Your Trusted Partner for

Integrated Air Conditioning Solutions







Johnson Controls

Building Efficiency Helping People Achieve Great Things

Building efficiency doesn't just happen. It takes commitment and expertise... and a partner with skills, solutions and a proven track record of success. Backed by the world's best technologies and experiences, we have helped more than 100,000 buildings achieve building efficiency around the world.

At Johnson Controls, we create buildings and environments that help people achieve – and that give buildings, businesses and people every opportunity to reach their full potential.



Table of Contents

Helping you Achieve with our Integrated Building Solutions 3

What has the Highest Impact to Building Performance? 4

Efficiency Now: Maximize your Building's Air Conditioning System Performance 5

Our Holistic Approach to Air Conditioning Solutions 6

Professional Service Contract
Chiller Plant Equipment & Water Circuits 7

Air-side Equipment & Air Distribution
Intelligent HVAC Controls & Optimization 8

Indoor Air & Environment Quality Management
Chiller Plant & Building Security 9

Energy Audit & Management
Green Building Services 10

Special Highlights 11

Chiller Plant Enhancement Retrofit
Chiller Plant Optimization & Monitoring 12

Energy Dashboard & Reports Tool (EDART)
Service Support – Maintenance, Repair, Overhaul & Parts 13

Air-side Repair & Enhancement Retrofit
Retro-Commissioning 14

Helping you Achieve with our Integrated Building Solutions

Improving building efficiency is the first and most important step towards achieving sustainability in buildings. It helps control rising energy costs, reduce environmental footprints, and increases the value and competitiveness of buildings.

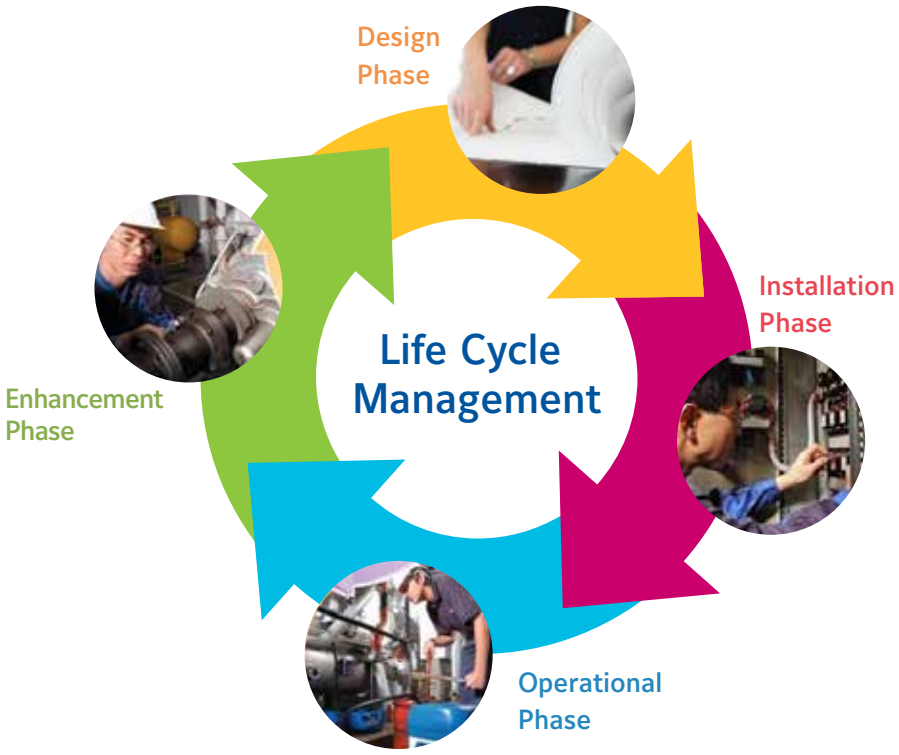
As a true one-stop integrated building solutions provider, we help building and facilities owners enhance Building Efficiency over their buildings' life cycle. We create environments that are efficient, safe and sustainable for our customers. At Johnson Controls, we believe that when the building performs, the people in it perform too.

