



CHILLED WATER PLANT OPTIMIZATION

The chiller plant is the “heart” of the building’s HVAC system, and optimization is critical to achieving better building performance. Striking a balance between performance expectations and proper chiller plant optimization starts with the operation of the chillers and chilled water pumps.

Stark Tech’s Chilled Water Plant Optimization solution applies advanced model -based analytical algorithms for continuous monitoring and optimization of the central chilled water plant equipment.

Solutions Driven Approach

Stark’s Chilled Water Plant Optimization Platform, ChlrOpt, monitors, optimizes, and controls the performance of the chilled water plant. The software platform identifies the optimum operational points for consistent and precise system-level performance improvement.

Unlike other tools that are designed to optimize individual components within the central chilled water plant, ChlrOpt uses a holistic approach to continuously evaluate and pass optimum operational conditions to the building management system (BMS), in addition to the individual equipment units within the plant. The resulting operation minimizes the system’s overall level energy consumption and balances equipment runtimes.

ChlrOpt has optional fault detection and diagnosis (FDD) functionality. The built-in predictive analytics

utilize performance data collected overtime to detect faults and provide recommended corrective action(s) and preventative maintenance schedules for plant optimization. Early fault detection helps with energy efficiency and reduces the incidents of unexpected equipment failures and emergency repair costs.

Stark Tech’s Customized Platform

- User-friendly system configuration
- Supports major communication protocols
- Intelligent data validation
- Well-tuned data-driven models
- Smooth & semi-optimized fallback method
- Comprehensive reporting & performance visibility





BUILDINGS

Systems Integration
Controls & Automation
Scanning & 3D Modeling



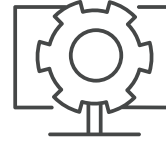
EQUIPMENT

HVAC Equipment
Pre-Fab Skidded Systems
Service & Technical Support



ENGINEERING

MEP Engineering
Design-Build Service Group
Commissioning (Cx & BCx)



TECHNOLOGY

Technology Integration
FDD & Advanced Analytics
Real-Time Monitoring



COST MANAGEMENT

Energy Procurement
Utility Bill Processing
Sustainability Reporting

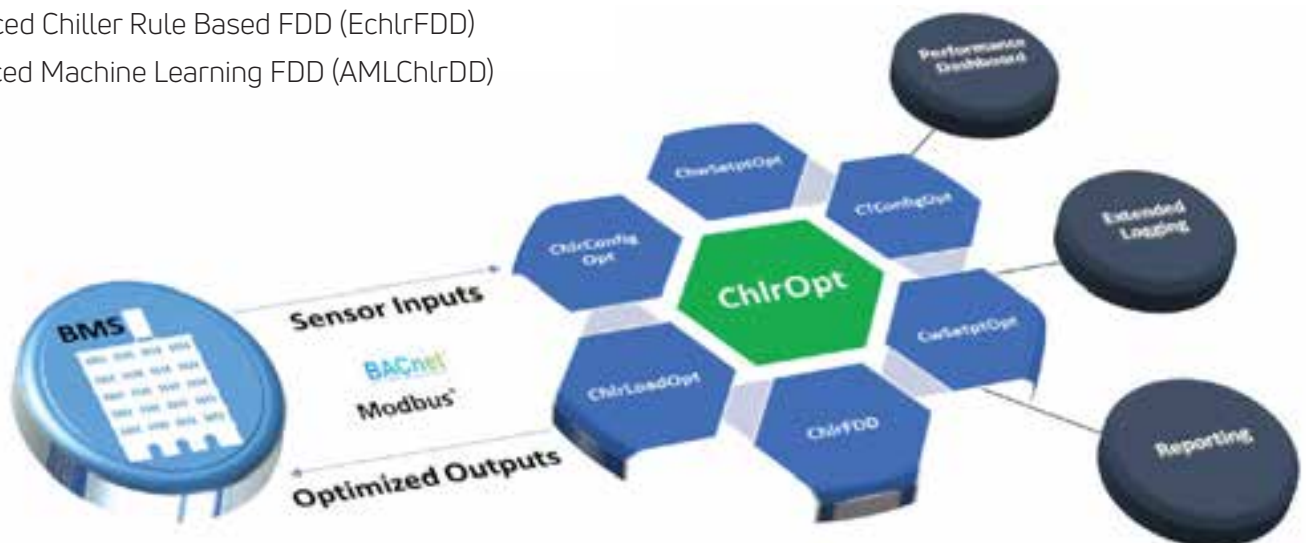
About ChlrOpt

ChlrOpt has eight (8) major functionalities/modules. Depending on the availability of sensor inputs, chiller communication cards and user preferences, it's possible to activate all or some of them.

