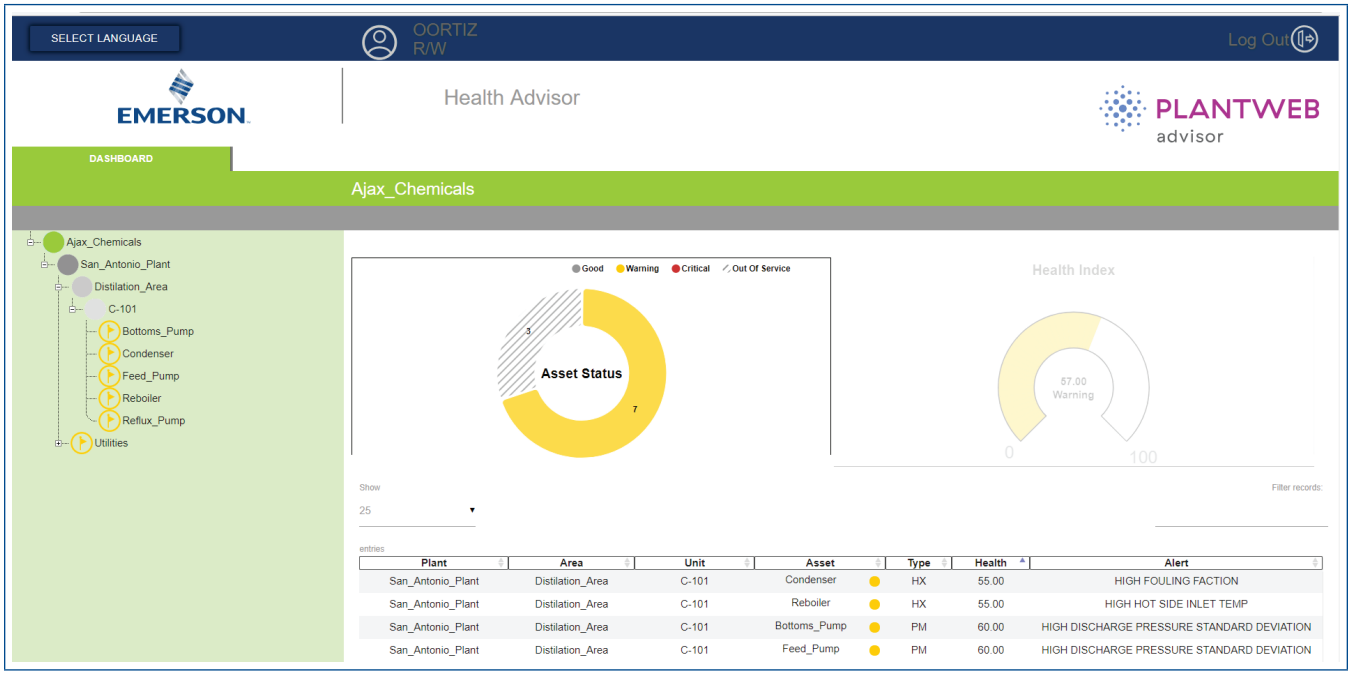
Plantweb™ Health Advisor



Preconfigured Applications which combine process and asset data to report Overall Asset Health

- Identify abnormal situations on your essential assets as they are happening
- Spot imminent failure and take preventive action
- Combine equipment and process data to gain online insight into the health of essential assets
- Be alerted to equipment degradation that could lead to potential safety or environmental hazards
- Reduce unscheduled shutdowns and slowdowns due to equipment failure

Introduction

Emerson's Plantweb Health Advisor is a cost-effective analytical solution to monitor those assets that have repeated failures or assets in important service areas where a failure can cause significant financial impact such as production loss, environmental or safety incidents. This solution analyzes the combination of process and equipment data to report overall health of an asset. Through intuitive dashboards, Plantweb Health Advisor provides continuous diagnostics and equipment alerts to help avoid unplanned shutdowns or slowdowns.

Benefits

- Real time monitoring and immediate visibility into complete health of an asset
- Pre- Configured and Customizable Asset Health analytics leveraging data from multiple data sources
- Easily scale from site wide to enterprise wide analytics
- Lower your Maintenance costs and increase availability by identifying developing problems in assets before they fail
- Minimize personnel trips to the field by replacing manual and periodic readings with online insights that visually tracks, analyzes and displays relevant key performance indicators

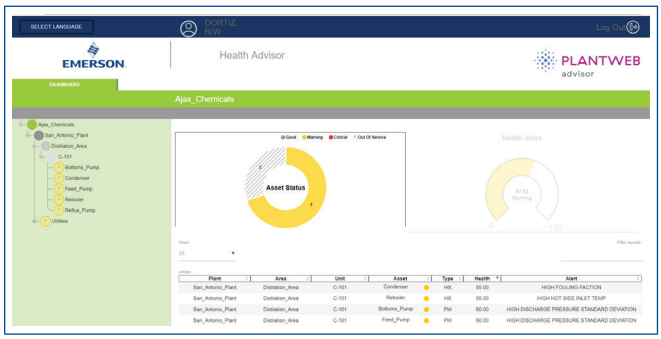
Benefits for the Entire Organization

Operations: receive alerts to spot degrading performance, modify operating conditions and take corrective action before assets fail.

Reliability: know which assets need attention and why. Apply condition-based maintenance programs with priorities in a targeted manner, based on current condition data. By capturing both process and equipment health data, and providing online analysis, it helps to quickly determine root causes of failure, analyze and fix “bad actors” and then easily redeploy assets.

Maintenance: reallocate staff from manual rounds to work on only the assets that need attention, preventing asset failures rather than repairing them. Be aware of impending equipment problems before leaving the maintenance shop. Target turnaround repairs to only those assets that need it.

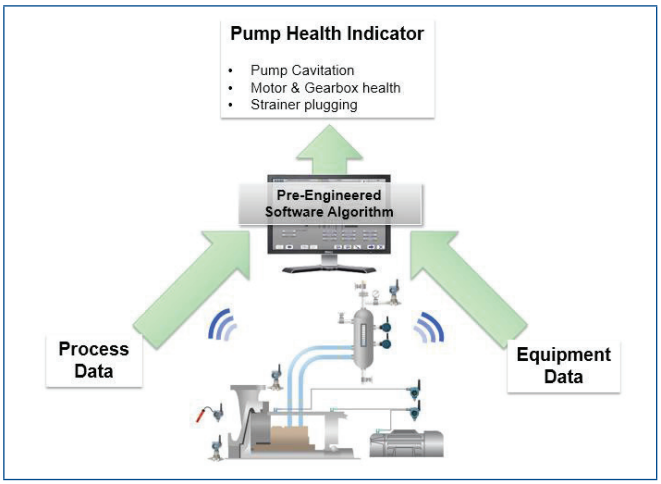
Safety, Health and Environmental: lower risk of asset failure being a cause of environmental and safety incidents.



Easily sort and filter asset health to fin the equipment in need of attention

Product Description

Emerson offers Plantweb Health Advisor, a suite of preconfigured software applications that continuously analyzes both process (such as flows, temperatures, pressures, etc.) and asset health data (such as vibration and bearing temperature) to provide an overall asset health rating (0-100%).



