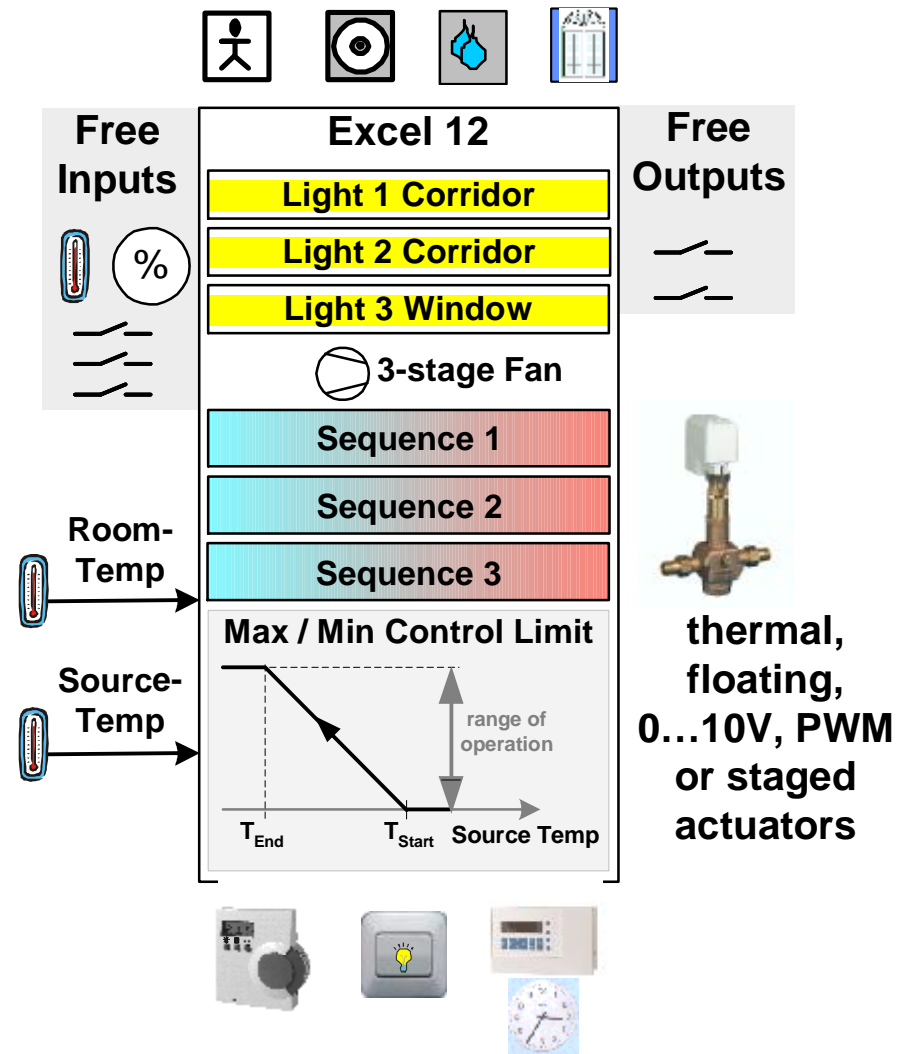


Excel 12 FCU + Light Application

Excel 12

THE solution for
Integrated Room Control



Honeywell

Excel 12 - Objectives

Objectives:

- ∅ Reduced total loop cost
- ∅ Increased functionality
 - HVAC application with 3 sequences and control limits
 - Lighting with 3 light loops (up to 2 constant light control lamps)
 - Free input for monitoring via LON
 - Free outputs for switching of equipment via LON

PAST

2-Controller Solution

Philips Light Controller

Honeywell XL10

FCU + chilled ceiling



NOW



All in One Solution
Excel 12
3 HVAC sequences + 3 Lights

Excel 12 - Market Drivers

Market Drivers:

∅ Lower Energy Cost & Integrate Operations

XL12 integrates light and HVAC functions in one controller and provides additional energy savings through constant light control.

Example:

Fluorescent lamps are in general 20 % over dimensioned because the efficiency of fluorescent lamps is reduced over the time. With constant light control the light output can be reduced by 20 % to achieve the required light level. This saves a lot of energy during the first 2 years of the lamps life time. Further savings are achieved as the light level is automatically adapted to the available sun light.

∅ Increase Flexibility

Easy adaptation to changed room usage via configuration change (e.g. master slave binding) instead of re-wiring.



Main Goals Users Wish to Accomplish Through Building Automation Investments
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Excel 12 – Advantages of an Integrated Solution

Advantages of an Integrated Solution

∅ All control functions included in one unit

- Reduced device and installation cost
- Price advantage compared to solutions involving expensive integration of 3-rd party devices
- Hard wired sensors can be easily shared.
Example: A hard wired occupancy sensor is used for HVAC and light control.

