced
High Efficiency Design Enables Retrofit options that increase capacity and efficiency!

Sustainable Efficiency
System Efficiency



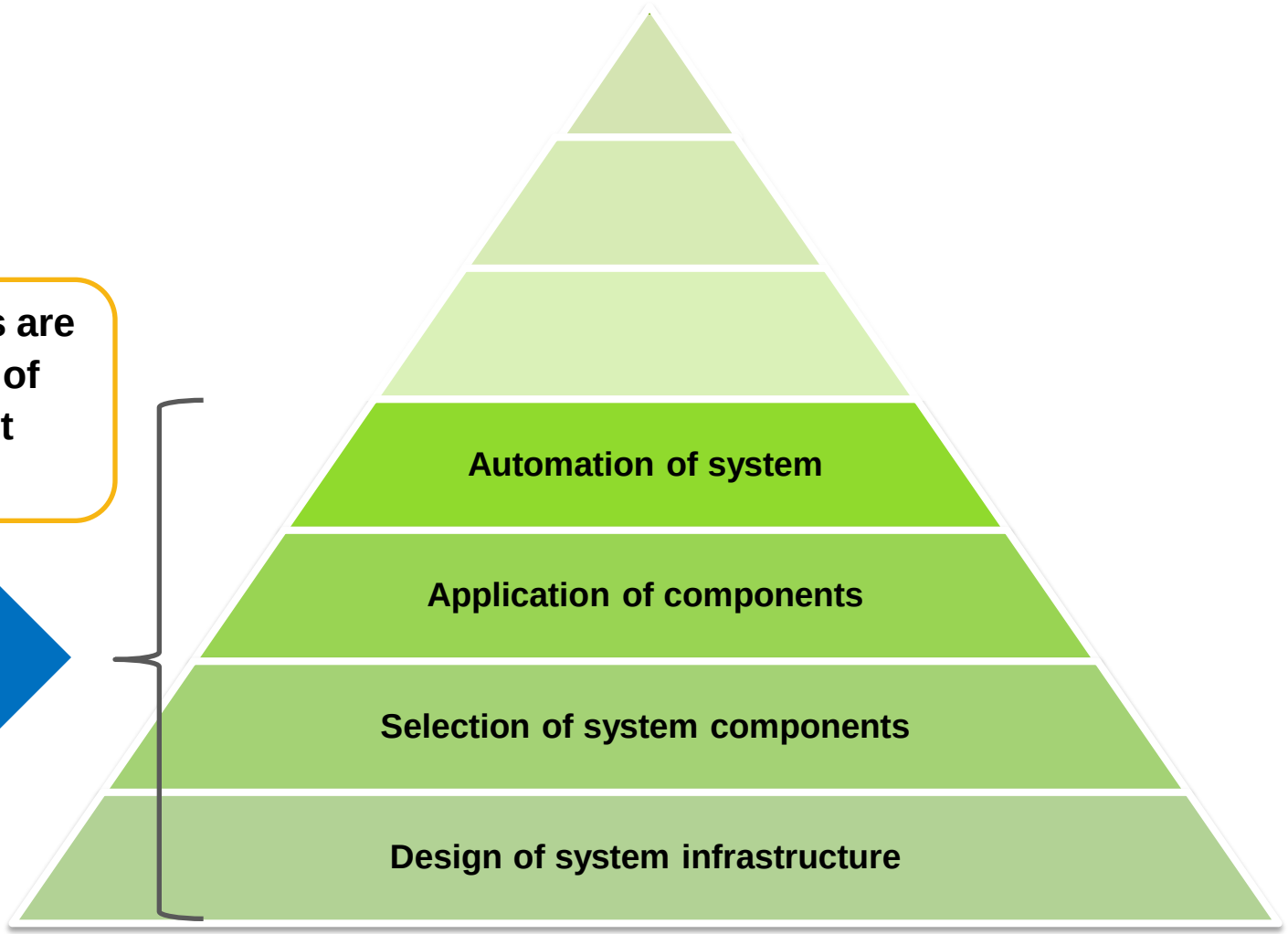
To maximize efficiency, plants should be designed and operated holistically