There's plenty to think about when it comes to the complex infrastructure of today's buildings:

HVAC System Chillers & Plant Equipment	HVAC System Airside & Controls Equipment	Intelligent Building Management System (iBMS)
Energy Management System	Fire Detection & Protection System	Security Management System
Lighting System	Lift & Escalator Systems	Public Announcement System
Hot Water System	General M&E Systems	Converged ICT Systems

The building systems must work in complete synchronization to ensure a comfortable, safe, productive, efficient and sustainable environment.

That's why we adopt the Life Cycle Management approach, ensuring the building systems that we maintain are kept in optimal condition. By leveraging our skilled service professionals who have in-depth knowledge of the respective building systems, governed by proven processes, and supported by our eco-partners, we're well positioned to meet your business needs.



What has the Highest Impact to Building Performance?

The Air Conditioning System has the highest impact on a commercial building, which includes:

- **Bottom-line & sustainability of business**
- **Highest energy consumption**
- **Largest associated CO_2 emission**
- **Indoor air quality**
- **Occupant comfort & productivity**
- **Retention of staff & tenants**
- **Legislative compliance**

Do you know that a typical commercial building's air conditioning system consumes between 50 – 70 percent of total electricity costs?



Efficiency Now: Maximize your Building's Air Conditioning System Performance

50 – 70 percent of your electricity costs are consumed in the building's air conditioning system, in which Chiller Plant equipment contributes to approximately 40 – 50 percent of total electricity used. This represents the biggest opportunity for increasing savings and improving the control of indoor air quality.

We help you maximize your building's Air Conditioning System performance with our comprehensive integrated solutions:

- Professional Service Contract
- Operations & Maintenance
- Service Repairs & Overhauls
- System Health Check
- Chiller Plant Optimization
- Air Side & Controls Optimization
- Retro-Commissioning
- Enhancement Retrofit
- Energy Audit & Management
- Green Building Consultancy

In addition, we're a certified Energy Services Company (ESCO). We help you meet the latest government legislation on Green Building codes and standards by extending our expertise as a Green Building Consultant.



As the Original Equipment Manufacturer (OEM) and designer, we've the best knowledge and expertise to deliver air conditioning equipment, systems, controls, services and energy solutions. Our experience and insights into the evolution of buildings allow us to proactively anticipate your needs and customize appropriate solutions.

Our Holistic Approach to Air Conditioning Solutions

Professional Service Contract

Our Professional Service Contract (PSC) makes it easy to keep your air conditioning system in tip-top condition. We tailor the various levels of coverage to meet your operating requirement budget and performance goals.

Chiller Plant Equipment & Water Circuits

The centralized chiller plant is the 'heart' of your air conditioning system and accounts for a significant share of the total energy use. Together with its chilled and condenser water circuitries, this is the pathway where improvements in operational risk, cost-savings and energy efficiency can be best achieved.



Air-side Equipment & Air Distribution

Place special focus on your air side equipment and air distribution, as it has significant impact on indoor quality and energy efficiency. Our solutions enhance air quality, temperature, humidity, air speed and noise, etc., all of which help boost the productivity of occupants. And boost your business.

Intelligent HVAC Controls & Optimization

Our intelligent air conditioning controls guarantee complete synchronization between each component of your air conditioning system and the rest of the system. The end result? Reliable, efficient and safe operation during full and partial load conditions throughout the system's life cycle.

Indoor Air & Environmental Quality

Poor indoor air and environmental quality (IAEQ) means low productivity and retention of building occupants. Pin-point the root cause related to poor air quality before they become a significant cost and risk.

Chiller Plant & Building Security

Keep the 'heart' of your air conditioning system and building secure. We have what it takes to design a system based on your needs and seamlessly integrate it with your other facility systems for greater efficiency.

Energy Audit & Management

Energy efficiency in buildings is influenced by the climate, building envelop, building systems and human behavior. Perform an energy audit to discover 'gold nuggets' in energy saving opportunities in your air conditioning system and building.

Green Building Services

Greener buildings make sound economic sense. We go beyond just air conditioning systems - we help you recognize and understand the multi-dimensional issues surrounding Green building performance, and how various active and passive environmental technologies and strategies can be applied to maximize a building's efficiency.

