

实验室资源

综合型实验室

教学型实验室

实验室建设 Laboratory

- 建筑电气与智能化专业实验室固定资产人民币255万元。
- 实验室部分时间内完全开放，学生可以自行安排实验时间，也可以做创新型实验
- 部分实验装置处于当今先进水平
- **Laboratory fixed assets: 2.55 million yuan**
- **Completely open, students carry out their innovation projects**
- **Make the experiment device's level in the domestic leading position**



综合型实验室

土壤源热泵综合实验平台

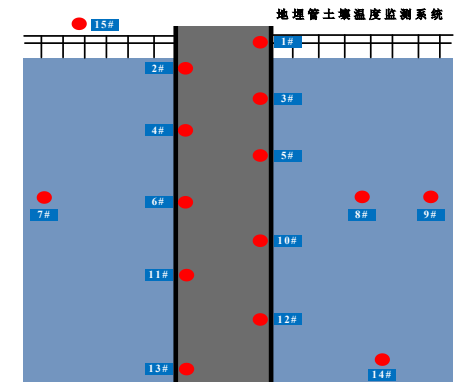
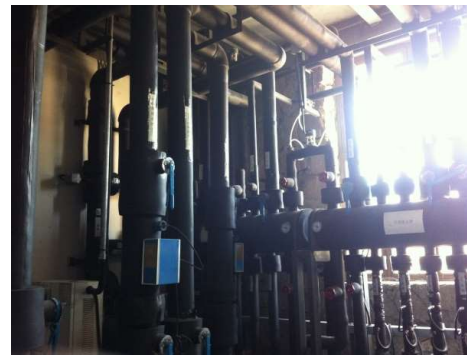
智能建筑设备系统实验室

光环境与光能利用实验室

土壤源热泵综合实验平台 Ground source heat pump lab

空调系统包括三个环路：地埋管换热器侧水环路、冷却塔侧水环路（主要用于科研目的）及负荷侧水环路。主要设备包括地源热泵机组、风冷热泵机组、板式换热器、冷却塔、循环水泵等。学生可以进行土壤源热泵系统运行性能影响因素、地埋管换热器不同埋管换热性能的分析、复合式土壤源热泵系统控制策略和空调系统测试等实验。

The main equipment includes ground-source heat pump, air-cooled heat pump, plate heat exchanger, cooling tower, circulating pumps and so on. There are totally 21 vertical heat exchanger boreholes and 15 monitoring boreholes in the ground heat exchanger. The experiments include the influence factors of ground source heat pump performance, analysis of heat transfer performance, control strategy for hybrid ground source heat pump system, and HVAC system test.



智能建筑设备系统实验室 Intelligent Building Equipments Lab

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土壤源热泵综合实验平台

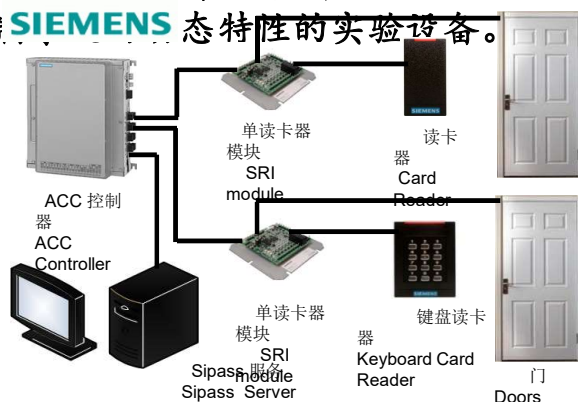
智能建筑设备系统实验室

光环境与光能利用实验室

视频监控系统是智能楼宇系统中的重要组成部分，也是安保系统中的核心部分。该系统由NVR、安装视频客户端软件的计算机、网络键盘、球机、半球、筒机三种不同类型的网络摄像机，西门子模拟球机、编码器、交换机等组成。学生可以了解不同类型摄像头的性能参数、应用场所、楼宇监控系统的架构，并可以通过NVR、客户端软件、网络键盘、IE对相关设备进行配置及视频图像管理，体会网络视频监控系统的特有分析功能。

