



TurboChyll min-e

Welcome to **TURBOCHYLL min-e**, the Aftermarket Industry's advanced Electric Chiller Control platform.

TURBOCHYLL min-e is small on size but not on power. Fully integrated with an onboard Program Card Processor (PCP) and powerful ifm efector field sensing elements, this package was developed in compliment to the proven performance and demand of the (larger) TURBOCHYLL Min-e Steam Operating System. Here too, the PCP by design maintains the **TURBOCHYLL**'s proven "software program" which fits neatly on a front loaded 2GB Compact Flash Card. The min-e maintains uniquely powerful control strategies for all high or low pressure chillers including "realized" TPS Surge Avoidance and protection, Part Load and Part Lift- Variable Speed Logic as well as full range Energy Demand. With such features a front end accessible for PID loop is available for local ease in tuning, gain and fine resolution settings without complex laptop consideration. **The min-e is STANDARD fit to function on ANY motor starter, be it electro-mechanical, soft start-solid state or for VSD with compressor pre-swirl integration.**

The **TURBOCHYLL min-e** Control Cabinet is manufactured with the finest industrial "zero screw" components available and runs exclusively on safe Low Voltage 24VDC. Here you will find the brilliantly simply Swivel Docking Blocks, CPU and front loaded Program Card Processors as well as the Front Panel Mounted Graphic Controlled Color 15" Human Interface Display. The Field Mounted Sensors are critically immersed into the varying fluid streams and each maintains LED readouts of pressure and temperatures for convenient operator inspection. No longer is there the need for leaky old mechanical gauges.

Final fit of The **TURBOCHYLL min-e** system includes exclusive retrofitting of old, absent or antiquated step controllers with fine resolution analog actuators, motorized valves, compressor vanes controllers, and analog solenoids. The **TURBOCHYLL** family of end devices offers field fit, carriages; distill tanks, linkages and the like for a perfect final fit of your **Electric Chiller Control System!**



Benefits:

PLC Industrial Automation...NOT microprocessor based!
100% Low Voltage Swivel Cabled (m-12) Platform Connections, NO hardwiring and Screws!
No Programming, Laptop or Propriety Software Ever!
No Complicated Interface, Electrical Construction /Wiring & or Conduits Required!
No Field "Start-Up Complexities" and "Requirements"!

Features:

OMRON PLC Computer Process Unit With Memory Card!
All Industrial IFM Efector Sensors
All M12 Swivel-Type Cables Requiring NO Wiring Terminals
10" Color Maple Human Machinery Interface
Onboard Swivel -Type Mass Docking Station
Broad Range Single Source Sensors R-11, 123-R134-22
Enclosed Pressure Controls, Require No Field Mounting
100% Package Product Turn Key Start-up
Front Panel Configurable For ALL Refrigerants and Graphics
VSD Compatible Using HyperChyll Exchange Logic
All Starter Capability



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TurboChyll **VST - Optimized Compressor Pre-Swirl**

IPLV centrifugal compressor efficiency's and capacity control are afforded through the use of the compressor's internal pre-swirl or pre rotation vane devices. While these devices offer favorable capacity reduction and efficiency in upper load regions, such performance unfavorably degrades as turndown continues. At flow regions less than 60% -this desirable and optimized preswirl of the gas begins to transition into a "dampening corruption" of gas flow -the result is a very significant impact to energy.

Fortunately, when chiller loads are reduced- so are ECWT's, now permitting "head relief" to the compressor. When such conditions are advantageously organized, the turbine drive can be "sloped and derated" favorably along an operating curve reducing overall consumption to fractions. This de-rated turbine "complimentary forces" the variable vanes open ultimately maintaining this optimized preswirl feature.

TurboChyll VST/OCP controllers are polling for this information and correcting to the same once every 1.5 seconds! This energy intended performance is not only occurring literally every moment it is graphically and dynamically displayed for the operator's evaluation. No other controller offers such features for the Aftermarket control offerings to the Steam Turbo Chiller sector.



HyperChyll **Compound Capacity Control**

While affording condenser head relief (reduced entering tower water) and de-rating the driver through the use of Variable Speed Turbine and Optimized Compressor PreSwirl devices are dramatically effective approaches to energy savings-such strategies limit the total available off design capacities. In the case of a multi-chiller installation, compounding the refrigeration effect of one chiller can actually help avoid putting a second chiller on line-while maintaining and solidifying the favorable optimization of compressor preswirl!

HyperChyll Compound Capacity Control logic affords just this. When off design head relief becomes available at anytime, or to any extent our proven TurboChyll VST-OCP Logic quickly and efficiently derates the turbine capacity introducing the highly efficient preswirl effect desired for energy savings. However should the building demand ever increase by more than a single Degree Fahrenheit (leaving fluid) -HyperChyll Compound Capacity Control will activate into the control system. Essentially- an "incremental capacity rerating" of the turbine and compressor shall commence.



SMARTcharge **Integral Charge Efficiency Manager**

Oil carryover in chiller systems have been a burden since the commercialization of our industry.

While necessary for mechanical compressor lubrication, this oil's quickly build in the chiller's refrigerant charge. According to one Journal article, a chiller containing even 3.5% oil may have an energy penalty of nearly 10%, and less contemporary chillers are found to average 13%. This is a cost that can exceed 20% of the chiller's energy consumption bill annually! Traditional attempts to remove these oils are often through the use of fixed motive pumps that try to "find" an assumed level. While this can work, it must "hope" that the chillers skim level is ideal.

