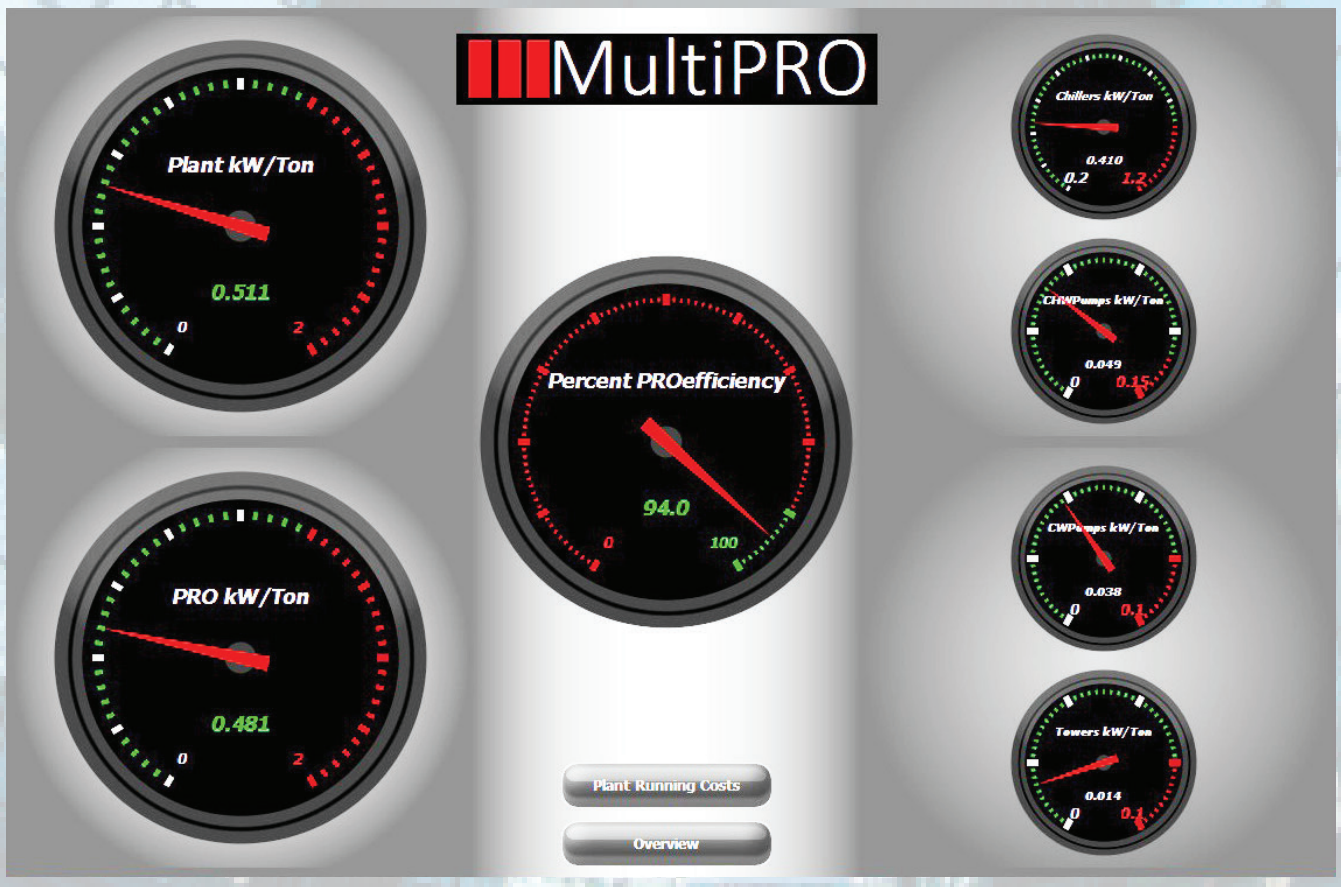
MULTISTACK®

MultiPRO™ Central Plant Control

- Chiller Plant Optimization for Peak Performance, Efficiency, Reliability and Reduced Operating Costs
- Measurement and Verification to Ensure Peak Performance Daily
- PRO kW/Ton Shows in Real Time Where Your System is Capable of Operating in kW/Ton and $$ Vs. Where it is Actually Operating



Why Use A Chiller Plant Controller?