门禁系统是安防系统中的一个子系统，其主要由门禁管理服务器、ACC控制器、读卡器模块、读卡器及各读卡器所控对应的电控锁门组成。门禁系统不是一个孤立的系统，为充分体现其对出入口的智能管理，还应与监控、消防系统联动控制。学生可以了解门禁系统的架构，并通过操作Sipass门禁管理软件对门禁IC卡的常用功能进行设置并管理。

可编程控制器PLC采用PHOENIX CONTACT公司的ILC 3xx和ILC1xx系列可编程控制器(programmable logic controller, PLC)示教板为主要实验设备。学生能够了解PLC和Interbus总线的工作原理、学习运用编程软件PC WORX编写PLC程序，以及掌握各种PLC编程语言的具体应用。另外，本实验装置也是自动控制原理课程的分析离散控制系统的实验设备。



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土壤源热泵综合实验平台

智能建筑设备系统实验室

视频监控系统
门禁系统
可编程控制器PLC

GDHAW

The video surveillance system is an important part of smart building system and the core of security system. The system consists of NVR, client software installed on the computer, network keyboard, three network cameras with different type, existing analog camera and video coder. Students can understand the operation and performance of different cameras, the structure and equipment configuration of video surveillance system, and the management video images by NVR, client software, keyboard and IE, and enjoy the analytical function.

Access control system is a subsystem of building security system. It includes access management server, ACC controller, card reader, card reader module and the electric door lock. In order to reflect intelligent management, access control system should also be connected with monitor system and fire alarm system. Students can understand the structure of access control system and the configuration and management of IC cards the Sipass software.

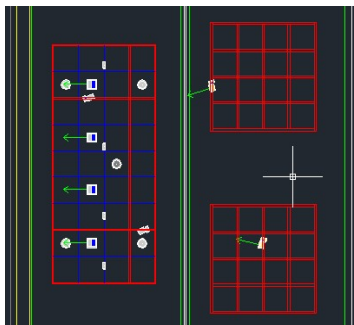
This experiment equipment is based on the ILC 3xx and ILC 1xx series PLC (Programmable Logic Controller) teaching board from PHOENIX CONTACT. Students will understand the operational principle of PLC and Interbus, learn and practice the use of PC WORX software, and the application of different programming languages for PLC. Moreover, this experiment equipment is also used in the automatic control experiments to analyze the dynamic characteristics of non-linear system.

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光环境与光能利用实验室



CDHAW

光环境与光能利用实验室 Light environment and light energy using lab

- 本实验室能够进行室内采光系数、室内亮度分布、表面光反射比测量，以及太阳能应用等实验教学。可以对建筑空间的建筑自然光环境进行综合测试和评价，对各种室内外照明方法进行体验。让学生在实验过程中学习如何营造智能的、可控的、节能的光环境。
- In this lab, students can do the experiment under different Light environmental and test the space of building natural light environment and experience indoor and outdoor lighting methods.



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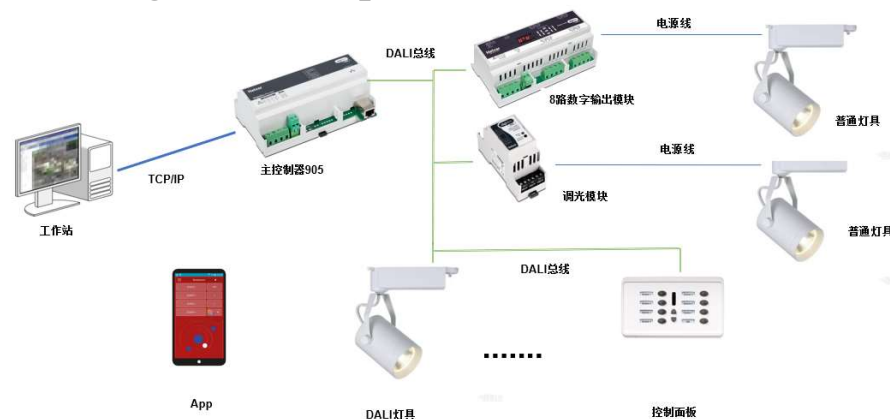
光环境与光能利用实验室 Light environment and light energy using lab