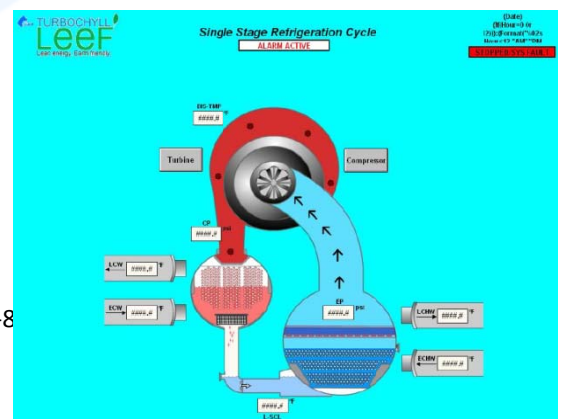
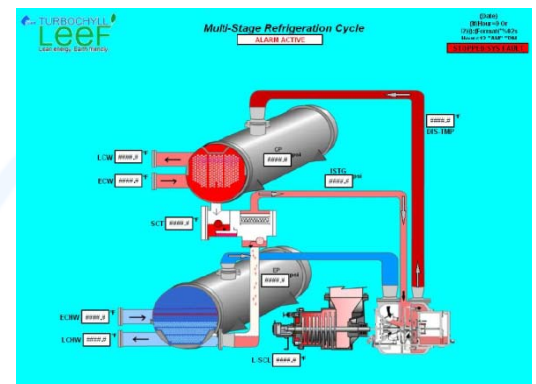
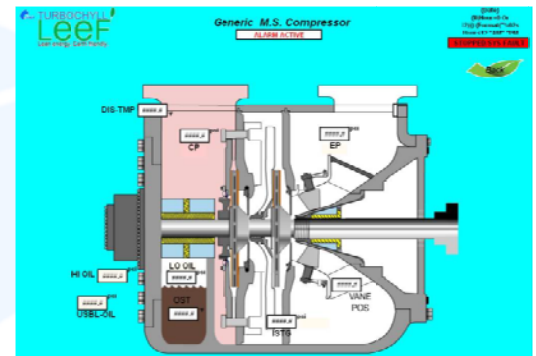


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The SMARTcharge approach instead removes the oil rich chiller charge without the use of any pumps or assumptions. The integral Min-e processor's optical sensor's permit a small transfer of refrigerant to an onboard holding tank for a superheated vapor distillation process, essentially purifying the refrigerant to untraceable oil volumes! The "found" oil now free of damaging liquid refrigerant is redirected back to its intended place in the compressor bearing system eliminating wasteful "oil topping"! No Aftermarket Steam Turbo control package affords such features to energy or the environment!

TURBOCHYLL Min-e Cabinet and Components

- Only Flash Card Processor and Running Routine
- Human Machinery Interface
- Swivel Connector Terminal Docking Station
- Min-eLow Voltage Remote PSM, Power Supply Module
- Min-e Digital IO Interface
- Min-e Multi Stacking Relay Module
- Display Head IFM Effector
- The Graphic Color Animated Refrigeration Cycle, including Compressor
- Systematic Color Sequence of Events
- TURBOCHYLL Variable Speed VSD PART LIFT Capacity Optimization Logic
- TURBOCHYLL- HyperChyll PART LOAD Capacity Optimization Logic
- TURBOCHYLL- SmartCharge Charge Management
- TURBOCHYLL- TurPulSonic (TPS) via Pulse Wave Sensitivity Device (PWSD) Surge Protection, true surge protection
- Diagnostic Display Menu and History
- User and Optimization Trending Screens
- Min-e Maintenance Screens
- Min-eSetpoints and Default Screens
- Min-eOverview Screens
- Bearing Oil Pressure
- Bearing Temperature
- Evaporator Pressure
- Condenser Pressure
- Low Oil Pressure
- High Oil Pressure
- Entering Chilled Water
- Leaving Chilled Water
- Entering Condenser Water
- Leaving Condenser Water
- Discharge Temperature
- Oil Sump Temperature
- Saturated Condenser Refrigerant Temperature
- Delta P, Compressor Lube Filter
- Interstage PSI
- Compressor Bearing Temperature, Tight End





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- Compressor Bearing Temperature, Loose End
- Liquid Line Temperature, Subcooling
- Saturated Evaporator Refrigerant Temperature
- Usable Oil PSI
- Compressor Mechanical, Thrust Bearing Temperature
- Low Evaporator SRT
- Low PSI Mechanical
- High PSI Mechanical
- Evaporator Flow Switch, Solid State
- Condenser Flow Switch, Solid State
- Pre Run Verification Switch
- Aux Safety Input #1
- Aux Safety Input #2
- Aux Safety Input #3
- Aux Safety Input #4
- Front Panel Start PB
- Front Panel Stop PB
- Front Panel Emergency Shutdown PB
- Front Panel Reset PB
- Surge Pulse Detection
- Sump Vent Valve
- PRV Actuator Analog Control
- HGBP Actuator Analog Control
- Compressor Auxiliary Oil Pump
- Compressor Oil Heater Logic "conserve feature"
- SMARTsump Start/Stop
- Common Alarm
- Run Status
- Front Panel Run Light
- Front Panel Alarm Light