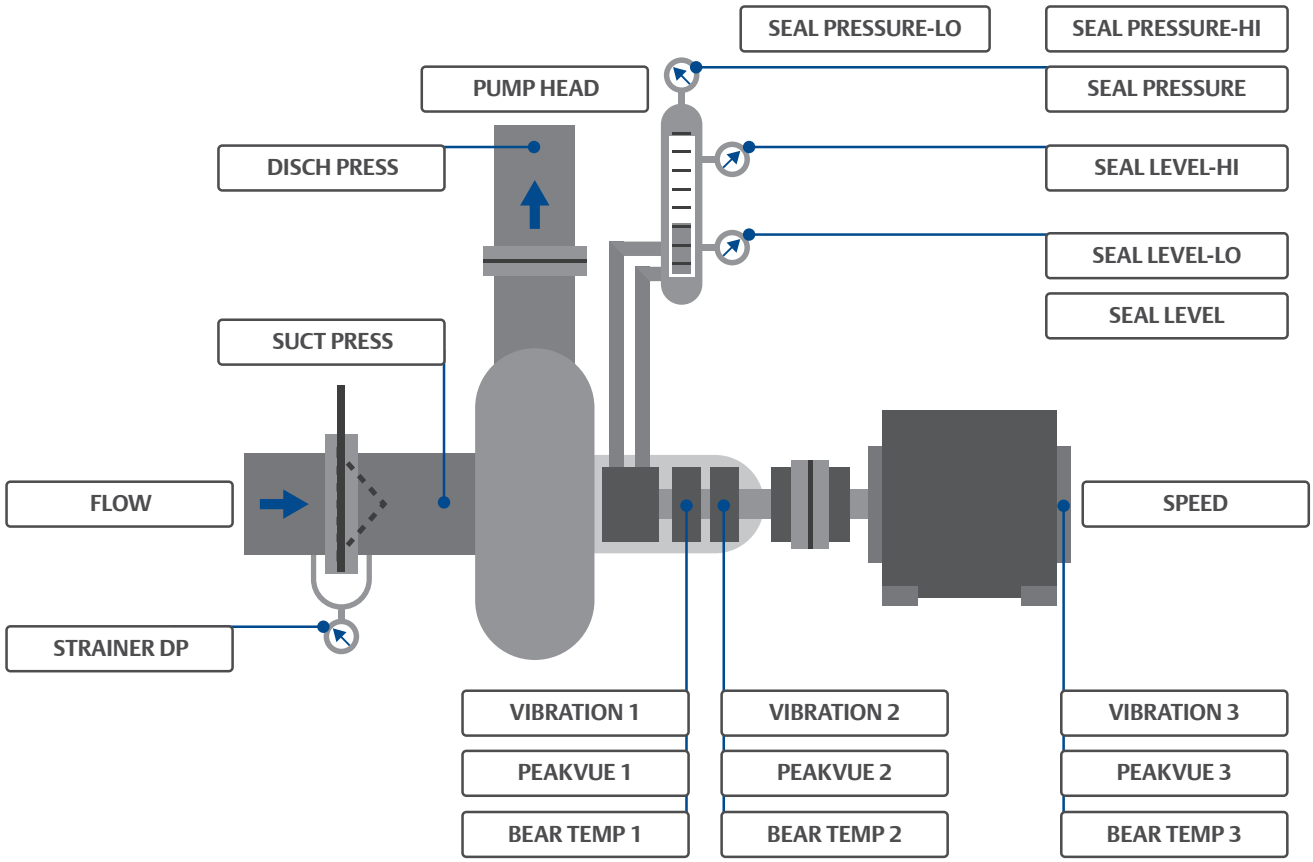
Preconfigured algorithms built into the solution continuously analyze process and asset data and provide on-line displays, trending, alarms, historization, key performance indicators and Statistical Process Control (SPC) calculations. The solutions are an early warning system that can be easily understood and do not require a machinery expert to interpret. Clear, meaningful alerts are provided such as “Increasing Trend in Vibration”, “Pump Cavitation”, “Compressor Instability” or “Exchanger Cleaning Required”, among others.

All Plantweb Health Advisor applications:

- Detect abnormal operation as a deviation from a “baseline”, where the baseline represents a snapshot of all parameters at a user defined normal operating point.
- Are designed to receive inputs from many data sources including wireless gateway, DCS, or other online systems. Several hundred protocols are available for data connectivity.
- Provide event logging and data historization.
- Support sending alerts to the plant control system (over OPC connectivity). Provide remote user access to the Plantweb Health Advisor system through a remote connection.
- Support multiple languages
- Offer the advantage of wireless deployment for missing measurements, eliminating engineering, labor, wiring, cable trays and field construction challenges.

Pumps

Module Process Flow Diagram



Features

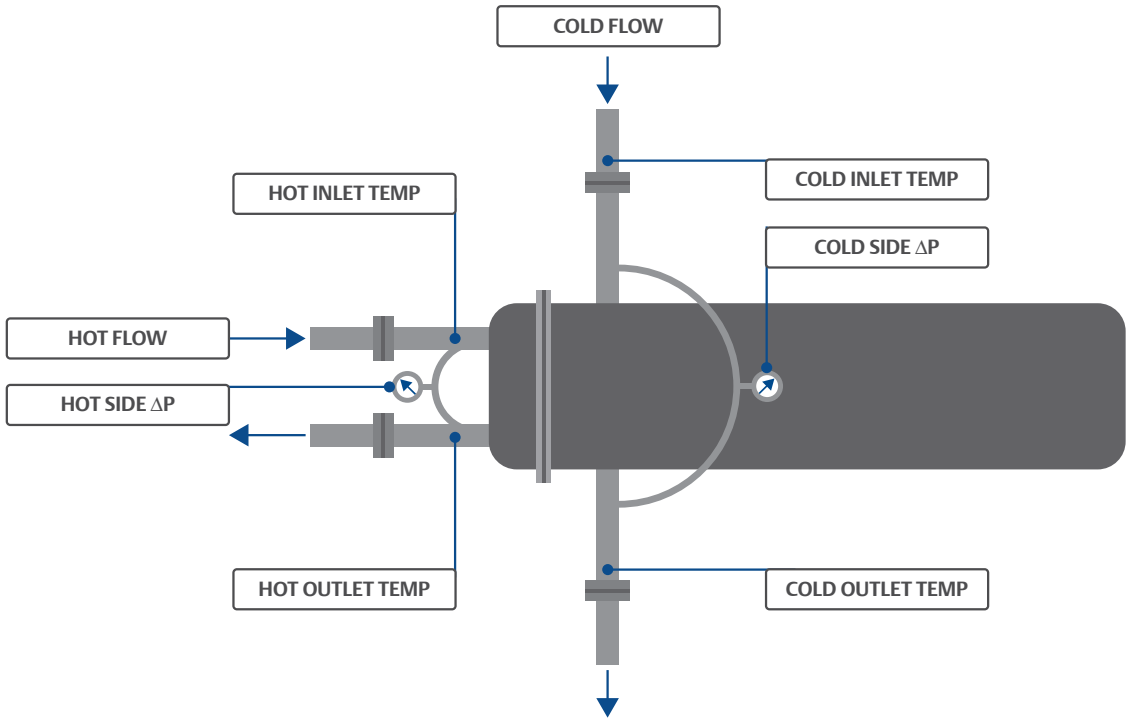
- Supports monitoring of both fixed as well as variable speed pumps
- Configuration supports
  - Single vibration sensor (overall and PeakVue™) and pump speed indicator for variable frequency drives
  - Additional vibration sensors
  - Two motor bearing temperature sensors
  - Suction and discharge pressure sensors
  - Strainer differential pressure sensor
  - Seal oil pressure and level switches
  - Flow sensor
  - Hydrocarbon leak detector
  - Cavitation detection is a combination of PeakVue™ Vibration and discharge pressure standard deviation

Calculations and Alarms

- Pump Run/Stop Status
- Run Time
- Pump Pressure Differential
- Statistical Performance Calculations (Vibration Monitoring)
- Cavitation & Pre- Cavitation Detection
- Baseline Capture (Process alarm limits)
- Bearing Fault
- Strainer Plugging
- Seal Failure
- Liquid hydrocarbon leak
- Lubrication Issues
- Seal Fluid Level Monitoring
- Seal Pot Pressure Monitoring

Heat Exchangers

Module Process Flow Diagram



Features

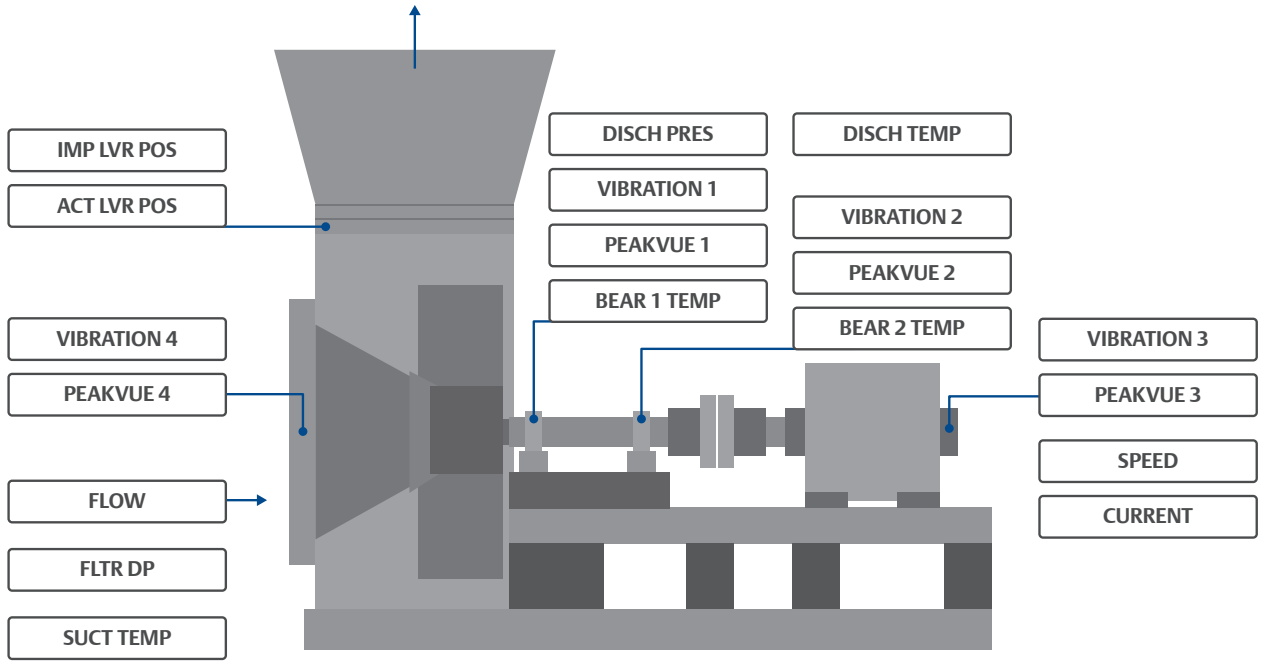
- Supports monitoring of shell and tube type heat exchangers
- Configuration supports
  - Flow plus inlet and outlet temperatures of at least one side of the exchanger to calculate heat duty
  - Cold side flow sensor
  - Hot side flow sensor
  - Cold side inlet temperature sensor
  - Cold side outlet temperature sensor
  - Hot side inlet temperature sensor
  - Hot side outlet temperature sensor
  - Cold side delta pressure sensor
  - Hot side delta pressure sensor
- With all four temperatures and any one flow sensor available it is possible to calculate fouling factor for heat exchanger
- Calculates a degradation cost of the lost performance
- Informs when an exchanger becomes excessively fouled
- Displays the total service run time since last cleaning
- Accepts mass or volumetric type of flow input
- Accepts any system of engineering units for process parameters