About 30 percent of a building's energy consumption is in the equipment room to make chilled and/or hot water, to pump the water and to operate cooling towers. Historically, building owners have relied on a building automation system (BAS)to control the chiller plant—and the elevators, lights, and fire/life safety systems, etc. Owners realize that with 30 percent of a building's energy going to the chilled water plant, there must be energy-saving opportunities available.

As a result, many chiller plants now use a chiller plant controller, designed to operate only chillers, pumps, cooling towers and ancillary components. MultiPRO™ is Multistack's chiller plant controller that can be applied to any chiller plant no matter the chiller age, manufacturer, or if the chillers are water-cooled, air-cooled, heat recovery, conventional or modular.

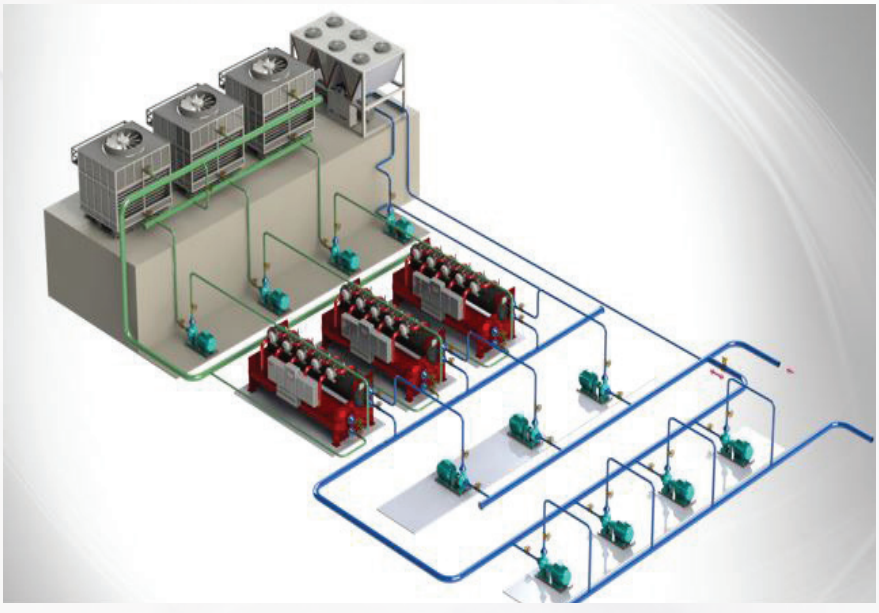
MultiPRO maintains optimum chiller plant efficiency, reduces chiller plant energy use and provides owner/operators with the information needed to operate and maintain the system. MultiPRO typically reduces chilled water plant energy consumption by 15 to 25 percent—without installing new equipment or variable speed drives.

MultiPRO was developed to run only the chilled water plant by chiller experts using knowledge gained over decades in the industry. MultiPRO is Web-based and requires no proprietary software to commission or operate. MultiPRO operates on the Niagara Framework™ by Tridium that is understood and used by many control contractors. MultiPRO can share information with the BAS, run multiple open protocols simultaneously and translate information between protocols. MultiPRO does not require a BAS system to operate.

MultiPRO will NOT interfere with any chiller's stand-alone operating or safety algorithms. MultiPRO only controls the chiller plant components -- it will not interfere with anything else that the BAS system is monitoring or controlling.

