

CEyesHP1 – Heat Pump Engineering Guide

• Overview

- The CEyesHP1 module is the base analysis and diagnostics component used on heat pump systems.
 - Typical applications:
 - HPU
 - CRAC

• Licensing

- Continual-Eyes™ may be licensed on any NiagaraAX® station.
- The base license includes a capacity of 15 points (or modules)
- Additional points (or modules) may be licensed.

• Module Execution Properties

- Module execution rate and duration.
 - Continuous execution:
 - The default settings will enable the CEyesHP1 module to execute at all times after initial execution period. (The beginning of the first hour after the placement of the module or after station restart).
 - Execution properties:
 - [ExecutionPeriod] specifies the amount of time that will pass between successive starts of the execution of the logic within this object. If [ExecutionPeriod] is set to 600 seconds (5 minutes), then the logic will be started at 0 minutes past each hour, 5 minutes past and so on until 55 minutes past. If [ExecutionPeriod] is set to 7200 seconds (2 hours), then the logic will be started at midnight, 2AM, 4AM and so on until 10PM.
 - [ExecutionOffset] allows for the modification of the timing of the execution. It specifies the amount of time into the execution period to wait until executing the logic. If [ExecutionPeriod] is set to 600 seconds (5 minutes) and [ExecutionOffset] is set to 60 seconds (1 minute), then the logic will be started at 1 minute past each hour, 6 minutes past, and so on until 56 minutes past. This allows the “staggering” of object execution.
 - [ExecutionDuration] specifies how long a period of time within each execution period the logic will run. If [ExecutionPeriod] and [ExecutionOffset] are set to 5 minutes and 1 minute, respectively and [ExecutionDuration] is set to 2 minutes, then the logic will run continuously from 1 minute past the hour until 3 minutes past the hour, from 6 minutes past until 8 minutes past, etc.
 - [IterationPeriod] is the rate at which the logic inside the object will execute.
 - [Executing] is a read property to view the current status of the module execution.

- **Alarms**

- **[SFanRunNoCmdAlarm]**

- Description
 - Indication that the supply fan is running without a system command to run.
 - Inputs and Parameters
 - Required connections
 - [SupplyFanCommand]
 - [SupplyFanStatus]
 - Parameters
 - [EnableSFanStatusAlarm]
 - [SFanStatusAlarmDelay] in seconds.

- **[SFanNoProofAlarm]**

- Description
 - Indication that the supply fan is not proving run status with a system command to run.
 - Inputs and Parameters
 - Required connections
 - [SupplyFanCommand]
 - [SupplyFanStatus]
 - Parameters
 - [EnableSFanStatusAlarm]
 - [SFanStatusAlarmDelay] in seconds.

- **[FanRunContinuousAlarm]**

- Description
 - Indication that the supply fan is running continuously.
 - Inputs and Parameters
 - Required connections
 - [SupplyFanStatus]
 - Parameters
 - [EnableSFanContinuousAlarm]
 - [MaxSFanRunTime] in hours.

- **[CompLoopAlarm]**

- Description
 - Indication of an unacceptable modulation or cycling of the control loop.
 - Inputs and Parameters
 - Required connections
 - [CompSignal]
 - Parameters
 - [CompLoopAlarmSetpoint]

- [CompLoopAlarmDelay] in seconds.
- [CompLoopSampleRate] in seconds. This is the rate at which the input is read. Use higher values on slower control loops.
- [CompLoopFilterUpdateTime] in seconds. This is the rate at which the [CompLoopError] is updated. Use higher values on slower control loops.
- [CompLoopFilterStepSize] This is the maximum amount of change in the [CompLoopError] at each [CompLoopFilterUpdateTime].
- Calculated values or other parameters
 - [CompLoopError] (Read Only)

- **[CoolMinDeltaTAlarm]**
 - Description
 - Indication of low differential temperature across the air coil.
 - Inputs and Parameters
 - Required connections
 - [Comp1Command]
 - [Comp2Command]
 - [RevValve]
 - [DischAirTemp]
 - [InletAirTemp]
 - Parameters
 - [DischAirDeltaTAlarmEnable]
 - [DischAirDeltaTAlarmDelay] in seconds.
 - [RevValveEnergHeat] true = energize on heat / false = energize on cool
 - [CoolMinDeltaT]

- **[CoolMaxDeltaTAlarm]**
 - Description
 - Indication of high differential temperature across the air coil.
 - Inputs and Parameters
 - Required connections
 - [Comp1Command]
 - [Comp2Command]
 - [RevValve]
 - [DischAirTemp]
 - [InletAirTemp]
 - Parameters
 - [DischAirDeltaTAlarmEnable]
 - [DischAirDeltaTAlarmDelay] in seconds.
 - [RevValveEnergHeat] true = energize on heat / false = energize on cool
 - [CoolMaxDeltaT]