Sustainable Efficiency
Key to System efficiency

Design decisions are the foundation of potential plant efficiency

Design Decisions



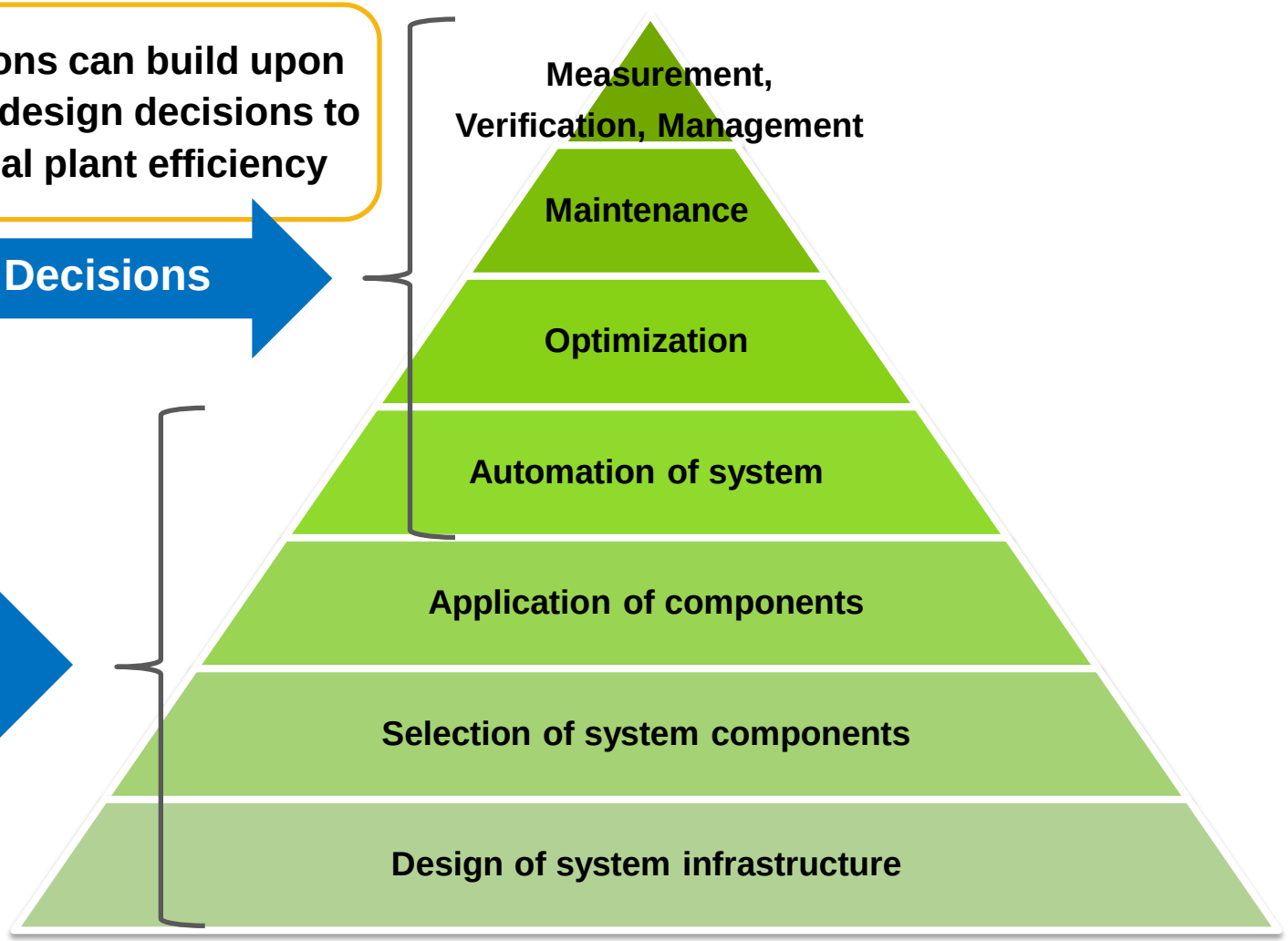


Sustainable Efficiency
Key to System efficiency

Operating decisions can build upon the foundation of design decisions to enhance potential plant efficiency