Sustainability

Everyone talks about sustainability but MultiPRO provides sustainability through Measurement & Verification (M&V). At commissioning chiller plant component data is input as a baseline for the operational curves that MultiPRO then populates while controlling the chiller plant. After several weeks of operation, MultiPRO knows how each component operates at varying indoor and ambient conditions. M&V is like continuously re-commissioning the chiller plant—saving money by constantly monitoring plant efficiency and making the owner aware of decreased performance so that corrective action can be taken.



Optimization

MultiPRO uses optimization algorithms for chiller, pump and tower operation. "Intelligent Sequencing" uses chiller performance curves, loaded with the manufacturers' data and actual operating data collected by MultiPRO to determine the most energy efficient combination of chillers available and the most efficient operating load point for each chiller based on current conditions. Intelligent Sequencing is a specially designed cycling control logic that adjusts the system using continuously acquired operating data. Even if all chillers in the plant are the same tonnage, over time performance declines on each chiller at different rates. Intelligent Sequencing accounts for real-time performance degradation when determing which chiller to operate. Intelligent Sequencing can be easily disabled if the owner desires their own comparison of optimized operation versus non-optimized. MultiPRO saves owners money by running the Intelligent Sequencing algorithms continuously to optimize chiller plant efficiency, minimizing energy expense.

PRO kW/Ton

MultiPRO calculates "PRO kW/Ton", the kW/Ton the chiller could be operating at currently, based on current ambient and building load conditions. The difference between the chiller's actual operating kW/Ton and the PRO kW/Ton is the chiller's inefficiency due to performance degradation. Using the site's utility rate data, MultiPRO can show what this performance degradation is costing the customer. The customer can use this information to determine the best time to have a performance issue addressed and knows what it is costing in the meantime. MultiPRO saves money by displaying chiller performance degradation using PRO kW/Ton so an action plan can be established for service/repairs.

Diagnostics

Because MultiPRO provides M&V, it collects a lot of information most controllers don't have access to, including electrical and flow data. In addition to this data, MultiPRO has a diagnostics engine that points out up to 20 operational issues that may affect plant performance and reliability.

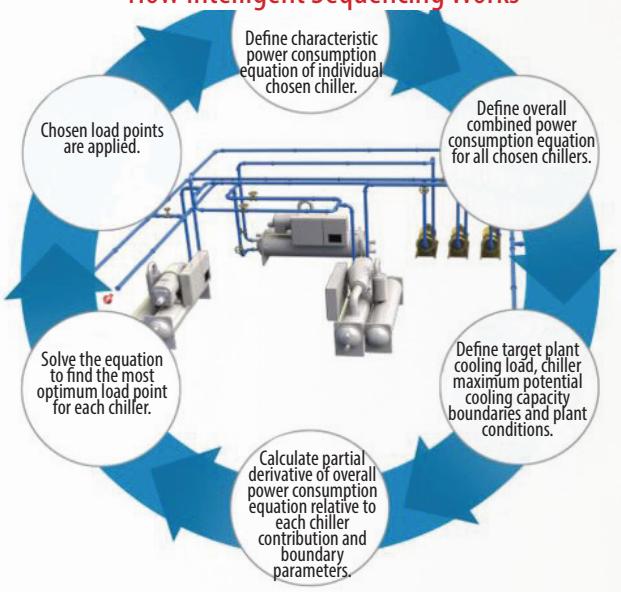
MultiPRO uses traffic light color-coded diagnostics to quickly show heat exchanger approach temperatures. If the heat exchangers show green, they are operating within design approach limits. If a heat exchanger turns yellow, approach temperature is starting to exceed design. A red heat exchanger indicates that the approach is outside of efficient limits and the heat exchanger needs to be cleaned to restore efficient operation. Consider these diagnostics scenarios:

1. When do we typically clean chiller heat exchangers? At the end of the cooling season. But what if the vessels are all showing green at the end of the cooling season? Maybe the money that was to be used to clean tubes can now be used to repair a pump bearing or for other urgent maintenance.