智能照明系统实验室 Intelligent Lighting System Lab

智能照明系统是基于DALI协议的智能建筑电气控制系统，该系统主要对灯光、遮阳、空调等系统进行集成化控制，通过软件、墙装面板、遥控器、App等对受控设备进行控制，并可同其他楼宇控制系统进行集成。学生还可作为专业综合实验项目对其功能进行拓展，从而让学生更具体地了解DALI现场总线的概念及其在建筑智能照明系统中的应用。

The intelligent lighting system is based on DALI protocol. This system is used for lighting, shading and HVAC system control, controlled via software, wall-mounted module, remote controller and App, and also supporting to be integrated with other smart building systems.

In GT project students can expand the function of intelligent lighting system too. In one word, this system can help students understanding the concept of DALI bus and building smart lighting system better.



综合型实验室

教学型实验室

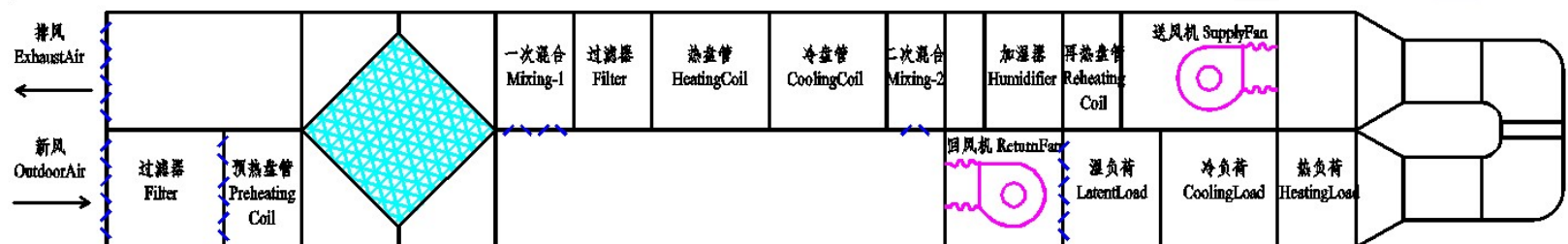
空气处理与控制实验室

自动控制原理
实验室

空气处理与控制实验室 Air handling and Control Lab

组合式空调机组 (AHU) 包含显热换热器、冷水盘管、热水盘管、加湿器、送风机、回风机等装置。学生可以进行过渡季空气侧经济器、湿空气性质和空气处理过程等实验。由于其完整的控制系统，学生亦可以自行编写程序，对不同的控制策略进行研究和测试。

Air handling unit (AHU) includes heat exchanger, cooling coil, heating coil, humidifier, supply fan, return fan and so on. The experiments include air side economizer operation in mild seasons, moist air properties test and air handling process test. With its complete control system, students can also code and test programs for different control strategies of AHU for their study works.



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教学型实验室

空气处理与控
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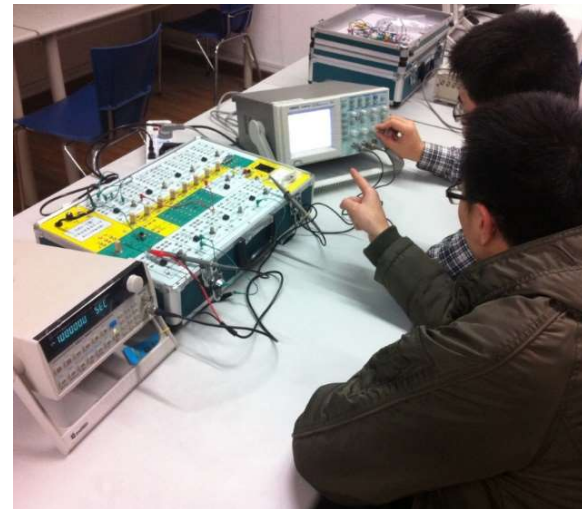
自动控制原理
实验室