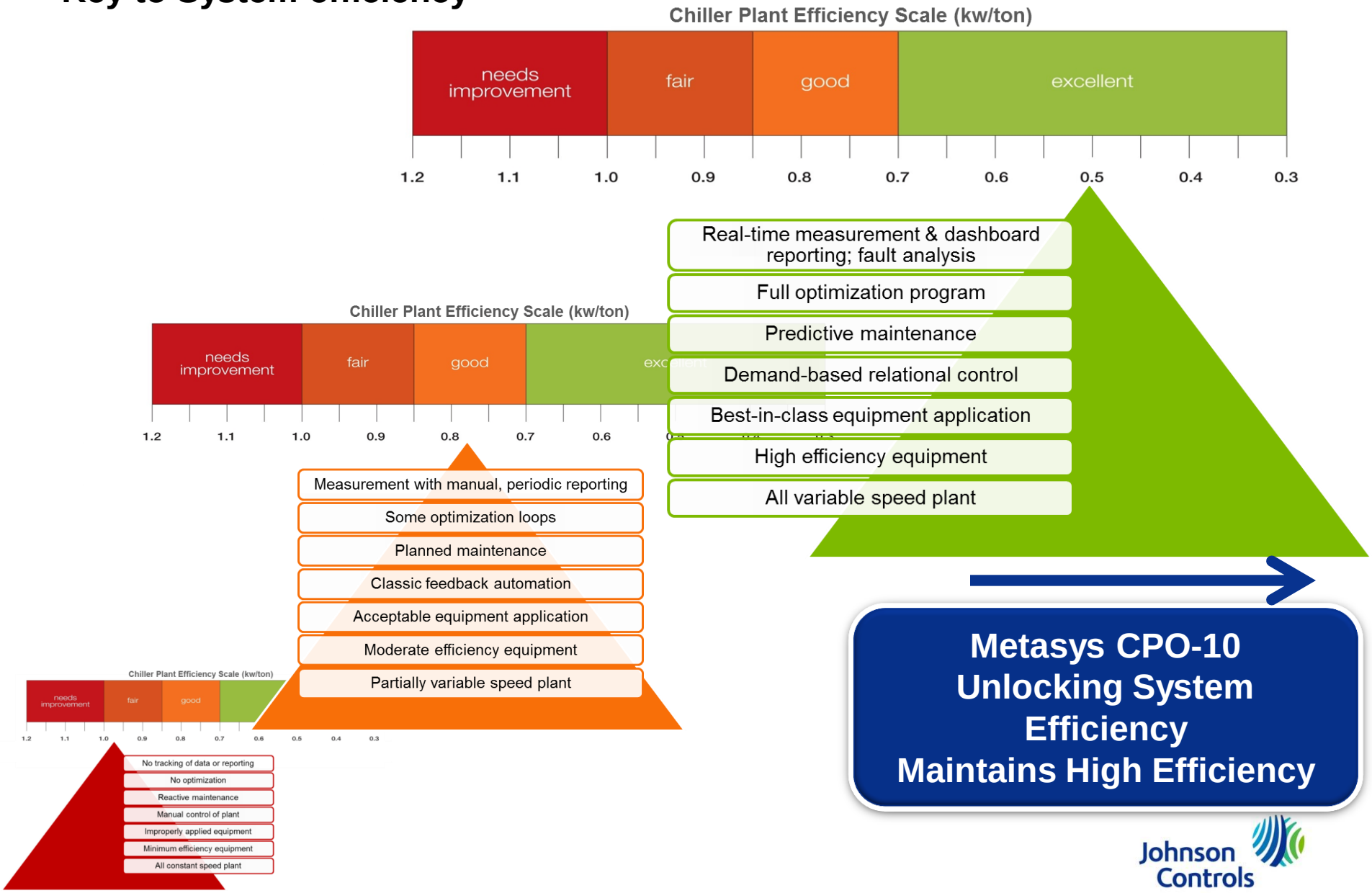
Operating Decisions

Design Decisions





Sustainable Efficiency
Key to System efficiency



Metasys CPO-10
Unlocking System Efficiency
Maintains High Efficiency

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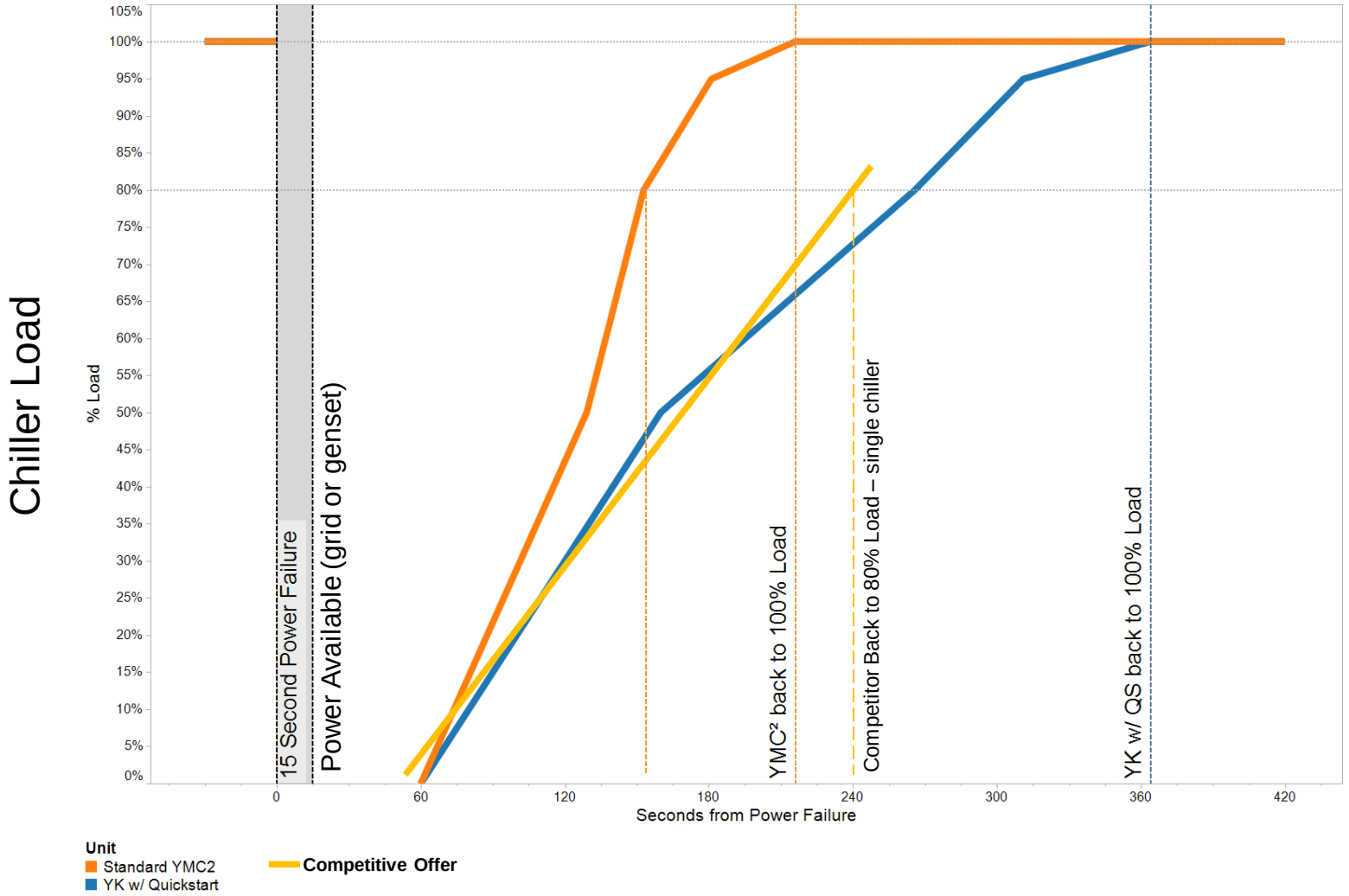
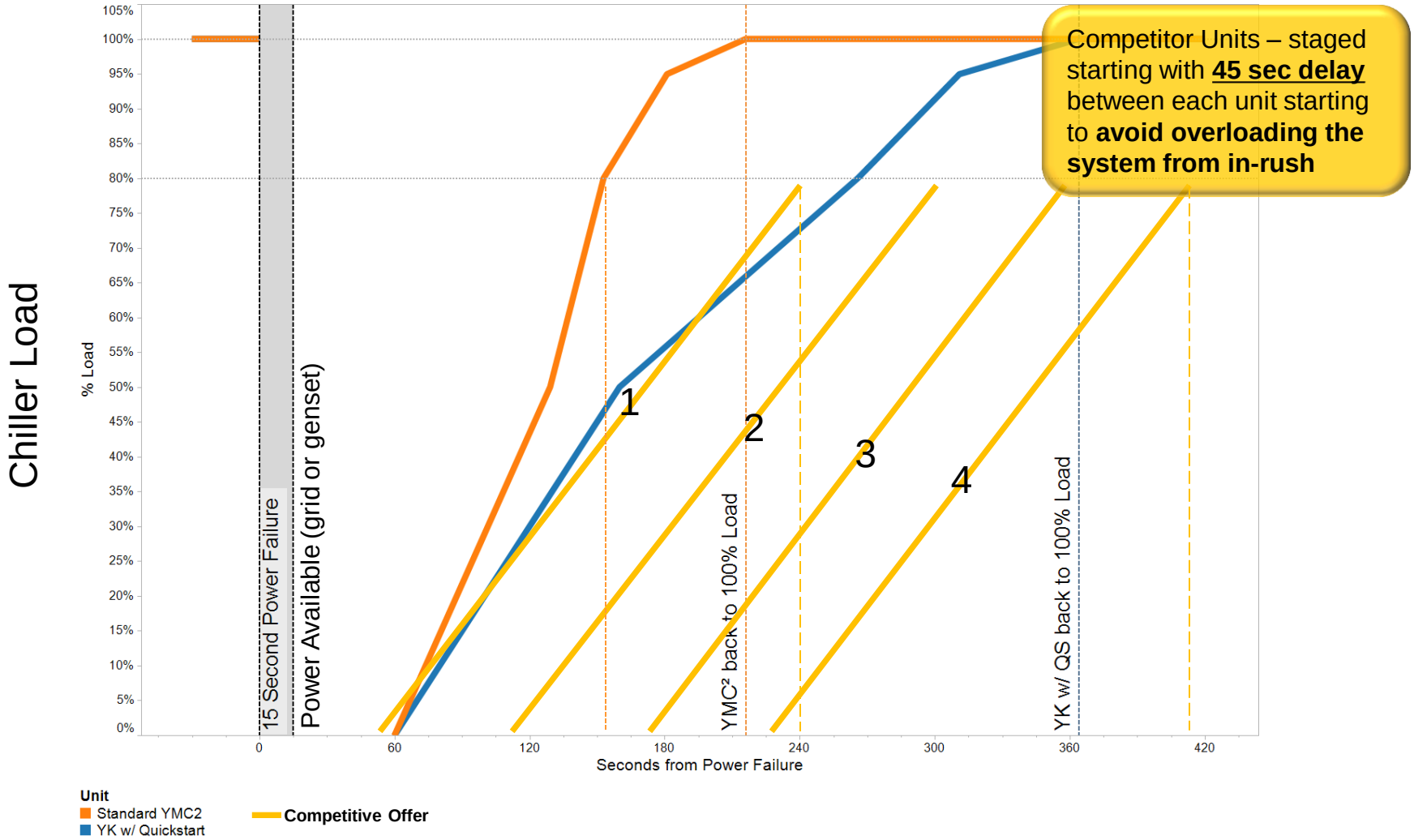
Sustainable Operation
System Response – Critical Applications