∅ Reduced services

- Reduction of technical clarification (no time consuming 3-rd party integration)
- Reduced bindings thanks to compact device (1 node instead of 2 nodes)

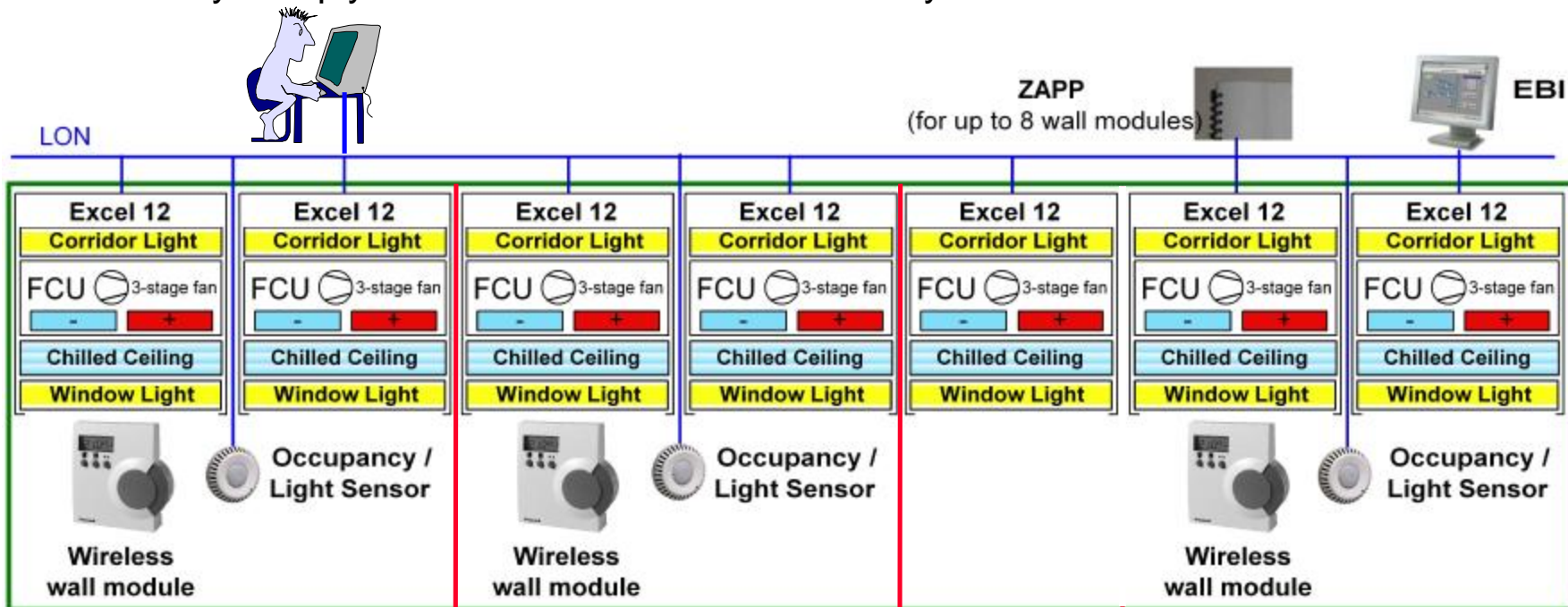
∅ No restriction of the openness

- Supports LONMARK®
- LNS plug-in and device resource files are available

Excel 12 – Flexible Room

Flexible Room:

- ∅ A room consists of several zones. Each zone includes the complete functionality for HVAC and lighting. Over the time it is often required to change the room layout, e.g. a room may be enlarged and includes now 3 zones instead of 2.
- ∅ Excel 12 helps you to adapt to a changed room usage by means of software re-configuration instead of re-wiring.
- ∅ Wireless wall modules (ZAPP) in combination with Excel 12 are providing additional flexibility. Simply move the wall module wherever you need it.