教学型实验室

自动控制原理实验室 Automatic Control Lab

拥有XMN-2型自动控制原理学习机、DF1405数字合成信号发生器，JC2021M示波器等电子仪器设备，能够容纳16名学生同时进行实验。本实验室能够进行自动控制原理课程中典型环节模拟、二阶系统的频率响应、系统校正、非线性控制系统分析等实验。同时可以配合计算机使用MATLAB等工具软件进行系统仿真与模拟。

The principle of automatic control lab can contain 16 students to do the experiment at the same time. Several experiments can be done in the lab, such as typical loop simulation, frequency response analysis of 2nd order system, system rectification and nonlinear system analysis, etc. Students can also use MATLAB to do system simulation.



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空气处理与控制实验室

自动控制原理实验室

先进空调技术实验室

先进空调技术实验室 Advanced HVAC Technology Lab

置换通风与冷吊顶系统是一种符合人体热舒适要求的空调系统。本系统中，由置换通风系统承担所有潜热负荷和部分显热负荷，冷辐射吊顶承担剩余的显热负荷。由于冷吊顶需要防结露控制，故其控制系统较复杂。

学生可进行空调房间的垂直温度分层实验，辐射顶板和置换通风系统的负荷分配实验，以及辐射顶板的防结露控制实验。

Displacement ventilation and radiant ceiling system is a comfortable air conditioning system. Displacement ventilation system deals with all latent load and part of sensible load while radiant ceiling system deals with remained sensible load. So the control system is complex because condensation-protection control on the surface of radiant ceiling is required.

The experiments include temperature stratification in the room, the load balance between displacement ventilation and radiant ceiling system and the condensation-protection control on the surface of radiant ceiling.