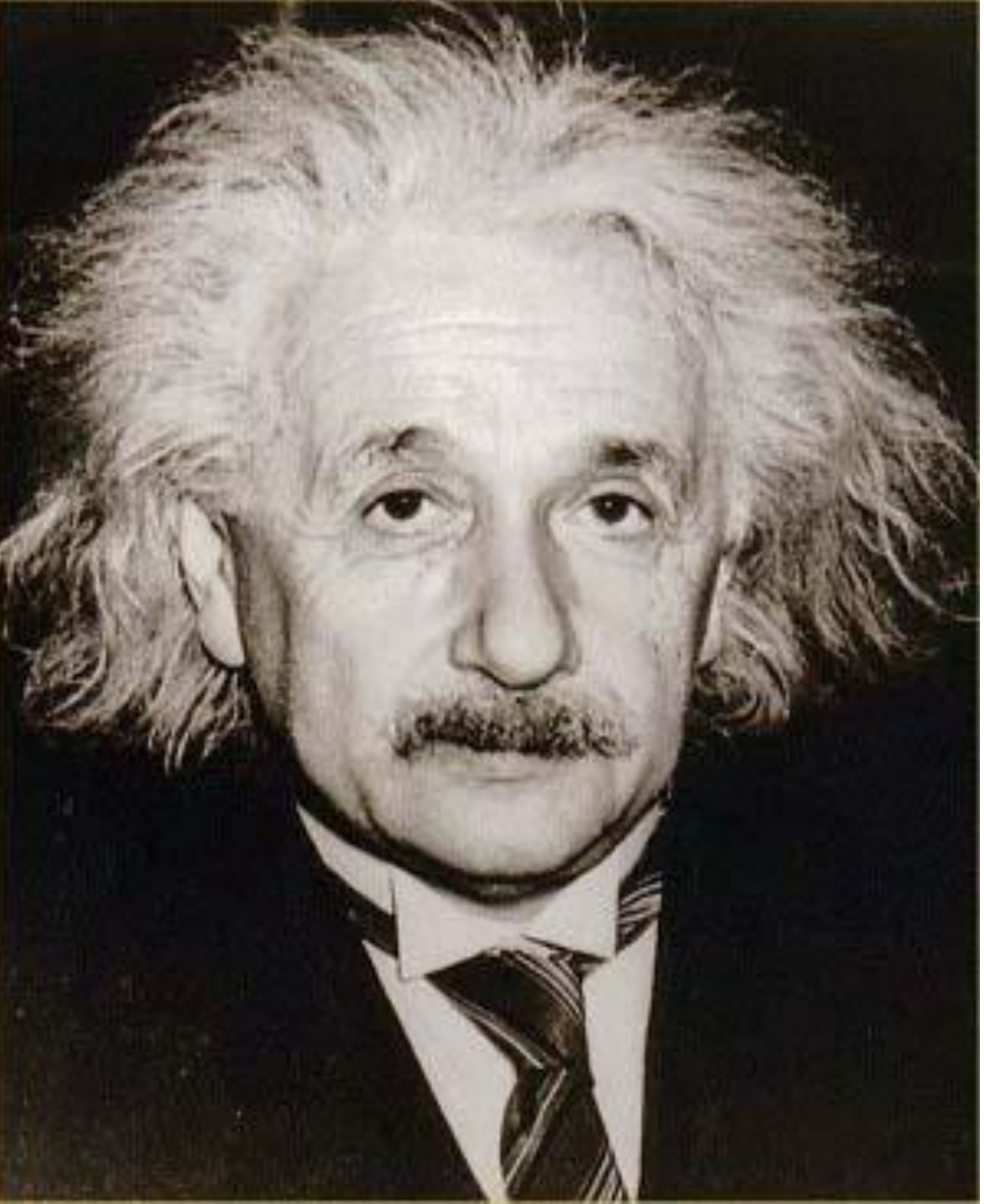


Sustainable Operation
System Response – Multiple Chillers



Competitor Units – staged starting with **45 sec delay** between each unit starting to **avoid overloading the system from in-rush**





“Everything should be made as simple as possible but not simpler.”