2. Conversely, what if the heat exchanger changes from yellow to red on July 2nd? Do you wait until fall to clean the heat exchanger or schedule it for earlier? It's your decision, but MultiPRO indicates when the approach is out of design so that corrective action can be taken.

MultiPRO also monitors sensor calibration on water-to-water units. If a sensor is reading 2°F low, the chiller is using more power than when reading properly. If the sensor is reading 2°F high, the space may be warmer than design, causing building tenant complaints. MultiPRO will automatically sends e-mail alerts to a user-defined list of addressees. MultiPRO also saves owners money by showing when maintenance is needed, or not yet needed.

How Intelligent Sequencing Works



Saves Water

Cooling tower water usage is becoming a major concern for many building owners. Cooling tower water useage has three components: evaporation, blow down and drift/spillage. Evaporation rate is a function of BTUs removed by the cooling tower. Blow down is based on cycles of concentration—the lower the cycles of concentration, the more water is lost down the drain. Drift and spillage loss is a function of cooling tower design but is also affected by cooling tower maintenance and operation.

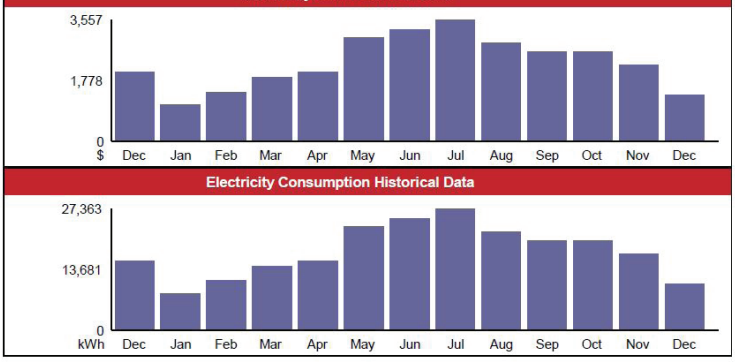
MultiPRO™ can monitor cooling tower make-up water and blow down. The difference is the amount evaporated and drift/spillage. Since evaporation can be calculated, drift/spillage is known. MultiPRO displays cooling tower water usage and indicates when drift/spillage becomes excessive and cycles of concentration becomes different than planned, allowing the building owner to monitor cooling tower water usage. MultiPRO gives the owner the performance data and indicates when maintenance is recommended.