Professional Service Contract

No two buildings are the same. That's why we tailor Professional Service Contracts designed to protect your investments during the life cycle of your air conditioning system. With our result oriented approach, we ensure the appropriate measures are in line with OEM recommendations.



- 9/5 (Office Hour), 24/5 or 24/7 Response
- Prioritized Services
- Basic Maintenance Scope
- Semi-comprehensive Maintenance Scope
- Comprehensive Maintenance Scope
- Equipment Health Check & Audit
- Skilled Repair Labor
- Replacement Parts
- Service Value Reporting
- Optional Value-Added Services:
  1. Oil Analysis
  2. Vibration Analysis
  3. Infrared Thermographic Analysis
  4. Refrigerant Analysis
  5. Eddy Current Tube Test
  6. Laser Alignment Test
  7. Ultrasonic Water Flow Test
  8. Power Quality Analysis
  9. Airflow Analysis
  10. Tube-thickness Analysis
  11. Water condition Analysis
  12. Metallographic Analysis
- Trouble-Shooting Services
- Annual Shut-Down Service
- Equipment Operation Services
- Computerized Maintenance Management System, etc.

Chiller Plant Equipment & Water Circuits

When you calculate the way your centralized chiller plant affects your total energy use, you will realize it has significant potential in improvements. Our solutions improve operational risk, cost savings and energy efficiency.





- Oil, Refrigerant, Vibration & Infrared Thermographic Analysis
- Electric Motors: Repair/Retrofit, Inspection, Bearing, Alignment, Insulation Analysis
- Chiller Shell & Cube: Cleaning, Leak testing, Eddy Current Analysis, Repair or Replacement
- Water Treatment
- Compressor Block Overhaul or Replacement
- Chiller Annual Shut Down (ASD)
- Controls Panel – Repair/Upgrade
- Chiller Capacity Validation
- Pumping System Enhancement
- Pump Flow Rate Validation
- Trimming of Pump Impeller
- Motor Starter – Repair/Upgrade
- Automatic Tube Cleaning System
- Chiller End-sheet Coating
- Centrifugal Impeller Balancing
- Chiller Drive Line Retrofit
- Optimization Service (Health Check, Calibration & Diagnostic)
- Cooling Tower: Repair/Replacement, Casing, Water Nozzle, Fan, Pulley
- Cooling Tower: In-fill Replacement
- Cooling Tower Capacity Validation
- Ultrasound of piping thickness, etc.

Air-side Equipment & Air Distribution

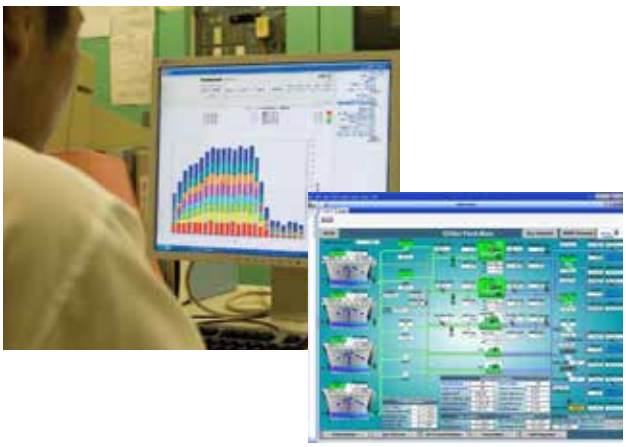
The air-side equipment and air distribution can pose significant impact to your indoor air quality, energy efficiency and building performance. With proper measures from Johnson Controls, we help enhance the quality of your indoor environment that covers air quality, temperature, humidity, air speed, scent and noise, all of which improve occupants' comfort and productivity.



- Filter Cleaning & Replacement
- Coil Replacement/Cleaning (Chemical/Steam)
- Airside Equipment Repair/Upgrade
- Bearing, Blower, Shaft, Pulley & General Parts Replacement Protection
- Resizing & Relocation
- Capacity Validation
- Humidification & Dehumidification
- Latent vs Sensible Heat Removal
- Electronic Filter Installation
- Duct Retrofit (including Modification)
- Duct Cleaning (Manual & Robotic)
- VAV Box: Calibration, Repair/Replacement, Airflow Balancing
- Fire, Damper Replacement & Addition
- Demand Ventilation Validation/Design, etc.