综合型实验室

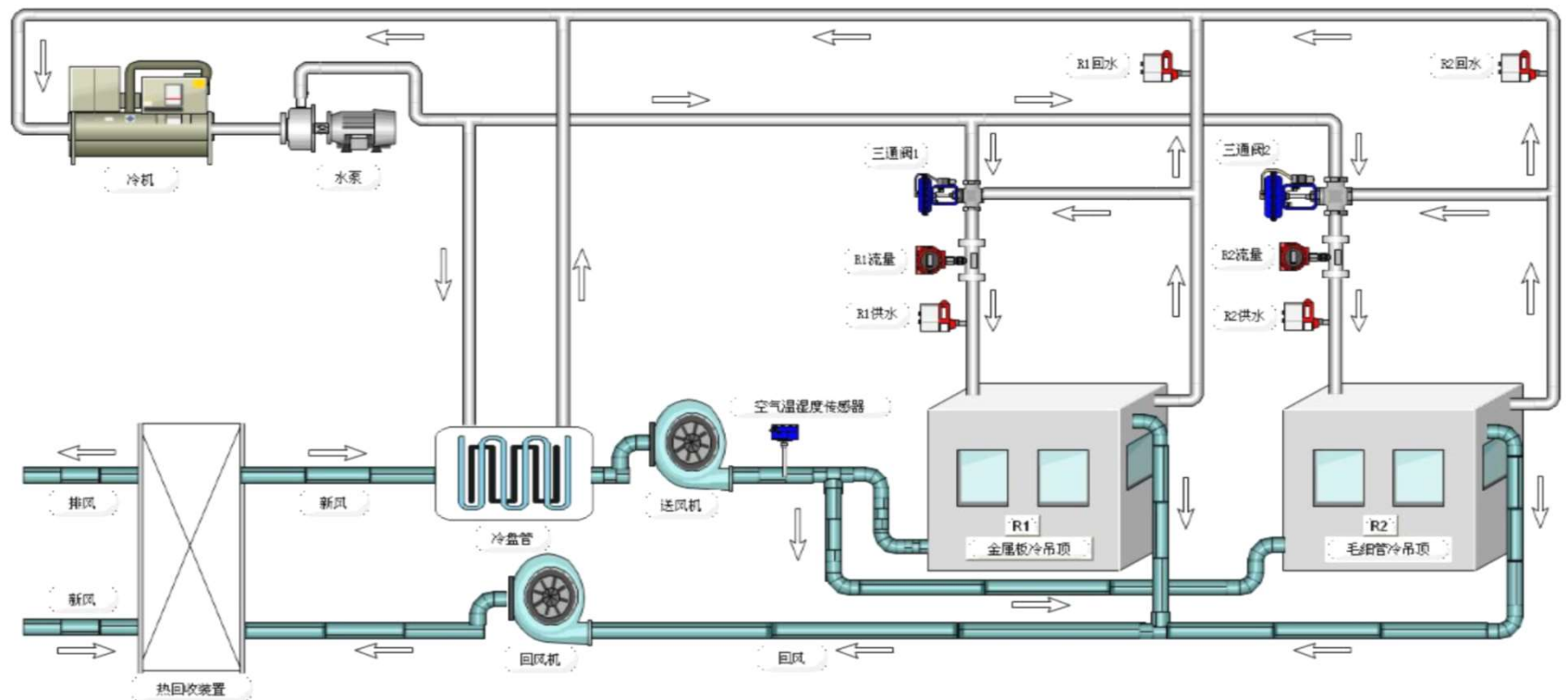
教学型实验室

空气处理与控
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自动控制原理
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先进空调技术
实验室

先进空调技术实验室 Advanced HVAC Technology Lab



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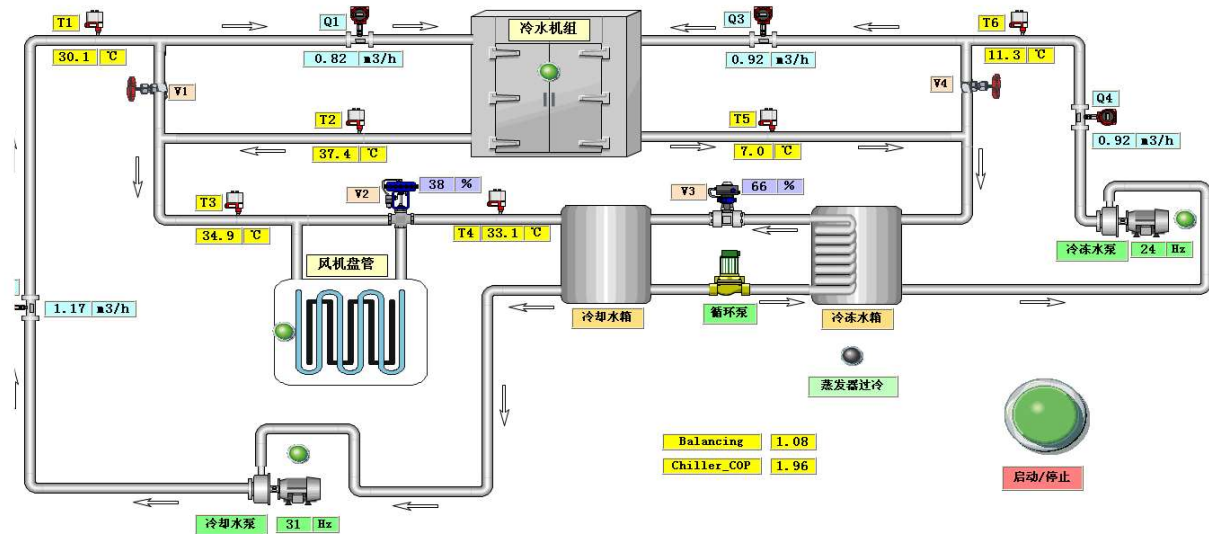
教学型实验室