1. Chiller Configuration Optimization (ChlrConfigOpt)
2. Optimized Chiller Load Balancing (ChlrLoadOpt)
3. Chilled Water Supply Temperature
4. Cooling Tower Configuration Optimization (CTConfigOpt)
5. Condenser Water Supply Treatment Setpoint Optimization (CwSTSetptOpt)

Optional Offerings:

6. Chilled Water Plant Rule Based FDD (ChwPlantFDD)
7. Enhanced Chiller Rule Based FDD (EchlrFDD)
8. Advanced Machine Learning FDD (AMLChlrDD)



Features

Our Single Pane of Glass (SPOG) unifies the chilled water plant with the building temperature control system to provide visibility across the entire network for total management of the facility.

System Configuration

ChlrOpt is equipped with a system configuration tool which allows easy navigation of initial system configuration. Each piece of equipment has its own configuration tab, which provides an excellent summary of the chilled water plant at a glance.

Supports Major Communication Protocols

Supports BACnet/IP, BACnet MS/TP, LON, and Modbus.

Intelligent Data Validation

ChlrOpt intelligently validates the collected chilled water plant data prior to any kind of optimization. In each timestep, if any error is found (e.g., disabled, or in alarm, under maintenance), optimization will not proceed. Subsequently an alarm will be generated, logged, and sent to the facility engineer/plant operator. This feature prevents any inaccurate optimization recommendations and provides a means for plant fault detection.

Convenient Fall-Back Method

If users don't want to run ChlrOpt for any reason, or if optimization cannot continue because of faulty sensor(s), loss of data etc., ChlrOpt is equipped with a methodology that can easily resume the operation of the chilled water plant using the conventional control system that exists within the BMS.

Data-Driven Models

All levels of optimization within ChlrOpt are model based. Historical chiller plant data and/or manufacturer's data is used for training the models. These models are used for continuous performance estimation and fault detection and diagnosis. Compared to empirical control scheme, this allows our ChlrOpt platform to tailor optimization for your specific plant conditions and therefore maximize operation efficiencies and savings.

Adaptive Optimization Methods

ChlrOpt is designed to easily adapt to site specific conditions:

- No plant configuration limitation. Unlike some other optimization tools, ChlrOpt platform has no upper limitations of equipment number. It is also flexible to process both primary only and primary/secondary systems.
- Flexible control and adjustment. The modular architecture of ChlrOpt platform can easily enable or disable certain optimization module based on customers' preferences.

Rich Chiller Models Database

ChlrOpt has a database of close to 200 water and 100+ air cooled chillers models from different manufacturers. If the chiller type is in the database, site specific historical data is not required for training the initial performance model. This feature allows for quicker platform deployment and system commissioning.



Excellent Performance Visibility

The optimization decision process is visible to the user through charts and graphics. In addition to the recommended optimum configuration, top four candidate configurations are also shown. This feature provides the operator the information required to make what if decisions when operating the plant.

Comprehensive Reporting and Data Logging

Advanced data analytics algorithms are used for operational analysis and saving estimations. ChlrOpt has comprehensive operational and saving reports. These reports are shown in the optimization output window in various levels of aggregation. ChlrOpt is also equipped with an extended log feature to store system information for further analysis in the future.



At the core of ChlrOpt is the Schneider Electric EcoStruxure Enterprise Server (ES).

The ES serves the following main functions:

- Communication with the existing building management systems (BMS)
- Optimization Engine
- Data Storage
- Optimization result/energy savings reports
- Web client graphical user interface (GUI)
 - Optimization configuration setup tool
 - Real time chilled water plant graphics





Reporting

All system and equipment level reporting shall be generated from the "Performance Report" button located on the CWPO platform's main dashboard graphic. Reporting shall provide the standard reports identified below in weekly, monthly and yearly levels of aggregation.

Alarming

As stated earlier, in the event that alarms affect the operation of the CWPO platform, the system will automatically revert back to fallback mode. We will notify you of any communication lost between CWPO and BMS, failed sensors, failed model calibration, or systems running outside of operational range.