Intelligent HVAC Controls & Optimization

Complete synchronization is key to reliable, efficient and safe operations throughout the system's life cycle. Our state-of-the-art intelligent air conditioning controls delivers that.



- Chiller Plant Optimization (CPO) Controls
- PMI Software Upgrade
- Graphic Modification
- Network Communication Units (NCU): Repair & Replacement
- Direct Digital Controllers (DDC): Repair & Replacement
- ArcNet to Ethernet Retrofit (Backbone Upgrade)
- Controls: Calibration of Valve Actuators, Sensors & Controllers
- Controls: Addition & Modification of Monitoring Points
- Web-based Remote Monitoring & Diagnostic (RMD)
- SMS Alarm Notification
- Remote Monitoring & Diagnostic (RMD) including Monthly Reporting
- Using BAS to Implement Energy Management Strategies
- Improve Indoor Air Quality through BAS
- Energy Dashboard & Reporting, etc.

Indoor Air & Environment Quality Management

Through a systematic approach such as detailed IAEQ analysis and microbe speciation test, our comprehensive solutions help identify the root causes related to poor air quality and help provide remediation solutions.



- Indoor Air Quality Inspection as per NEA Guidelines & SS554:2009.
- Microbe Speciation Test
- Establish Building IAEQ Profile
- IAEQ Root Cause analysis (including Legionella Disease)
- Contamination Source Tracing
- IAEQ Solution Recommendation & Implementation
- Building Air Purging
- Anti-microbial Treatment
- Electronic Air Filter Installation
- Nano TiO2 (Titanium Dioxide) Air Treatment
- Internal Duct Inspection/Cleaning
- Fragrance Enhancement
- Exhaust Gas Analysis
- CO2 Sensors & Control for AHU
- RH Sensors Calibration
- Duct Cleaning (Manual & Robotic)
- Humidity Control in Room
- UV-light Treatment in AHU/duct, etc.

Chiller Plant & Building Security

The air conditioning system is a critical facility and has significant impact on electricity cost and human comfort. Monitor your building and the 'heart' of the air conditioning system closely with our comprehensive security solutions that protect your investments, giving you a peace of mind.



- Closed Circuit Television CCTV
- Digital Video Management
- Card Access
- Visual Object Tracking
- Biometric
- Visitor Management
- Emergency Phones
- Emergency Evacuation Siren & Lighting
- Door Alarm
- Asset Management, etc.

Energy Audit & Management

Opportunities in energy savings are always lurking in the air conditioning environment. With our years of expertise as an ESCO and our easy-to-understand energy management process and solutions, we will help you achieve 10 to 30 percent, or more of energy savings.



- Energy Metering & Billing
- Air-cooled to Water-cooled Chiller Conversion
- Chiller VSD Retrofit
- Cooling Tower: VSD Retrofit
- Chiller Plant Redesign & Optimized against Building Load Profile
- Chilled Water Temperature Reset
- CPO Advanced Controls
- Load Shifting
- Power Factor Correction
- Conversion of Pumping System
- Carbon Credit Services
- Waste Heat Recovery/Heat Pump
- AHU Condensate Water Management
- Water-cooled Package Unit Optimization
- Airside Optimization (AHU/VSD/VAV)
- Pumps VSD Retrofit, etc.

Green Building Services



Understand the power of 'going green' – it helps you to achieve the Triple Bottom Line of economic prosperity, social responsibility and environmental stewardship. Demonstrate market leadership by getting your building certified according to various international rating systems, including Green Mark, LEED and BREEAM, etc., by earning credits in categories such as energy efficiency, water use, materials, indoor environmental quality, sustainable operations & management, and other green features.

Our strategic approach is more than just earning credits. The true power of 'green' comes in what that building makes possible for its occupants. Green and healthier environments create comfortable and healthy occupants – free to focus on achieving important goals.

We know and can help you achieve these benefits:

- Lower Energy, Operating Costs
- Comfortable/Healthy Environment
- Higher Productivity of Occupants
- Improve Staff Recruitment
- Better Image & Reputation
- Higher Occupancy Rate
- Higher Lease or Rental Rate
- Lower Tenant Turnover
- Lower CO2 Emission
- Lower Waste Discharge
- Higher Asset Value
- Legislative Compliance
- Future Proofing of Assets, etc.