Calculations and Alarms

- Performance calculations
  - Observed Heat Exchanger Coefficient
  - Corrected Heat Exchanger Coefficient
- Hot side Heat Duty
- Cold Side Heat Duty
- Heat Duty Error
- Average Heat Duty
- Fouling Factor
- Cost of Degradation
- Baseline Capture (Process alarm limits)
- Clean Exchanger Indicator
- High Fouling Rate Indicator
- Exchanger Run Time
- Exchanger Health Indicator

Blowers

Module Process Flow Diagram



Features

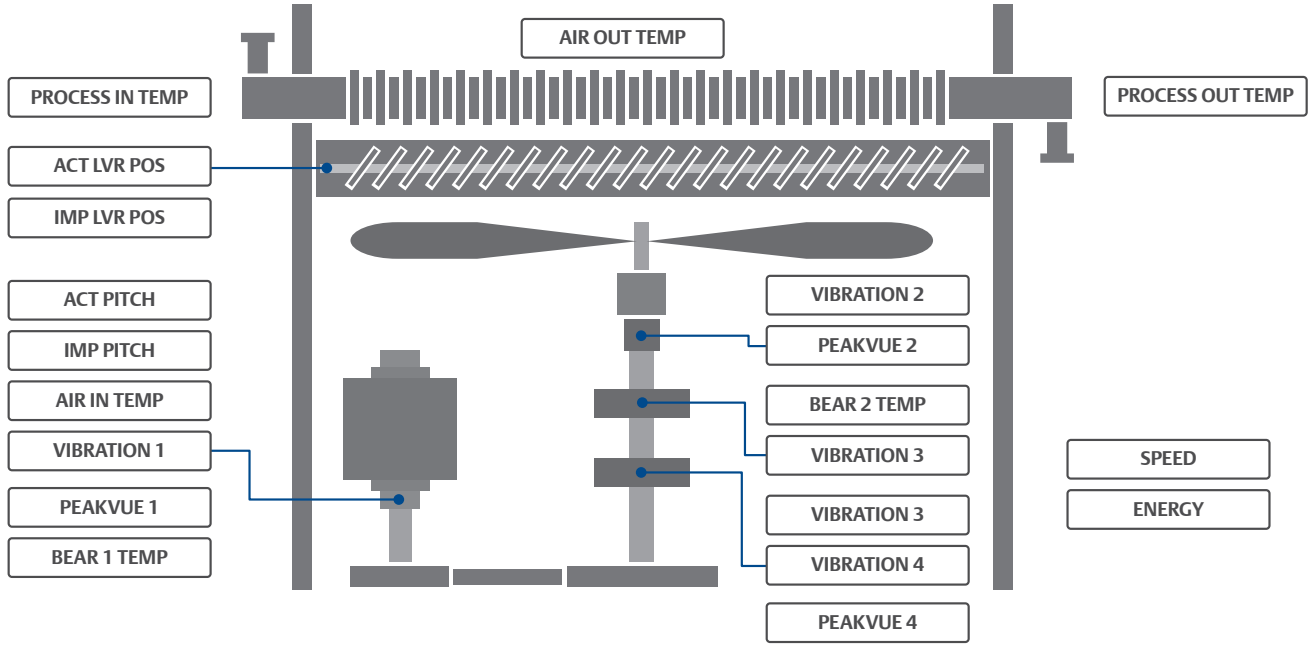
- Supports monitoring of fixed and variable speed blowers with fixed or variable louver position
- Configuration supports
  - Vibration sensor (overall and PeakVue™) and speed indicator for variable frequency drives or louver position sensor
  - Three additional vibration sensors set for other three bearings
  - Two bearing temperature sensors
  - Suction and discharge pressure sensors
  - Motor current measurement
  - Temperature sensors at suction and discharge
  - Differential pressure sensor
  - Air flow sensor
  - Suction & Discharge Louver position sensor
- Indicates discrepancy in actual and expected louver position
- Detects resonance conditions for three different configurable ranges of motor speed

Calculations and Alarms

- Run/Stop Status
- Run time
- Statistical Performance Calculations
  - Blower Vibration Monitoring
  - Motor Vibration Monitoring
- Baseline Capture (Process alarms limits)
- Blower Differential Pressure
- Resonance Frequency Detection
- Bearing Fault
- Lubrication Issues
- Variable Frequency Drive Speed
- Louver Mechanical Defect Detection
- Drive Over Amps Monitoring
- Plugged Suction Filter Detection
- Blower Health Indicator
  - Vibration Health
  - Alarm Health

Air Cooled Heat Exchangers

Module Process Flow Diagram



Features

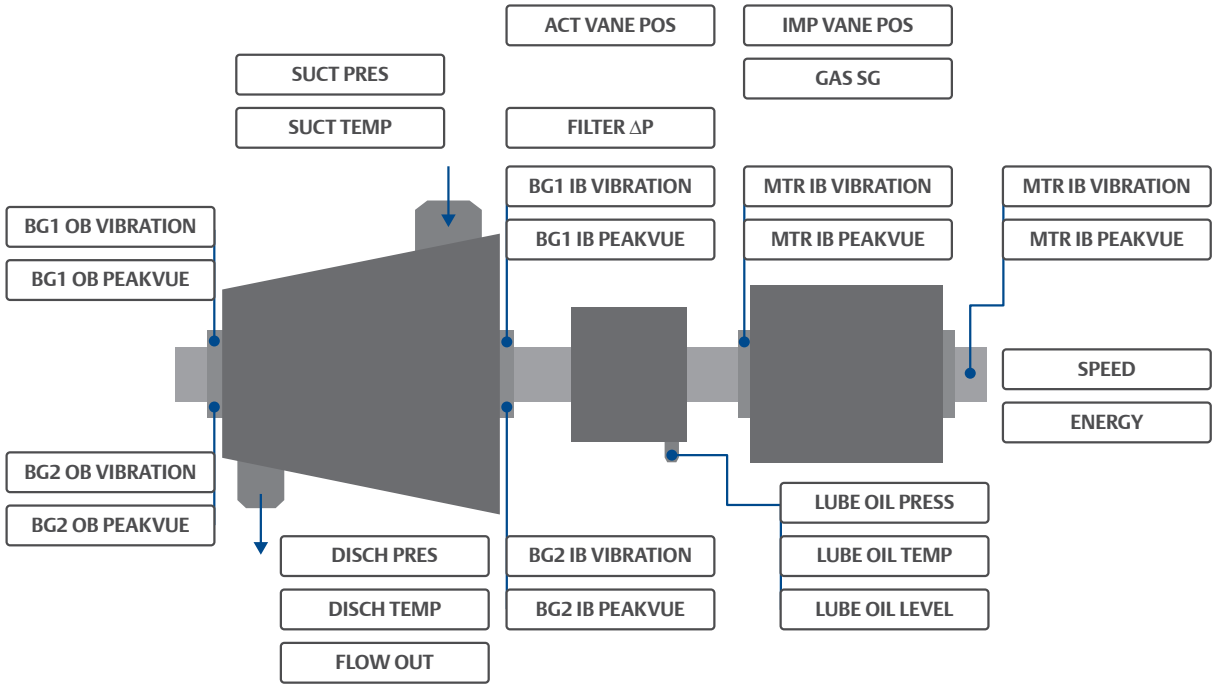
- Supports monitoring of fixed and variable speed air cooled exchangers with fixed or variable louver/pitch position
- Configuration supports:
  - Single vibration sensor (overall and PeakVue™ vibration) and speed indicator for variable frequency drives or louver position sensor
  - Three additional vibration sensors set for other three bearings
  - Two bearing temperature sensors
  - Inlet and outlet air temperature sensors
  - Inlet and outlet process temperature sensors
  - Motor energy measurement
  - Louver position sensor
  - Pitch position sensor
  - Motor run/stop indicator
- Indicates discrepancy in actual and expected louver/pitch position