- Albert Einstein

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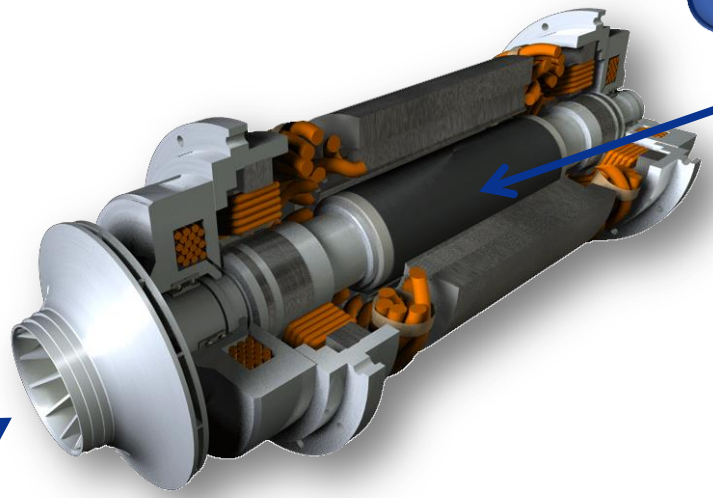
Sustainable Operation
Proven Pedigree

YORK BY JOHNSON CONTROLS

Permanent magnet motor with active magnetic bearings



Aerodynamic designs from YORK model YK product line





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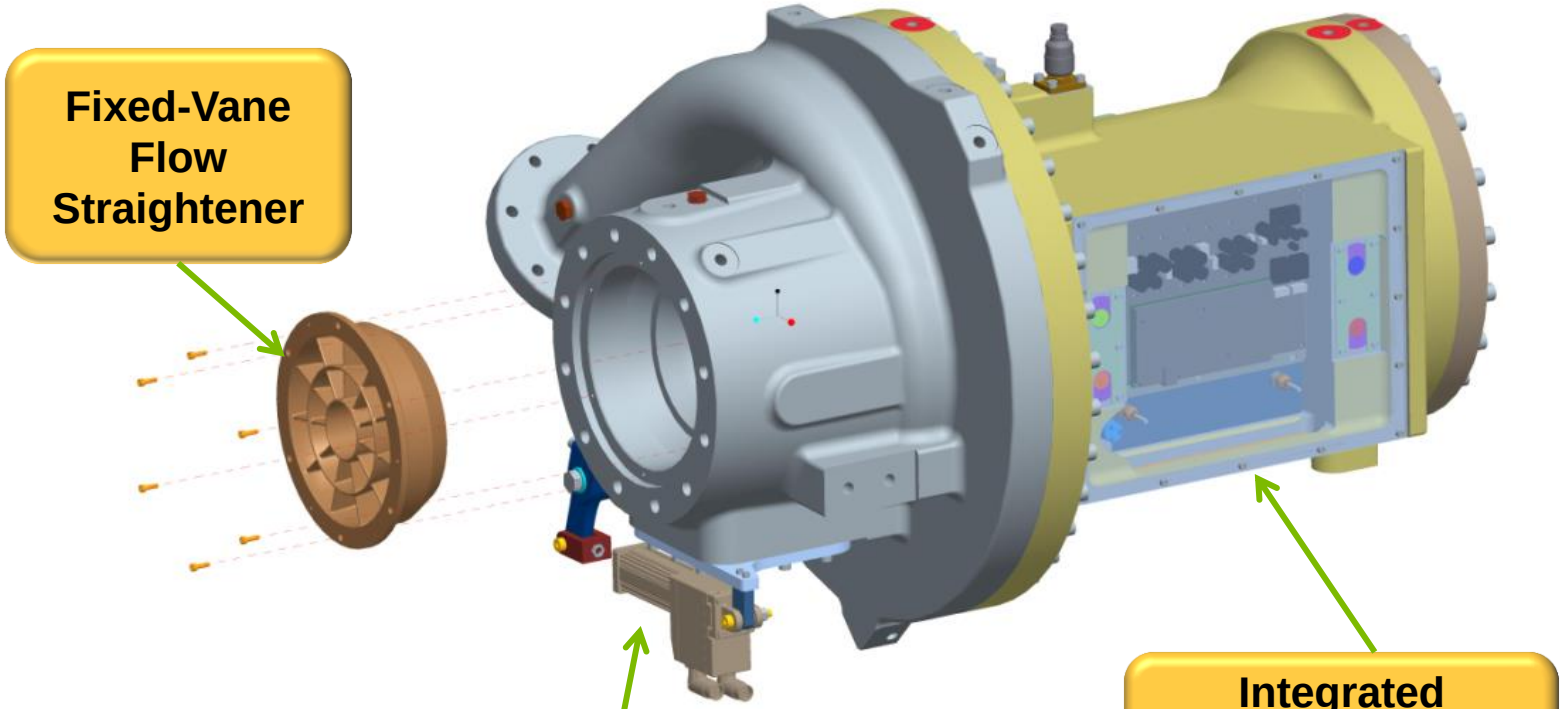
Sustainable Operation
Reliability



STSTEM STATUS
SYSTEM READY TO START
STSTEM DETAILS
DATE
18 Jun 2013
TIME
9:54 PM
CONTROL SOURCE
Local
ACCESS LEVEL
Service
Home