Special Highlights







In exceeding our increasing customers' expectations, we go beyond to meet their demands:

- Chiller Plant Enhancement Retrofit
- Chiller Plant Optimization & Monitoring
- Energy Dashboard & Reports Tool
- Service Support
- Air-side Repair & Enhancement Retrofit
- Retro-Commissioning

Read on to find how we can help you achieve, even more.

Chiller Plant Enhancement Retrofit



Our research has shown that the chiller plant is often over-sized and operating inefficiently due to the partial load phenomenon, poor system design and mismatching of equipment to the cooling load demands. Do you know that the current possible chiller plant's system efficiency can be achieved at an average of between 0.6kW/Ton and 0.65kW/Ton*?

Right size your equipment to the building's cooling load requirement. Our capabilities range from chiller plant energy audit, system design, improvement solutions, equipment & controls supply, installation, testing & commissioning, measurement & verification, remote monitoring, maintenance contract and service support over the system's entire life cycle.

We can help you achieve an improvement in system efficiency ranging from 20 to 40 percent, with our in-depth knowledge on retrofit design, process, and applying innovative technology in chiller plant controls.

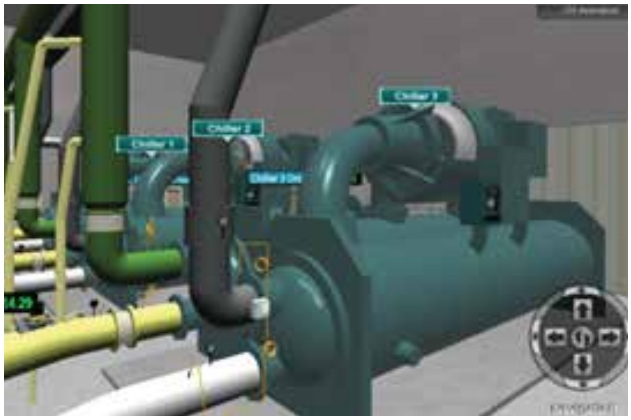
For further peace of mind, we also provide Guaranteed Energy Saving Performance (GESP) contracting.

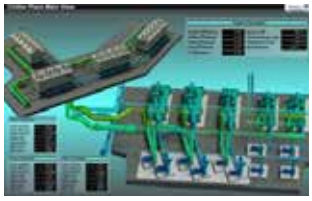
**depending on its size & complexity*

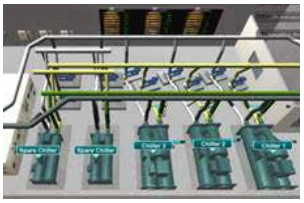
Chiller Plant Optimization & Monitoring

Installing even the most energy efficient equipment alone is not enough. To become truly energy efficient, a facility's central plant equipment and its auxiliary systems must be designed, installed and operated as a single, integrated system.

Our Chiller Plant Optimization (CPO) solution orchestrates all the chiller plant equipment to deliver optimal performance and efficiency. Our chiller plant experts will meet you personally to assess your needs and develop a solution based on your efficiency goals.







Our 3 Dimensional (3D) visualization of the chiller plant makes system monitoring easy. It provides integrated visibility of all Key Performance Indicators (KPI) and the operating status of the chiller plant and equipment, including visual display via CCTV.

Energy Dashboard & Reports Tool (EDART)





To manage, you need to measure - EDART simplifies and brings transparency of your building and building systems' energy management and usage to your building managers.

EDART is a complete energy management solution – it monitors utility and equipment energy performance data, enables parametric analysis through data trending and visualization, summarizes key information into dashboards, and provides customized data reporting capabilities.

EDART allows you to:

- Keep decision makers up-to-date, by sharing reports with different stakeholders and helping them make more informed decisions.
- View critical data at a glance.
- Analyze data through powerful data trending and visualization.
- Make smarter decisions - perform automated analysis and calculations to evaluate equipment efficiency.
- Interface with multiple data sources, ensure data integrity - supports all Johnson Controls Metasys® software platforms and third-party control and monitoring system databases.
- Share information with tenants – generate automate tenant billing operation, assign portal access to tenants to track their energy spend and consumption, view benchmark data, and track the after-hours consumption.
- Meet local legislative requirements – in building, system and equipment energy efficiency and usage reporting.