Calculations and Alarms

- Run/Stop Status
- Run time
- Statistical Performance Calculations (Vibration Monitoring)
- Baseline Capture (Process alarms limits)
- Resonance Frequency Detection
- Pitch actuator Mechanical Defect Detection
- Exchanger Fouling
- Excessive Cooling
- Bearing Fault
- Louver Defect
- Reverse Fan Operation
- Fan Health Indication
  - Vibration Health
  - Alarm Health

Centrifugal Compressors

Module Process Flow Diagram



Features

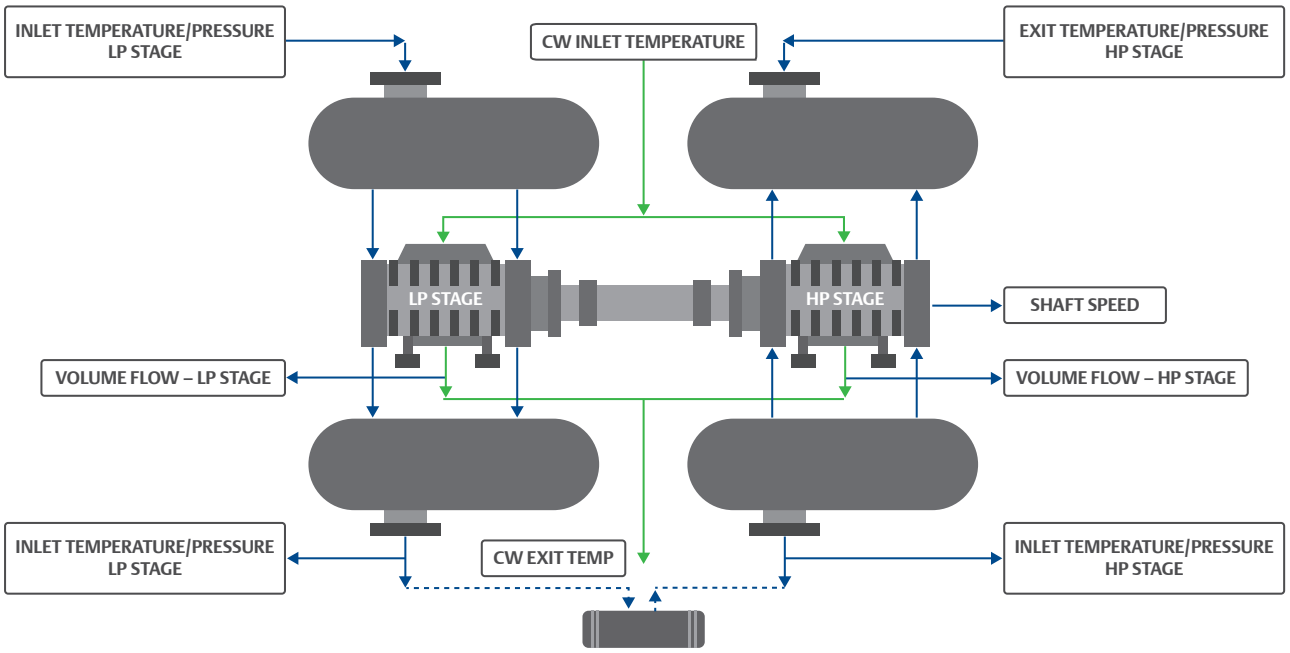
- Supports monitoring or fixed and variable speed compressors with fixed or variable vane
- Configuration supports
  - Single vibration sensor (overall and PeakVue™) and speed indicator for variable frequency drives or vane position sensor.
  - Five additional vibration sensors set for other five bearings
  - Lube oil pressure and temperature sensors
  - Suction and discharge pressure sensors
  - Motor energy measurement
  - Temperature sensors at suction and discharge
  - Output air flow sensor
  - Differential pressure sensor
  - Air filter differential pressure sensor
  - Compressor gas specific gravity measurement
  - Vane position sensor
  - Motor run/stop indicator
- Indicates discrepancy in actual and expected vane position

Calculations and Alarms

- Compressor Run/Stop Status
- Run time
- Statistical Performance Calculations (Vibration Monitoring)
- Baseline Capture (Process alarm limits)
- Compressor Differential Pressure
- Compressor Differential Temperature
- Compressor Instability Detection
  - Pressure Instability
  - Process Instability
  - Flow Instability
- Control Vane Mechanical Defect Detection
- Plugged Suction Filter Detection
- Resonance Frequency Detection
- Plugged Intake Filter
- Bearing Fault
- Spill Back Valve Defect
- Lube Oil Monitoring
- Low/ High Knock Out Drum Levels
- Gas Composition Change
- Compressor Health Indicator

Reciprocating Compressors

Module Process Flow Diagram



Features

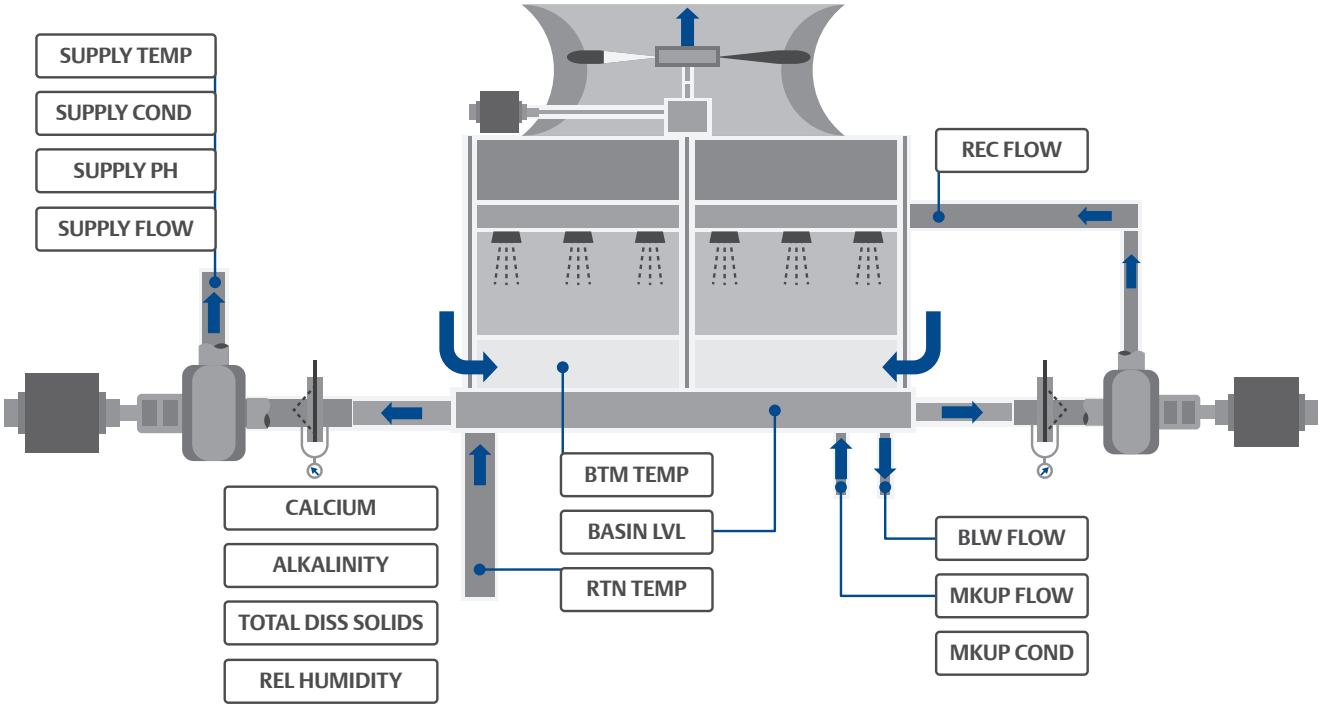
- Supports monitoring or fixed and variable speed compressors with fixed or variable vane
- Configuration supports
  - Single vibration sensor (overall and PeakVue™) and speed indicator for variable frequency drives or vane position sensor.
  - Five additional vibration sensors set for other five bearings
  - Lube oil pressure and temperature sensors
  - Suction and discharge pressure sensors
  - Motor energy measurement
  - Temperature sensors at suction and discharge
  - Output air flow sensor
  - Differential pressure sensor
  - Air filter differential pressure sensor
  - Compressor gas specific gravity measurement
  - Vane position sensor
  - Motor run/stop indicator
- Indicates discrepancy in actual and expected vane position