MAGNETIC BEARING CONTROLLER (MBC) SCREEN

Motor Speed 0 Hz
MBC Input Voltage 0 V

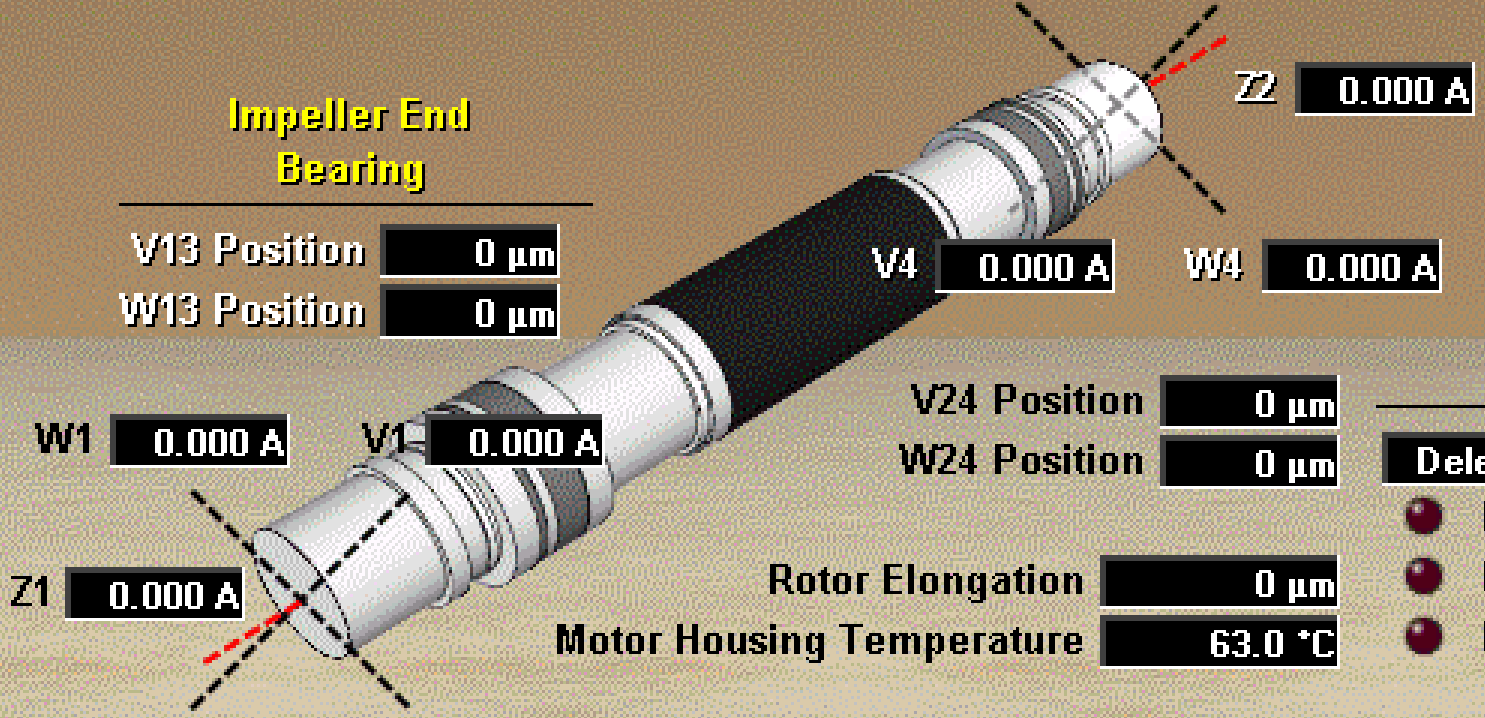
Compressor
MBC Details
MBC Event Log

Opposite Impeller End Bearing

W2 0.000 A
V2 0.000 A
Z2 0.000 A
V4 0.000 A
W4 0.000 A

Impeller End Bearing

V13 Position 0 µm
W13 Position 0 µm



W1 0.000 A
V1 0.000 A
Z1 0.000 A
V3 0.000 A
W3 0.000 A

Z12 Position 0 µm

V24 Position 0 µm
W24 Position 0 µm

Rotor Elongation 0 µm
Motor Housing Temperature 63.0 °C

MBC Control Mode Auto
Levitate

MBC Status

Delevitate Command
Levitation Mode
Rotation Mode
MBC Alarm

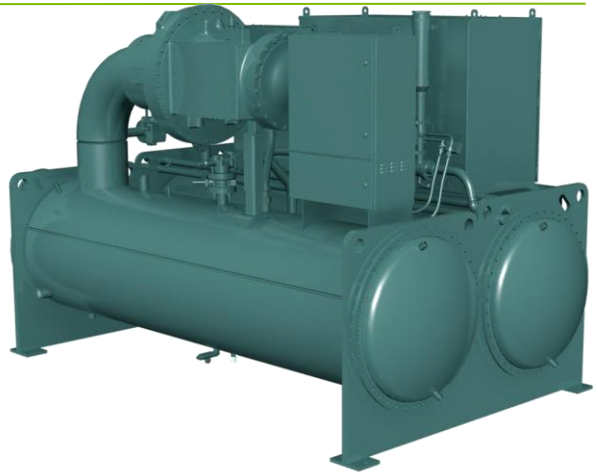
MBC Outputs

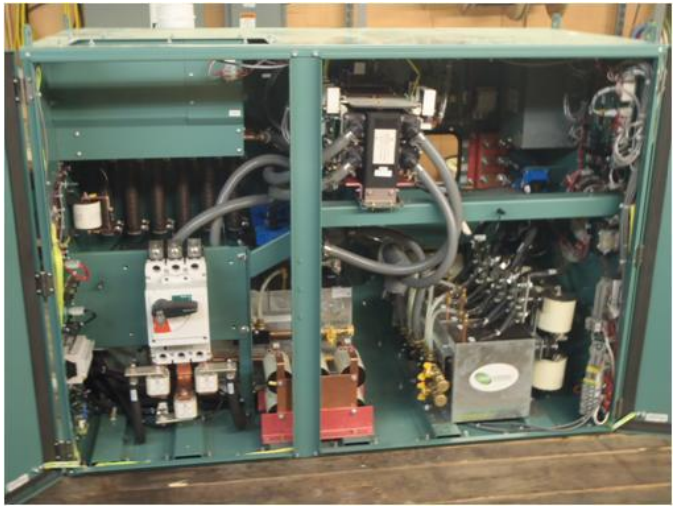
MBC Alive
Rotation Allowed
MBC Fault

Sustainable Operation
Proven Technology, Long Life

OptiSpeed 5th Generation Technology

- Unit mounted (factory pre-wired)
- Integrated with OptiView™ Control
- Low Harmonic content (standard).
  - Harmonic Distortion < 5% TDD
  - ≥ 0.97 Fundamental Power Factor
- High frequency to drive permanent magnet motor
- **<u>VSD components, including capacitors, designed for the life of the chiller</u>**