- **[HeatMinDeltaTAlarm]**

- Description
 - Indication of low differential temperature across the air coil.
- Inputs and Parameters
 - Required connections
 - [Comp1Command]
 - [Comp2Command]
 - [RevValve]
 - [DischAirTemp]
 - [InletAirTemp]
 - Parameters
 - [DischAirDeltaTAlarmEnable]
 - [DischAirDeltaTAlarmDelay] in seconds.
 - [RevValveEnergHeat] true = energize on heat / false = energize on cool
 - [HeatMinDeltaT]
- **[HeatMaxDeltaTAlarm]**
 - Description
 - Indication of high differential temperature across the air coil.
 - Inputs and Parameters
 - Required connections
 - [Comp1Command]
 - [Comp2Command]
 - [RevValve]
 - [DischAirTemp]
 - [InletAirTemp]
 - Parameters
 - [DischAirDeltaTAlarmEnable]
 - [DischAirDeltaTAlarmDelay] in seconds.
 - [RevValveEnergHeat] true = energize on heat / false = energize on cool
 - [HeatMaxDeltaT]
- **[HpLoopMinDeltaTAlarm]**
 - Description
 - Indication of low differential temperature across the HP Loop coil.
 - Inputs and Parameters
 - Required connections
 - [Comp1Command]
 - [Comp2Command]
 - [HpLoopInletTemp]
 - [HpLoopOutletTemp]
 - Parameters
 - [HpLoopAlarmEnable]

- [HpLoopTempAlarmDelay] in seconds.
- [HpLoopMinDeltaT]

- **[HpLoopMaxDeltaTAlarm]**
 - Description
 - Indication of high differential temperature across the HP Loop coil.
 - Inputs and Parameters
 - Required connections
 - [Comp1Command]
 - [Comp2Command]
 - [HpLoopInletTemp]
 - [HpLoopOutletTemp]
 - Parameters
 - [HpLoopAlarmEnable]
 - [HpLoopTempAlarmDelay] in seconds.
 - [HpLoopMaxDeltaT]

- **[HpLoopInletTempNotOptimal]**
 - Description
 - Indication HP Loop inlet temperature outside of range for optimal unit performance.
 - Inputs and Parameters
 - Required connections
 - [Comp1Command]
 - [Comp2Command]
 - [HpLoopInletTemp]
 - Parameters
 - [HpLoopAlarmEnable]
 - [HpLoopTempAlarmDelay] in seconds.
 - [HpLoopMinInletTemp]
 - [HpLoopMaxInletTemp]

- **[EmergHeatLoopAlarm]**
 - Description
 - Indication of an unacceptable modulation or cycling of the control loop.
 - Inputs and Parameters
 - Required connections
 - [EmergHeatSignal]
 - Parameters
 - [EmergHeatLoopAlarmSetpoint]
 - [EmergHeatLoopAlarmDelay] in seconds.
 - [EmergHeatLoopSampleRate] in seconds. This is the rate at which the input is read. Use higher values on slower control loops.

- [EmergHeatLoopFilterUpdateTime] in seconds. This is the rate at which the [EmergHeatLoopError] is updated. Use higher values on slower control loops.
- [EmergHeatLoopFilterStepSize] This is the maximum amount of change in the [EmergHeatLoopError] at each [EmergHeatLoopFilterUpdateTime].
- Calculated values or other parameters
 - [EmergHeatLoopError] (Read Only)

- **[EmergHeatMinDeltaTAlarm]**
 - Description
 - Indication of low differential temperature across the emergency heating component.
 - Inputs and Parameters
 - Required connections
 - [EmergHeatSignal]
 - [DischAirTemp]
 - [InletAirTemp]
 - Parameters
 - [EmergHeatAlarmEnable]
 - [EmergHeatAlarmDelay] in seconds.
 - [EmergHeatEffectiveFullOn]
 - [EmergHeatMinDeltaT]

- **[EmergHeatMaxDeltaTAlarm]**
 - Description
 - Indication of high differential temperature across the emergency heating component.
 - Inputs and Parameters
 - Required connections
 - [EmergHeatSignal]
 - [DischAirTemp]
 - [InletAirTemp]
 - Parameters
 - [EmergHeatAlarmEnable]
 - [EmergHeatAlarmDelay] in seconds.
 - [EmergHeatEffectiveOn]
 - [EmergHeatMaxDeltaT]

- **[EmergHeatExcessRunAlarm]**
 - Description
 - Indication emergency heat excessive continuous run time.
 - Inputs and Parameters
 - Required connections
 - [EmergHeatSignal]
 - Parameters
 - [EmergHeatRunTimeAlarmEnable]

- [EmergHeatMaxRunTime] in seconds.
- [EmergHeatEffectiveOn]

- **[OaDamperOpenInUnocc]**
 - Description
 - Indication that the fresh air damper is open in the unoccupied mode.
 - Inputs and Parameters
 - Required connections
 - [OccupiedSig]
 - [OaDamper]
 - Parameters
 - [OaDamperAlarmDelay] in seconds.

- **[ZeroEnergyMaxDeltaTAlarm]**
 - Description
 - Indication that there is an unacceptable differential temperature between the HPU inlet and outlet air when the system is in fan only mode.
 - Inputs and Parameters
 - Required connections
 - [Comp1Command]
 - [Comp2Command]
 - [EmergHeatSignal]
 - [DischAirTemp]
 - [InletAirTemp]
 - Parameters
 - [ZeroEnergyAlarmEnable]
 - [ZeroEnergyAlarmDelay] in seconds.
 - [EmergHeatEffectiveOff]
 - [ZeroEnergyMaxDeltaT]

- **[AnyAlarm]**
 - Description
 - Indication of any alarm active with this module. Primarily used for system alarm indication or to share into an associated module's [AssocAlarm] input.
 - Optional Input
 - [AssocAlarm] is used to indicate alarm condition of associated modules.
 - Operation
 - [AnyAlarm] will be initiated:
 - When any of the alarms above are initiated
 - OR
 - [AssocAlarm] = true

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