Calculations and Alarms

- Compressor Run/Stop Status
- Run time
- Statistical Performance Calculations (Vibration Monitoring)
- Baseline Capture (Process alarm limits)
- Compressor Differential Pressure
- Compressor Differential Temperature
- Compressor Instability Detection
  - Pressure Instability
  - Process Instability
  - Flow Instability
- Control Vane Mechanical Defect Detection
- Plugged Suction Filter Detection
- Resonance Frequency Detection
- Plugged Intake Filter
- Bearing Fault
- Lube Oil Monitoring
- Low/ High Knock Out Drum Levels
- Gas Composition Change
- Compressor Health Indicator

Cooling Towers

Module Process Flow Diagram



Features

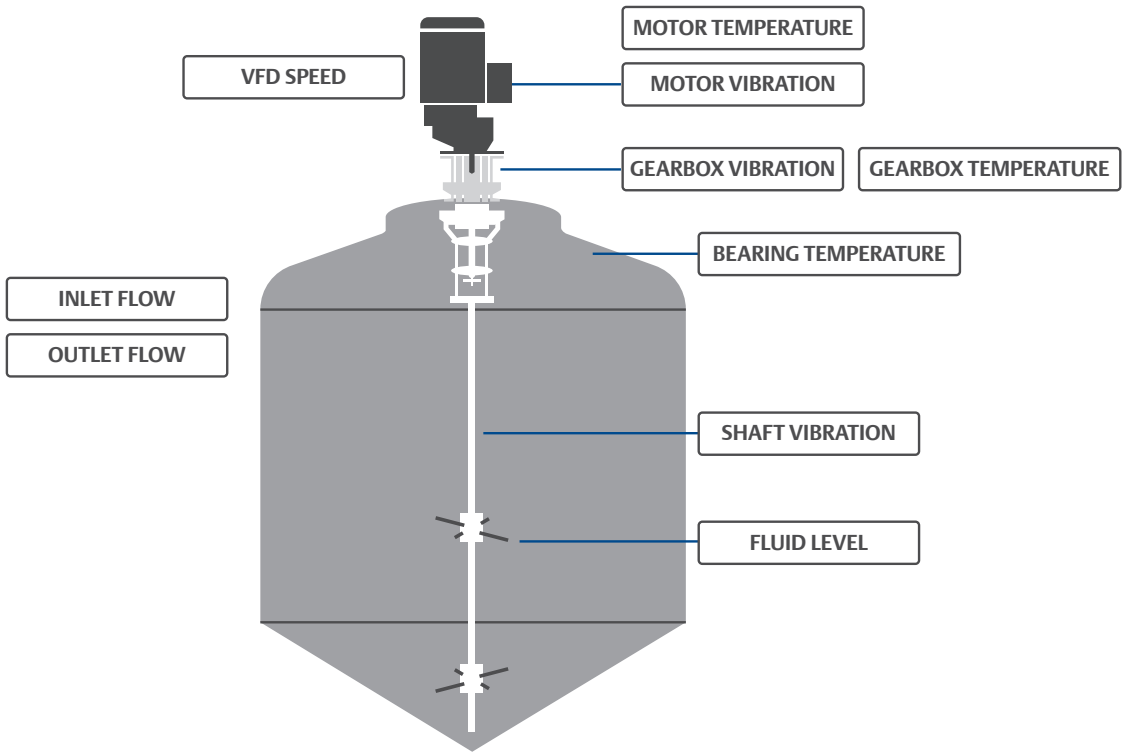
- Supports combination of components for cooling water basins, fans and pumps. Functionality for fans and pumps is the same as air cooled exchangers and other types of pumps
- Configuration of cooling water basin supports:
  - Tower bottom air temperature sensor
  - Cooling Water supply temperature sensor
  - Cooling Water return temperature sensor
  - Water Conductivity sensor
  - Water pH sensor
  - Basin Water level sensor
  - Supply Flow sensor
  - Recirculation Flow sensor
  - Blowdown Flow sensor
  - Makeup Flow sensor
  - Makeup Conductivity sensor
  - Hardness in water as CaCO3 input
  - Alkalinity as CaCO3 input
  - Total Dissolved Solids input
  - Relative Humidity input

Calculations and Alarms

- Baseline Capture (Process alarm limits)
- Cooling Tower Efficiency
- Evaporative Loss
- Recommended Blowdown Flow
- Recommended Makeup Flow
- Cycles of concentration
- Water pH Alerts
- Low Water Supply Flow
- Hydrocarbon Leak in the Basin
- Total Dissolved Solids
- Saturation Index
- Equipment Run Time
- Asset (pump and fan) faults
- Cooling Tower Health Indicator
  - Vibration Health
  - Alarm Health

Agitators

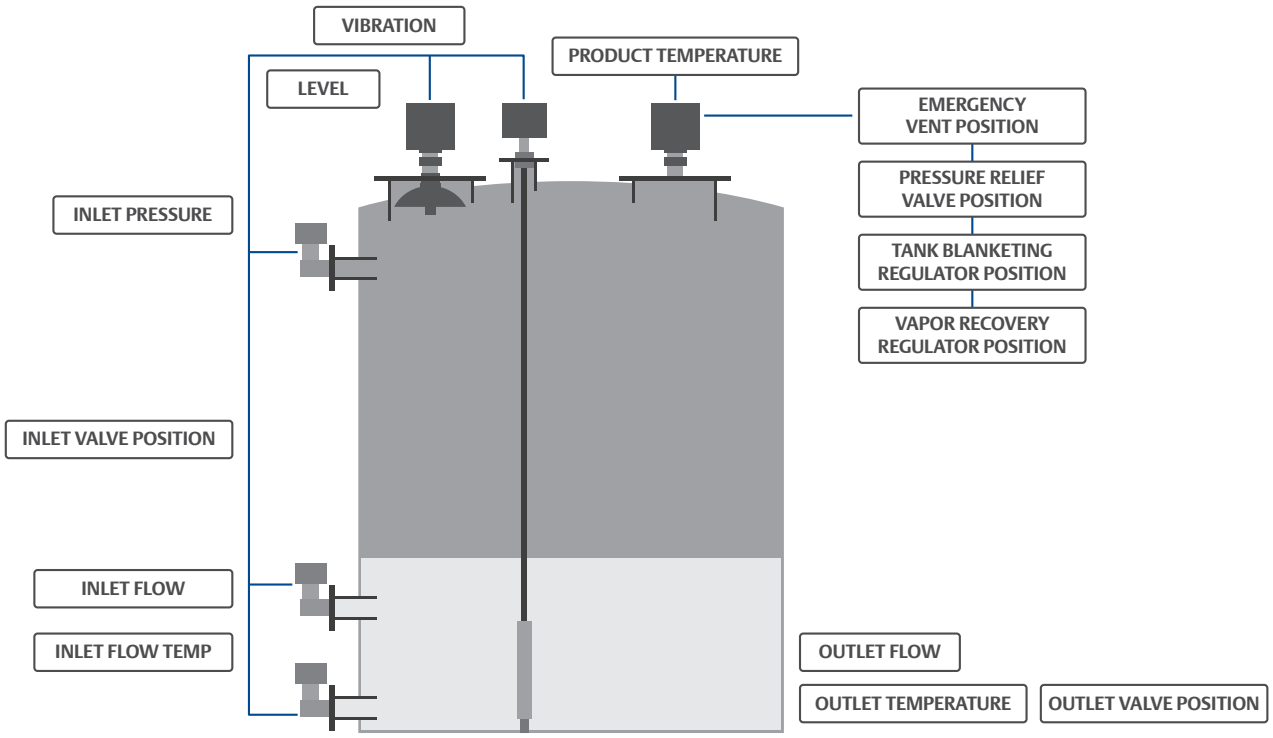
Module Process Flow Diagram



Features	Calculations and Alarms
■ Configuration of agitator supports: ● Motor Vibration sensor ● Gearbox Vibration sensor ● Agitator Shaft vibration sensor ● Bearing Temperature sensor ● Gearbox Temperature sensor ● Motor Temperature sensor ● Level measurement of the fluid ● Agitator Inlet Flow ● Agitator Outlet Flow ● Motor VFD Speed	■ Baseline Capture (Process alarm limits) ■ High/ Increase Gearbox Vibration ■ High/ Increase Shaft Vibration ■ High/ Increase Motor Vibration ■ Inlet flow alerts ■ Outlet flow alerts ■ Gearbox temperature monitoring ■ Bearing Temperature monitoring ■ Motor Temperature monitoring ■ Speed alert