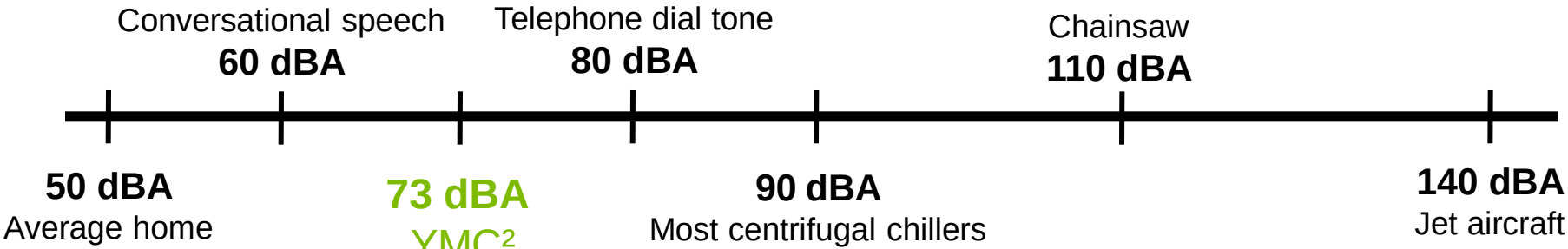
Sustainable Operation
Lowest Sound and Vibration



Lowest sound levels on the market.
Selections available for all tonnages at 73 dBA or less (AHRI 575 Rating)

Achieved through the use of:

- Permanent magnet motor with active magnetic bearings
- OptiSound™ Control





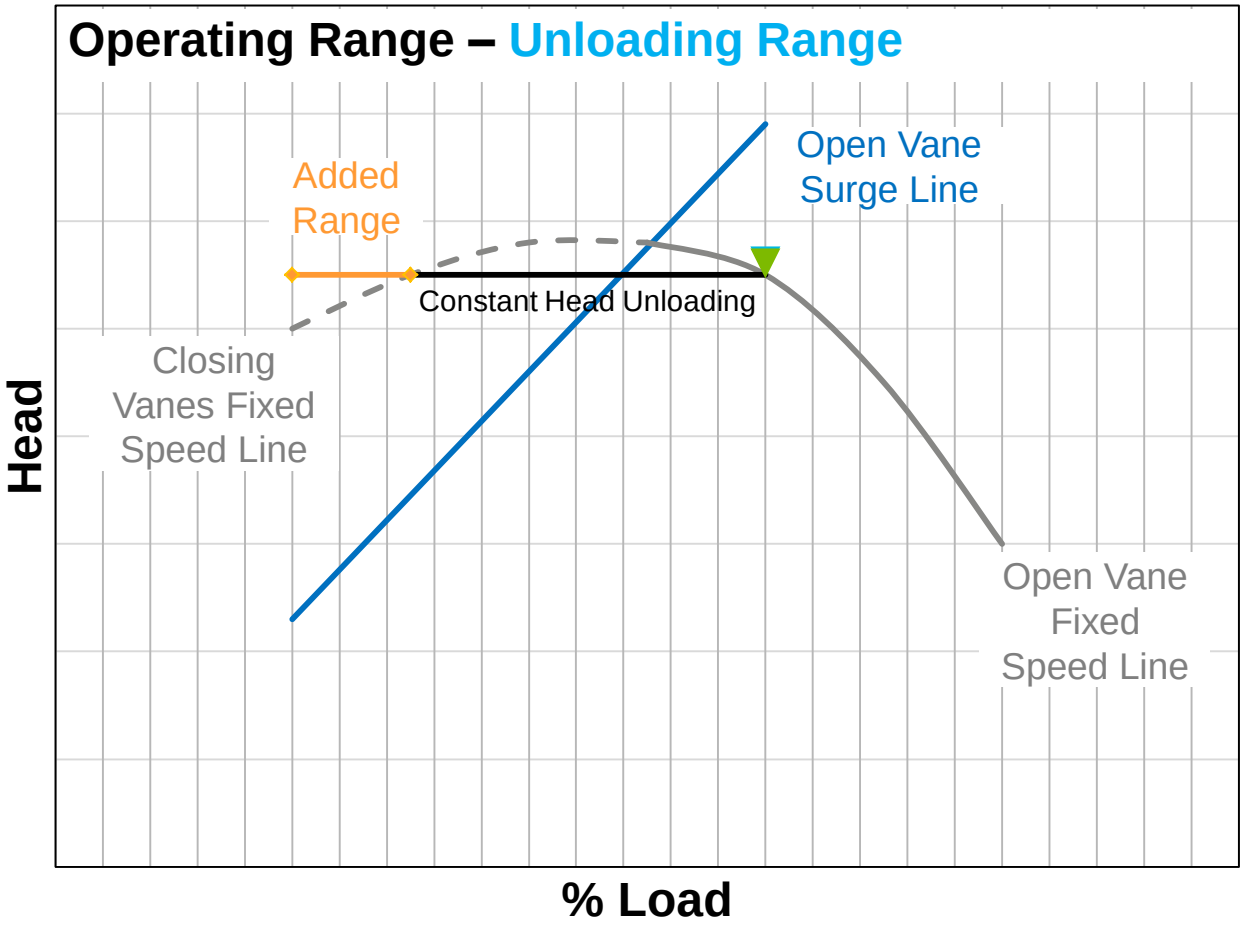

3 Chillers Installed
in a small
mechanical room
with concrete
walls/ceiling …

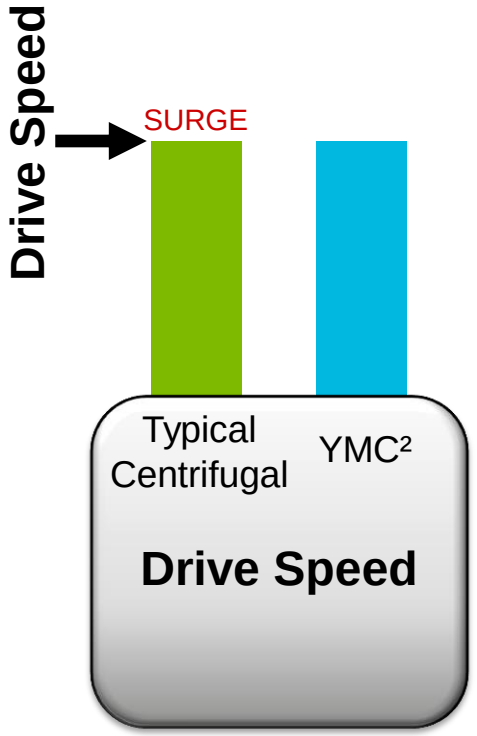

But this is what
you hear!
CHWP - 2
CHWP - 3
CHWP - 3

Significant effort needed to manage screw chiller noise …



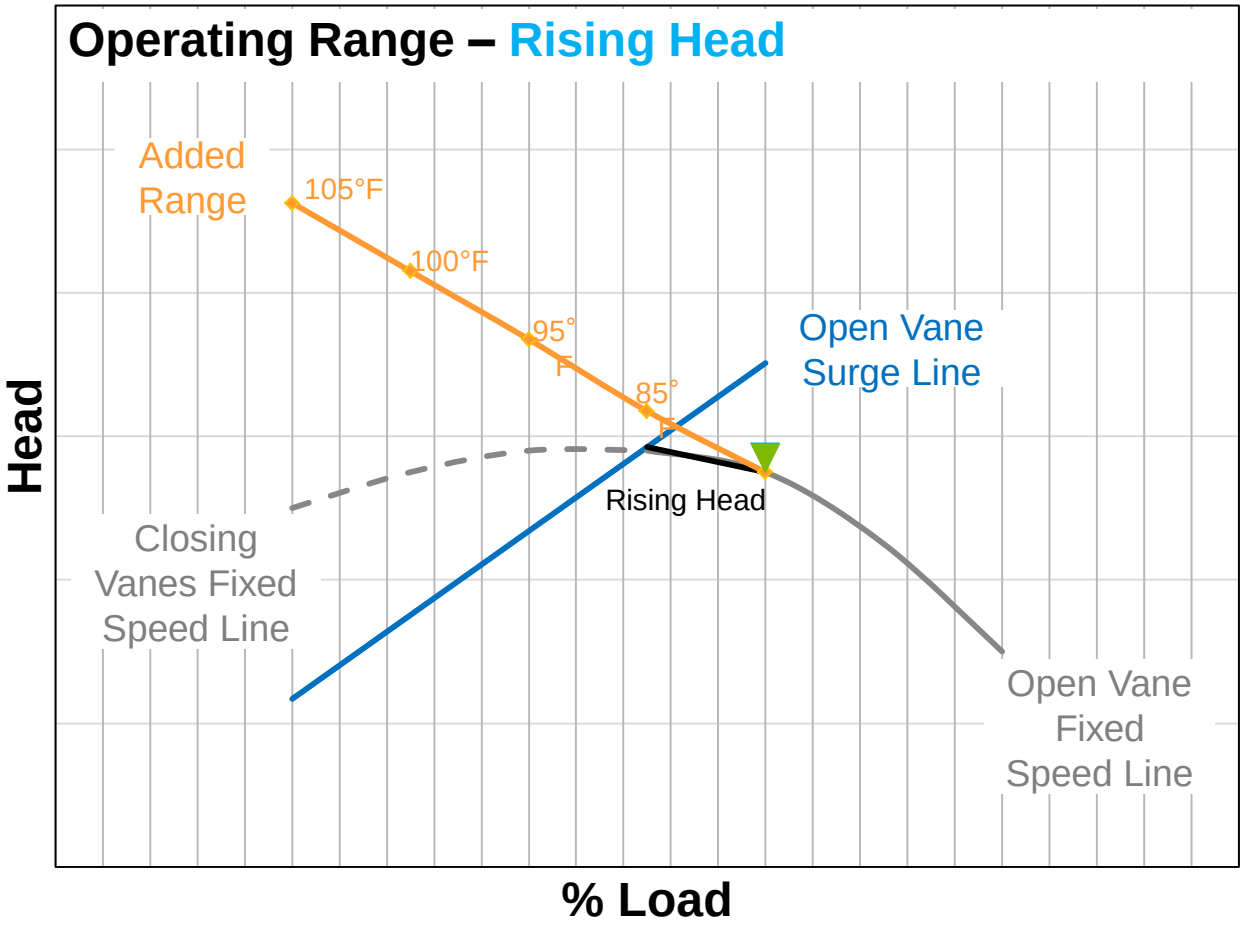
Sustainable Operation
Robust Operating Map

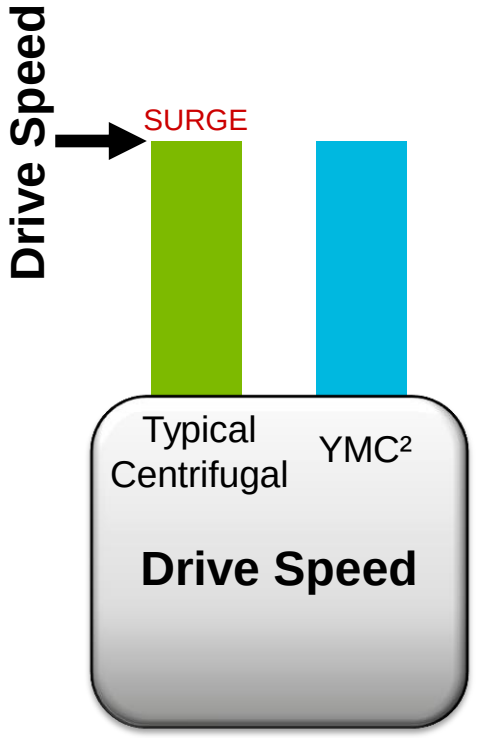






Sustainable Operation
"Surge Proof" Centrifugal Compressor







Design Choice Commitment …



"Till Death Do Us Part"

- System design – life of building
- Chiller selection – 20+ years
- Relationship risks
- Cost of Ownership
  - Maintenance?
  - Efficiency?
- Reliability
  - Flexibility?
  - Responsiveness?
  - Sound?



Johnson Controls

The Path to Sustainability …



"If we are facing in the right direction, all we have to do is keep on walking"

Buddhist Proverb

Thank you!



Johnson Controls