Service Support – Maintenance, Repair, Overhaul & Parts



We've invested resources in our Front-Line Service Professionals (FLSPs), so that you can benefit directly from the OEM.

Guided by the promises of our 8 Simple Rules to deliver the 'Ultimate Service Experience', our FLSPs are available to assist you in any capacity - maintenance, service repair, retrofitting and overhaul of chillers and equipment for an air conditioning system over its entire life cycle.

Our strong expertise in chiller repair and overhaul provides facility owners with a complete end-to-end solution.

Rest assured that we use only genuine parts with factory-backed warranty and engineered specifically for your equipment to ensure durability and performance reliability.



Air-side Repair & Enhancement Retrofit



Significant amounts of energy are consumed at your air-side equipment - Air Handling Units (AHU), Fan Coil Units (FCU), Mechanical Ventilation Fans, Cooling Towers, etc. Having them properly serviced is essential so that it does not impact effective air cooling and distribution, energy efficiency and indoor air quality. You can avoid 'Sick Building Syndrome' through proper operations and maintenance programs.

Our capabilities extend beyond the Chiller Plant and into Air-side Equipment. We have different strategies at our fingertips to enhance the overall performance efficiency of your integrated air conditioning system. For example, through the use of enhanced controls of our Building Management System, we can reset the chilled water leaving temperature at the appropriate time of the day to optimize energy savings.

To enhance human comfort in the built environment, we provide filter repairs or enhancement, coil cleaning and replacement, fan bearing or motor replacement, and complete AHU or FCU retrofit, 3-way to 2-way valve conversion, etc.

Retro-Commissioning



Most building systems experience performance degradation over time, no matter how well they are being maintained. These systems may also undergo operational and occupancy changes, inevitably challenging the mechanical, electrical and control systems.

If left unmonitored, these systems may operate inefficiently over time, leading to energy wastage and reliability issues.

Hence, we recommend retro-commissioning. It is a systematic process for examining how and why existing building systems are operated and maintained and identifying ways to improve the overall performance. We are committed to improve on the equipment and system function of air conditioning systems in an integrated manner at peak efficiency. Retro-commissioning can often resolve problems that occurred during the design or construction stage, or address problems that have developed over the life cycle of the system*. It also helps to address operations and maintenance (O&M) procedures, thus enhancing the overall system and building performance.

**depending on the age of the system*

Johnson Controls is a global diversified technology and industrial leader serving customers in more than 150 countries. Our 168,000 employees create quality products, services and solutions to optimize energy and operational efficiencies of buildings; lead-acid automotive batteries and advanced batteries for hybrid and electric vehicles; and interior systems for automobiles. Our commitment to sustainability dates back to our roots in 1885, with the invention of the first electric room thermostat. Through our growth strategies and by increasing market share we are committed to delivering value to shareholders and making our customers successful. In 2013, Corporate Responsibility Magazine recognized Johnson Controls as the #14 company in its annual "100 Best Corporate Citizens" list. For additional information, please visit http://www.johnsoncontrols.sg.

Johnson Controls Building Efficiency delivers products, services and solutions that increase energy efficiency and lower operating costs in buildings for more than one million customers. Operating from 500 branch offices in more than 150 countries, we are a leading provider of equipment, controls and services for heating, ventilating, air-conditioning, refrigeration and security systems. We have been involved in more than 500 renewable energy projects including solar, wind and geothermal technologies. Our solutions have reduced carbon dioxide emissions by 16 million metric tons and generated savings of $7.5 billion since 2000. Many of the world's largest companies rely on us to manage 1.5 billion square feet of their commercial real estate.

Johnson Controls(s) Pte Ltd
6 Changi Business Park Avenue 1
#06-21/22 UE Bizhub East (North Tower)
Singapore 486017
Tel: +65 6748 0202
Fax: +65 6743 4420
Email: be-sg-johnson.controls.marketing@jci.com
Website: www.johnsoncontrols.sg

Johnson Controls

© 2013 Johnson Controls, Inc.