Tank

Module Process Flow Diagram



Features

- Tank monitoring application supports the configuration of:
  - Inlet Flow sensor
  - Inlet Flow Temperature sensor
  - Outlet Flow sensor
  - Outlet Flow Temperature sensor
  - Product Temperature sensor
  - Level sensor
  - Pressure sensor
  - Inlet Valve position
  - Outlet Valve position

Optional Measurement Inputs

- Pressure Valve Relief Valve Relief/Vacuum Position
- Emergency Vent Position
- Tank Blanketing Regulator Position
- Vapor Recovery Regulator Position

Calculations and Alarms

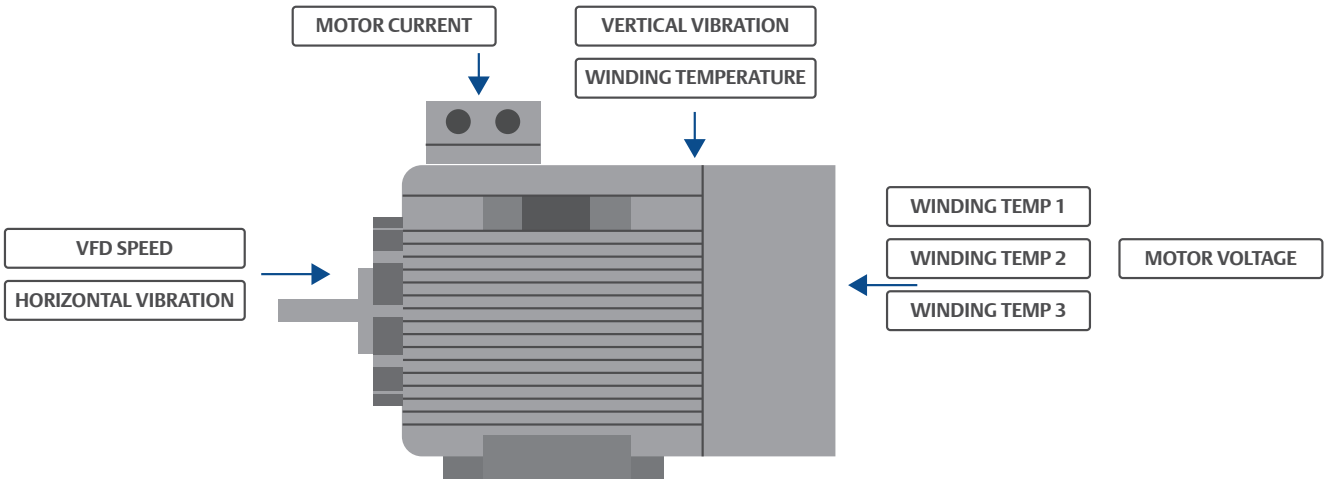
- Baseline Capture (Process alarm limits)
- Inlet/Outlet Flow Monitoring
- Inlet/ Outlet Fluid Temperature Monitoring
- Tank Product Temperature Monitoring
- Tank Pressure monitoring
- Fluid Density Monitoring
- Tank level Overfill/Empty Alert
- Time to fill alert
- Time to drain alert
- Unexpected tank movement alert

Optional Calculated Outputs

- Emergency Overpressure alert
- Under pressure event
- Vapor Space error alert
- Blanketing Error alert

Electric Motor

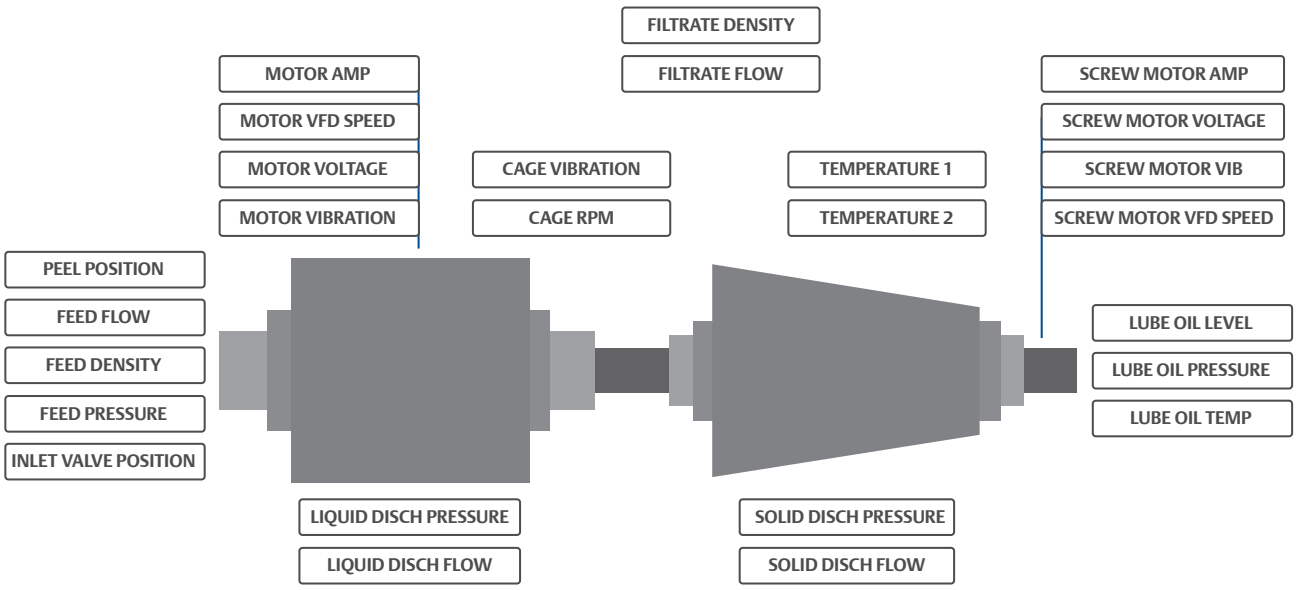
Module Process Flow Diagram



Features	Calculations and Alarms
■ Configuration of Electric Motor supports: ● Speed Input from the Variable Frequency Drive ● Horizontal Vibration ● Vertical Vibration ● Motor Temperature ● Motor Current ● Motor Volage (Line to Line) ● Winding Temperature measurement	■ Baseline Capture (Process alarm limits) ■ Speed monitoring ■ Temperature monitoring ■ High/ Increase Motor Vibration ■ Motor Efficiency monitoring ■ Bearing Fault monitoring ■ Motor Torque monitoring ■ Overamps current monitoring ■ Stator Condition Monitoring ■ Voltage Imbalance monitoring

Centrifuges

Module Process Flow Diagram



Features

- Configuration of centrifuge includes following inputs
  - Motor Amps sensor
  - Motor Voltage sensor
  - VFD Speed sensor
  - Motor Vibration
  - Cage Vibration
  - Cage RPM
  - Cage Inner Diameter
  - Feed Flow
  - Feed Density
  - Inlet Valve Position
  - Feed Pressure
  - Filtrate Flow
  - Filtrate Density
  - Peel Position
  - Liquid /Solids Discharge Flow
  - Liquid / Solids Discharge Pressure
  - Centrifuge Temperature
  - Lube Oil Level
  - Lube Oil pressure
  - Lube Oil Temperature
  - Screw Motor Amps & Voltage
  - Screw Motor VFD Speed & Vibration

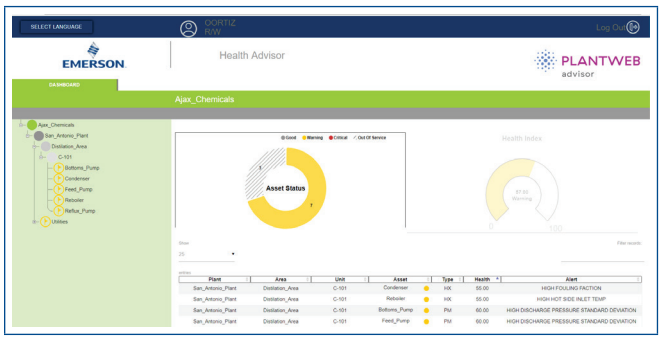
Calculations and Alarms

- Baseline Capture (Process alarm limits)
- High/ Increase Motor Vibration
- High/ Increase Cage Vibration
- Belt Slippage
- Excess Load
- Cage Integrity
- Peeler Failure
- Plugged Feed Nozzle
- Current Monitoring
- Voltage Monitoring
- Temperature Monitoring
- Fluid Flow Rate of Change
- Centrifuge Separation Efficiency
- Unexpected Filling Event
- Plugged Liquid Discharge Nozzle
- Plugged Solid Discharge Nozzle
- Lube Oil System Failure

User Interface

The primary user interface to the Health Advisor system is through a web based application designed for PCs as well as mobile device users. The web interface uses a tree structure to navigate between sites, plant areas, process units and assets. The user view has a similar look and feel at each level, with more detail added as the user drills down into the specific assets.