空气处理与控
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自动控制原理
实验室

先进空调技术
实验室

制冷机组性能检测实验台是专业内教师自行设计、编程控制的实验台，是实际中央空调水系统的缩小版，帮助学生进一步理解制冷机组的运行原理，掌握制冷机组运行参数的计算方法。
The equipment of chiller performance is designed and programed by teachers.It is scaled-down version of centralized water-side HVAC system. Based on the experiment,the students can understand the principle of chiller much better and learn how to test the efficiency of chiller.



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教学型实验室

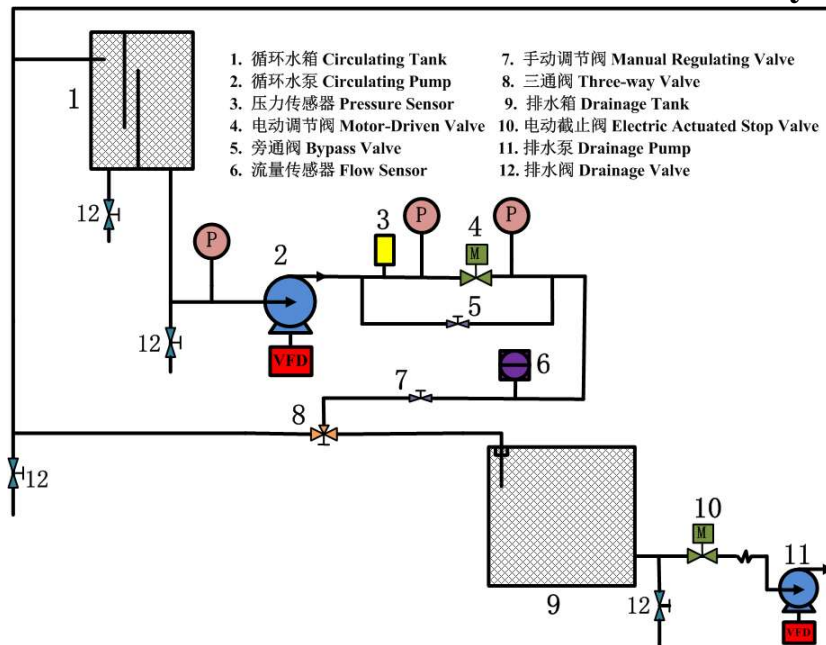
空气处理与控
制实验室

自动控制原理
实验室

先进空调技术
实验室

本实验台包括变频水泵、压力传感器、电动调节阀、电磁流量计、排水泵等装置，其原型是由CDHAW学生自主设计。学生可以进行压力传感器，流量传感器，电动调节阀和水泵流量特性与效率测试等实验。

This deck is originally designed by CDHAW students including VFD pump, pressure sensor, motor-driven valve, electromagnetic flow meter, drainage pump and so on. The experiments include Pressure Sensor Specification Test, Flow Sensor Specification Test, Motor Driven Valve Specification Test and Characteristics and Efficiency Test of Pump in different operation status.



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空气处理与控制实验室

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先进空调技术实验室

CDHAW

本实验装置模拟空调系统中典型的冷冻水环路，两台水泵分别代表一次冷冻水泵组和二次冷冻水泵组，冷水机组用水箱代替。差压传感器测量负荷两端的压差。学生可借助仪器确定水泵的传递函数；通过整定控制器参数实现预期的控制特性，以及实现更加节能的冷冻水控制策略。

This experiment deck simulates a typical chilled water loop in air conditioning system. Two pumps stand for primary pumps and secondary pumps in real system respectively, the tank stands for the chiller. Differential pressure sensor measures the differential pressure across the loads. Students can use instruments to determine the transfer function of pump, to implement expected control characteristics by tuning controller parameters, and find out more energy-efficient chilled water control strategy.