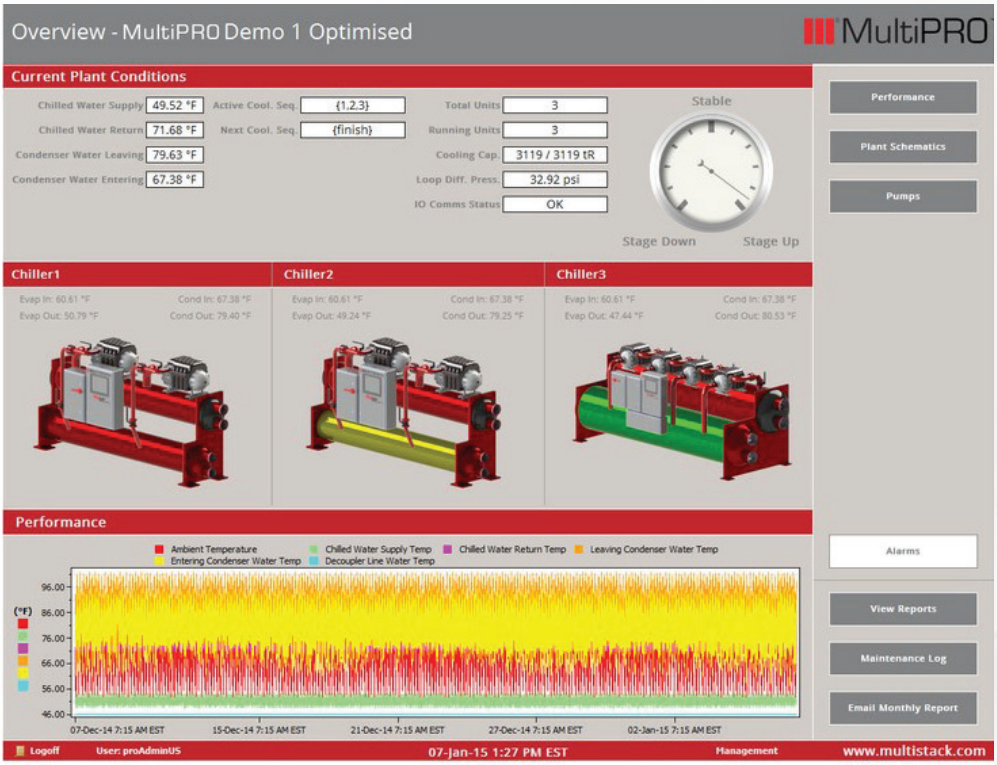
Reports

MultiPRO provides reports that are system generated and electronically distributed to a user defined addressee list. There are daily log reports that show status of each chiller for that day. Monthly plant and chiller reports provide an overview of plant operation. There is a monthly energy report that provides month-to-date, year-to-date and year-on-year energy consumption information. MultiPRO can generate unique reports, if needed.

Unit Report

ASP060X	MTD	Diagnostics	MTD
Avg kW/Ton	0.60	-	-
Pro kW/Ton	1.23	-	-
Electricity Consumed	10,222 kWh	-	-
Electricity Cost	$1,329	-	-
Cooling Produced	15,300 kWh	-	-
Avg Sp Cooling Cost	7.07 c/tR-hr	-	-
Norm. Cooling Cost	5.44 c/tR-hr	-	-
Run Hours	742	-	-





Graphics

MultiPRO graphics simplify understanding and troubleshooting the system. An optional 17 inch touchscreen allows the MultiPRO system to be monitored in the equipment room or, without it, on the BAS system monitor. System graphics accurately display the system architecture.

MultiPRO chiller plant summary screen uses "traffic signal" colors to indicate heat exchanger performance and the need for cleaning or maintenance.

Green - Chiller Running Efficiently

Yellow - Chiller Will Need Maintenance

Red - Chiller Requires Service

Successful MultiPRO™ Installations

Here are just three of many examples of how MultiPRO is helping building owners optimize their chiller plant operations for best performance and efficiency:

Value in Manufacturing

MultiPRO has enabled a manufacturing facility to achieve new system efficiencies as the central plant controller. Also installed at this job site is a new Multistack air-cooled chiller with free-cooling modules and a modular pumping system. Customer benefits include:

- MultiPRO Intelligent Sequencing optimization algorithms constantly look at past and current operating conditions to provide the most efficient operation possible
- MultiPRO Measurement & Verification algorithms monitor past and current performance, and the manufacturer's design data to make sure the chiller continues operating as efficiently as possible. If performance declines, MultiPRO shows the customer how much that inefficiency costs in terms of utility dollars.

Public Sector Profitability

MultiPRO has already proven its value at a large prison facility. The prison required three independent chilled water loops served by three MagLev™ flooded-evaporator chillers on each loop. MultiPRO easily controls the chillers, pumps and cooling towers. This ESCO (Energy Services Company) project wanted the Measurement & Verification along with the optimization and diagnostic functions provided by MultiPRO.

Green with Geothermal

The MultiPRO system acts as the central plant controller to fine tune efficiencies for geothermal applications. Paired with Multistack's custom VME II centralized heat recovery chiller, MultiPRO smoothly coordinates the operation of the system also utilizing the benefits of MultiGEO™ software. MultiGEO software controls the bore field incorporated in this geothermal project. The MultiPRO system acts as the central plant controller for the VME II and the MultiGEO system. The owner saw the value in having the entire central plant and bore field controlled by the chiller manufacturer.

MULTISTACK®
Originators. Innovators. Never the Imitators.℠

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