At the Client, Plant, Area and Unit levels of the hierarchy, a list of the assets in that part of the hierarchy is shown with their overall status, active alerts and their health values as shown below. The user can sort on any column by just clicking to column header. A search field at the top right provides a global search function.



Asset Summary View

From this view, the user is allowed to search, filter and sort by any of the fields in the display. This view provides:

- Quick visual assessment of asset health through status button colors
  - Red - Critical
  - Yellow - Warning
  - Grey - Healthy
- Alarm text and health status (0-100%) indications for each asset
- Icons for each asset that provide shortcuts to the detail pages
- Double-clicking on any of the lines in the display will open a detailed display for that asset.

Asset View

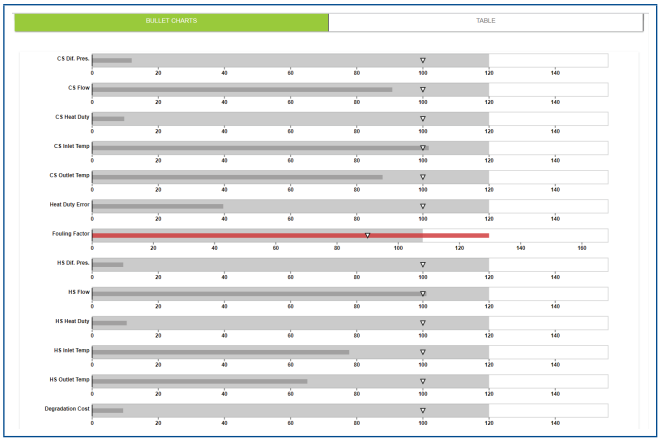
Each asset has a detailed view that provides a quick way to assess the health, active alerts and deviations from baseline. The asset view is divided into three main sections. At the top, a trend chart function provides trending for all the variables monitored for that asset.

Asset Summary View

From the Trend view, a user can:

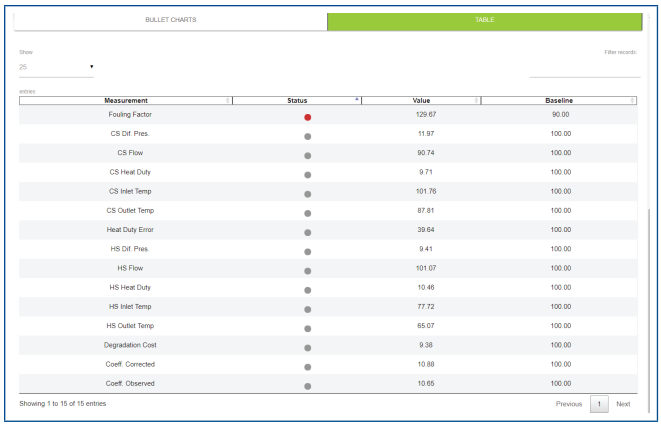
- Choose a timeframe for the chart view: 8 hr, 24 hr, 1 week, 1 month or 1 year
- Select the end-time for the chart using the calendar icon
- Select/deselect variables to be trended Use a scroll bar to look at specific values in the trend

Below the trend chart is a set of bar charts for all of the inputs and KPI calculations to provide a quick visual display of current value for all the variables along with the maximum and minimum alert limits and the baseline value. An example is shown below.



Input and KPI view

Finally, at the bottom of the Asset view is a tabular view of all the inputs, their status, current value and baseline value as shown below.



Input status view

Baseline Capture

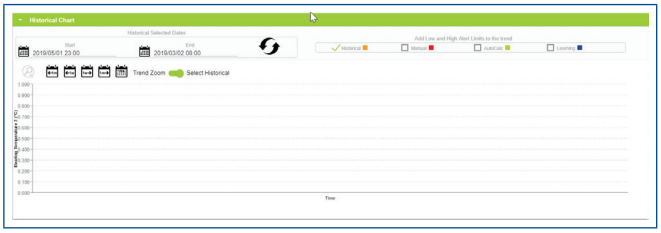
The application has the capability to capture a baseline set of inputs and key performance data during a period when the asset is running normally, which can be used to automatically set default alarms and limits. The Baseline Capture function is only available to authorized users and it requires user action and confirmation.

Baseline for an asset represents a snapshot of normal process conditions when the asset is running. Therefore, whenever the operating conditions change, it should get reflected in a new baseline. When process conditions vary frequently, it might be necessary to capture multiple baselines representing different operating conditions. Plantweb Health Advisor architecture offers a feature which allows a user to save and restore baselines along with associated configuration settings, termed as 'Snapshot'. A snapshot would typically consist of the following data:

- Static baseline values of all process parameters
- Dynamic baseline (signature curve data)
- Alarm limits for all static and dynamic alarms.

With this feature, snapshots can be saved at any point of time during runtime operation and also retrieve any of the previously stored snapshots whenever required.

There are four options available to the user to set the baselines and alerts for the assets that are being monitored. Manual, Auto Limit, Historical & Learning. Manual mode allows the user to set the baselines for each of the asset alerts manually. When Auto-limit feature is turned on, limits are automatically calculated from the baseline value. With the historical mode option, the user can select a historical time frame to capture the baseline for the asset. Based on the timeframe identified, Advisor auto-calculates the baseline and the alert limits associated with all the faults being monitored for the assets



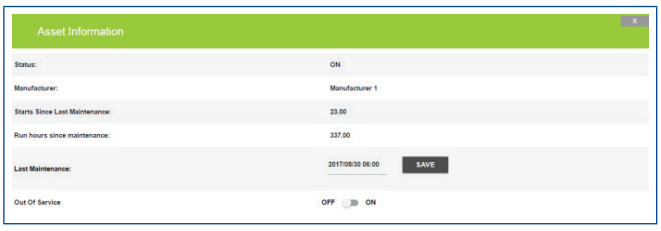
Similarly, with the learning mode, the user can define a time frame in future where the Advisor application needs to learn and auto-calculate the baseline and alert limits for all the faults being monitored for the assets.

Auto Baseline Switch Feature

If the asset has multiple baselines or normal operating conditions based on varying factors such as weather, operating conditions etc, then Advisor application has auto-baseline switch feature in place where advisor would automatically switch the baselines of the asset based on the identified changing operating condition.

Asset Information

Advisor application also provides asset specific information to the end-user and allows the ability to indicate when the asset is in service or not. From this information view a user gets an overview of the asset status, manufacturer, installation date, total number of running hours, and starts and run time since last maintenance.



based on process requirements. Alternatively, an Auto- Limit calculation will set limits based on a deviation from the baseline value. These alarm settings can be adjusted online at any point in the future.

Alarm Limit Configuration

Vibration parameter limits: this alarm limit will be available only for rotary type of asset (pump, blower, air cooled heat exchanger, compressor, etc.). The vibration limits are calculated based on the motor speed using IEC rotary equipment guides, for:

- Overall vibration (OV)
- PeakVue™ (PKV) – Emerson's patented technology for detecting metal impacting in rolling element bearings

Each of the vibration limit values for both peak impact shown as PKV and overall vibration shown as OV can be adjusted by a user configurable parameter. This provides user flexibility to fine tune the sensitivity of the vibration alarm.

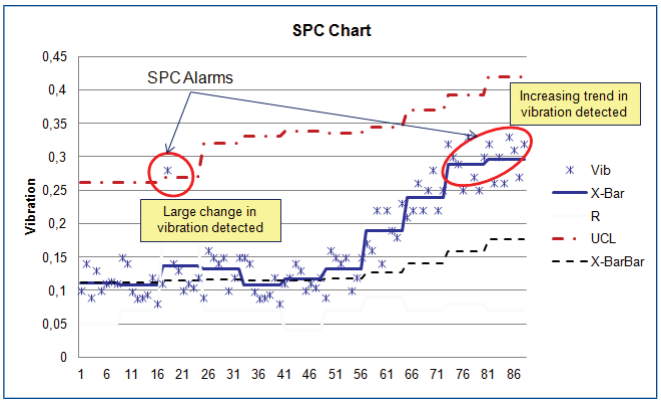
- Process Parameters (Non Vibration) limits: each input variable can have high and low alarm limits. These are generally calculated from the baseline (BL), based on a calculation formula.
- Save alarm limits: this feature allows users to save any changes made to the alarm limits

Statistical Process Control (SPC)

Statistical Process Control (SPC) techniques are used to determine when there is a statistically significant shift in the vibration readings for fixed speed assets. SPC uses average (XBAR) and ranges (R) of small sets of data compared to a "population" average (XBARBAR) and "population" range (RBAR) for all vibration measurements used. Using these values, an Upper Control Limit (UCL) is calculated.

Using these calculations, two alarms have been defined which continuously monitor the variations in vibration signals over a period of time:

- Vibration increasing trend alarm
- Vibration large change alarm



Vibration monitoring with SPC

Variable state parameter assets

There are a few asset variables like vibration, pressure, etc. that are dependent on the asset load and measured by variables such as speed, control vane, pitch and louver position, etc. (state variable). In this case, instead of a single set of baseline values, the system automatically captures a 'signature' of normal operation for each monitored parameter against its state variable. Alarms are triggered based on a deviation from the expected signature at the current load.

The signature curve can be accessed and edited from the AF configuration page. Signature for variable state parameter assets can be adjusted on-line by authorized users.

Asset Health

Asset health value is an indication of the functional performance of the asset. It is calculated from the active process alarms.

For rotating equipment, the asset health is inferred as minimum of health due to all vibration signals ('Vibration Health') and the health due to other process alarms (pressure, level, temperatures, etc. displayed as 'Alarm Health'). All the health values are scaled from 0 to 100%.

The alarm health is based on the weight of most severe active alarm. The vibration health is based on how close the current vibration value is to its baseline value and configured high alarm limit value. The color of the health value displayed shows how critical the asset condition is:

- Critical (<50%): Red
- Warning (50%-89%): Yellow
- Healthy (90%-100): Grey

Report Package & Notifications

Using the standard PI Datalink Excel Add-in, a user can create any number of custom reports for their assets. Standard report templates can be provided. These customizable reports can consist of a combination of graphical and tabular data. The Plantweb Health Advisor solution also has an available notification option based on PI Notifications. This function will send an email or text to specified individuals when an alert occurs.

Hardware and Software Requirements

Emerson's experts will work with the client to perform the necessary project and site scoping activities to define the hardware required, including any new instrumentation and wireless infrastructure. While wireless devices provide an easy means of adding missing measurements, Plantweb Health Advisor solutions can make use of existing wired or wireless measurements. Emerson has created a number of tools to help determine what instrumentation and wireless capabilities are needed to support a particular site.

The Plantweb Health Advisor equipment models run on an OSIsoft Asset Framework (AF) server. Health Advisor can be installed in conjunction with an existing plant PI system, or Emerson can supply a system as a part of the project. The AF server provides the object model for the equipment monitoring algorithms and context and hierarchy for the real time data feeding the models. The application can be easily integrated with other existing plant historians (IP21, PHD, etc.) through data connectivity solutions from OSIsoft.

The Health Advisor runtime license should cover the desired number of assets. These part numbers are included in the Ordering information section.

System Compatibility

Recommended Microsoft Windows operating systems supported by OSIsoft PI includes Window Server 2008 R2 SP1 or later. OSIsoft Asset Framework 2015 or later is required for the modules and IIS 7.0 or later for the Web Server

Minimum system specifications for a single user system can be found on the OSIsoft Support web page listed below. Server requirements depend on the number of PI elements (or tags) in the system. AF can run on the same server or can be installed on a separate server for large systems. For the latest information on the hardware and software specification, see the OSIsoft Support page: **http://techsupport.osisoft.com**

Web Application Requirements

Current versions of browsers supported for:

- Chrome™
- Mozilla Firefox®
- Safari
- Microsoft Internet Explorer™

Ordering Information

The Plantweb Health Advisor module libraries are licensed on a per-asset basis and will be delivered ready for configuration. The Plantweb Health Advisor module library comes as a set of pre-configured templates in AF. There is a Foundation license which includes the base functions used by all the assets and an Asset license for each type of asset. These part numbers are included in the table below. Note the Foundation license is a system-wide license and the Health Advisor asset modules are licensed per asset.

PC Specifications

Hardware Requirements		
Processor	Minimum CPU Count	4 cores
	Recommended CPU Count	8 cores
Memory	Minimum RAM	16 GB
	Recommended RAM	24 GB
Network	Minimum Bandwidth	10 Mbps
	Recommended Bandwidth	100 Mbps
Storage AF Server	Minimum Local Disk Size	100 GB
	Recommended Disk Size	300 GB

Foundation Licenses

Software License Name	Size	Emerson Part Number
Single Foundation	1 asset	PAS-HA-BASE1
Small Foundation	10 assets	PAS-HA-BASE10
Medium Foundation	11-50 assets	PAS-HA-BASE50
Large Foundation	50+ assets	PAS-HA-BASEMAX

Asset Licenses

Software License Name	Size	Emerson Part Number
Pump Asset (1st)	First pump	PAS-HA-PUMP-UNI1ST
Pump Asset (Additional)	Additional pump	PAS-HA-PUMP-ADDSIM
Heat Exchanger (1st)	First HX	PAS-HA-HX-UNI1ST
Heat Exchanger (Additional)	Additional HX	PAS-HA-HX-ADDSIM
Blower Asset (1st)	First Blower	PAS-HA-BLW-UNI1ST
Blower Asset (Additional)	Additional Blower	PAS-HA-BLW-ADDSIM
Centrifugal Compressor (1st)	First Centrifugal Compressor	PAS-HA-CCMP-UNI1ST
Centrifugal Compressor (Additional)	Additional Centrifugal Compressor	PAS-HA-CCMP-ADDSIM
Reciprocating Compressor (1st)	First Reciprocating Compressor	PAS-HA-RCR-UNI1ST
Reciprocating Compressor (Additional)	Additional Reciprocating Compres-sor	PAS-HA-RCR-ADDSIM
Air Cooled Heat Exchanger (1st)	First Air Cooled HX	PAS-HA-ACHE-UNI1ST
Air Cooled Heat Exchanger (Additional)	Additional Air Cooled HX	PAS-HA-ACHE-ADDSIM
Cooling Towers Asset (1st)	First Cooling Tower	PAS-HA-CT-UNI1ST
Cooling Towers Asset (Additional)	Additional Cooling Tower	PAS-HA-CT-ADDSIM
Agitator Asset (1st)	First Agitator	PAS-HA-AGI-UNI1ST
Agitator Asset (Additional)	Additional Agitator	PAS-HA-AGI-ADDSIM
Tank Asset (1st)	First Tank	PAS-HA-TANK-UNI1ST
Tank Asset (Additional)	Additional Tank	PAS-HA-TANK-ADDSIM
Electric Motor Asset (1st)	First Electric Motor	PAS-HA-MTR-UNI1ST
Electric Motor Asset (Additional)	Additional Electric Motor	PAS-HA-MTR-ADDSIM
Centrifuge Asset (1st)	First Centrifuge	PAS-HA-CENT-UNI1ST
Centrifuge Asset (Additional)	Additional Centrifuge	PAS-HA-CENT-ADDSIM

Related Products

Plantweb™ Advisor Suite: Uses predictive intelligence to improve the availability and performance of key production assets, including mechanical equipment, electrical systems, process equipment, instruments, and valves. This integrated family of diagnostic software applications enables to detect plant equipment problems before they occur and provides the information to make informed decisions.

- Plantweb™ Performance Advisor: Allows to run processes more efficiently, track operating performance against targets, schedule maintenance activities, and determine the root cause of production asset inefficiencies.
- Plantweb™ Energy Advisor: A real-time Energy Management Information System (EMIS) that automates the process of mapping and managing energy consumption, across a site, as it is being consumed. Real- time alerts, dashboards and emails notify decision makers when energy consumption is above expected so that actions may be taken to drive down energy costs.

Plantweb™ Optics: Emerson's Plantweb Optics Platform collects asset data from field-based wired and wireless sensors and delivers information on only the most critical situations, enabling you to make well informed decisions to maintain availability. Plantweb Optics utilizes modern communication tools to deliver alerts to both traditional desktop PCs and laptops as well as the tablets and smart phones available outside the office or plant. Remote accessibility to smart alerts in a secure environment means operators and maintenance personnel alike are on top of the performance of critical production assets at all times.

AMS Device Manager: This application helps users avoid unnecessary costs from unplanned shutdowns and inefficient practices, with a universal window into the health of intelligent field devices.

Based on real-time condition data from intelligent field devices, plant staff can respond fast and take informed decisions on whether to maintain or replace field devices

AMS Machinery Manager: Designed for rotating equipment specialist, AMS Machinery Manager diagnoses and communicates the health of mechanical and rotating machinery using data from several maintenance technologies. The result is a comprehensive view of each monitored machine and a more accurate diagnosis when developing problems are discovered.

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