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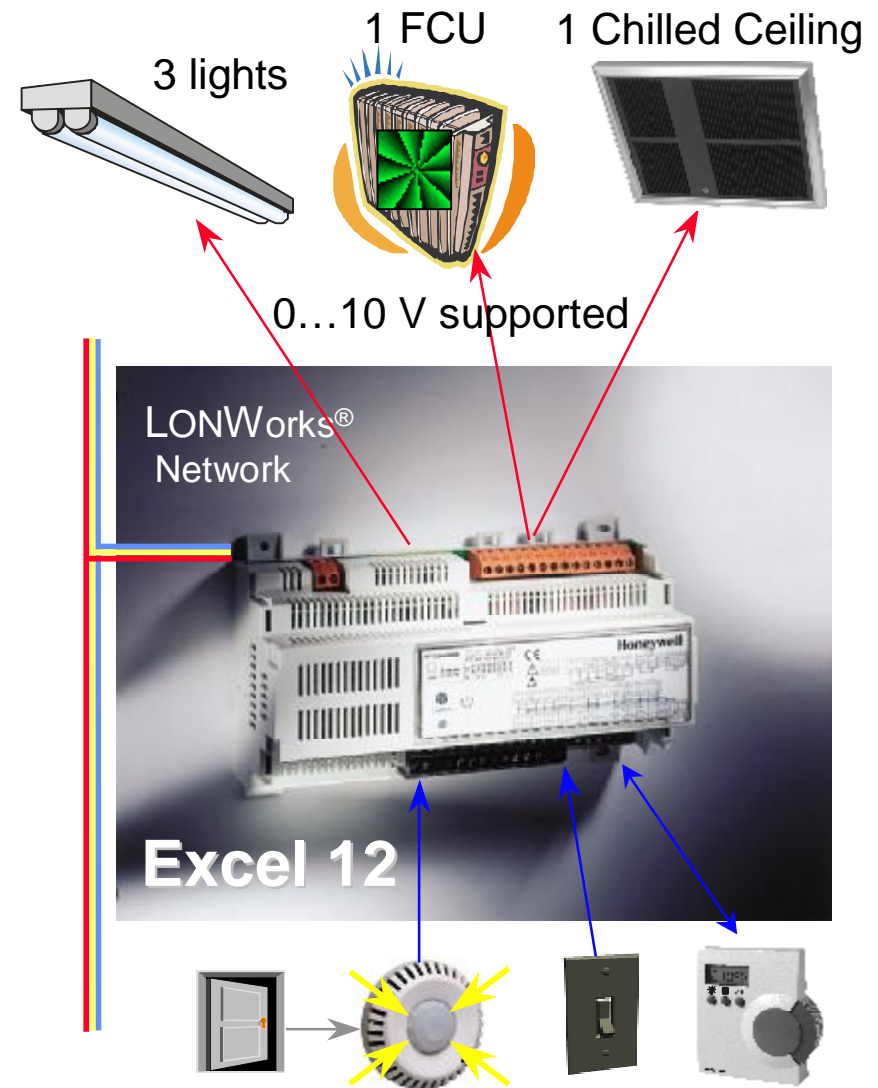
Excel 12 – Application Overview

HVAC:

- ∅ 3 sequences, e.g. FCU + chilled ceiling or 2 heating sequences and 1 cooling sequence etc.
- ∅ Cooling valve closed in case of condensation
- ∅ 3-stage fan
- ∅ Maximum and minimum control limits, e.g. chilled ceiling output has at least 18 degrees Celsius (configurable)
- ∅ Different actuators types (thermal, floating, 0...10V, PWM, staged).
- ∅ Energy hold off function

3 Lights:

- ∅ Constant light control and dimming for up to 2 lights
- ∅ Switching of 3 lights depending on central command, manual command, occupancy and light level
- Grouping of lights (up to 3 lights switched via one push button)



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Excel 12 – Application Overview

Free Inputs:

∅ Unused analog or digital inputs may be used for monitoring via LON.

XL12 supports the following input types:

- § 1 x temperature input
- § 1 x percentage input (0..10Vdc or 2...10Vdc)
- § 3 x digital inputs.

Free Outputs:

∅ Up to 2 unused digital outputs (relay or triac) may be switched via LON.

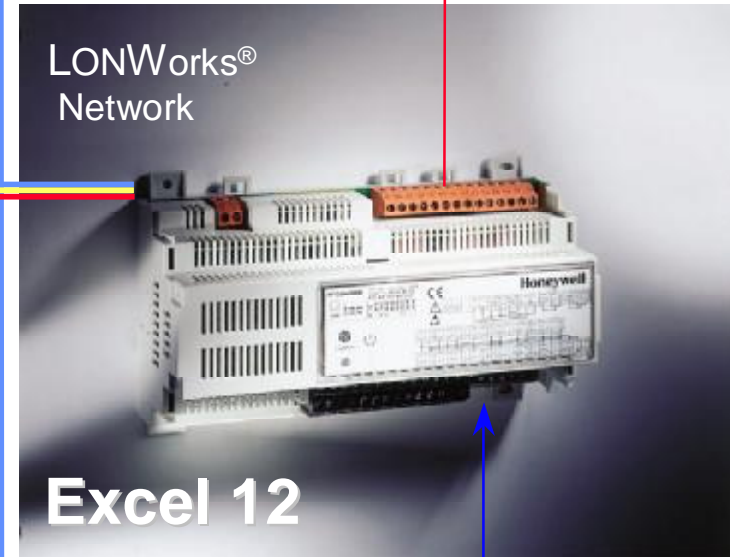
Examples for the usage of this features:

- ∅ XL500 uses an analog input to monitor the humidity in a room and a relay output in the XL12 to switch On/Off a dehumidifier in a room.
- ∅ An analog input is used to monitor a temperature in the room
- ∅ A relay output is used to open / close a sunblind (total up / down)

Dehumidifier



LONWorks®
Network



Excel 12

T7560B1008-HUM
Temperature
+
Humidity



Honeywell

Excel 12 – Application Overview

Configurable Application:

3 Sequences:

Heat / Cool or Change-over
 Actuator options:
 Thermal / staged / floating
 or analog configurable

Control Limits:

Max / min heat or cool

3 Speed Fan

Wall Module:

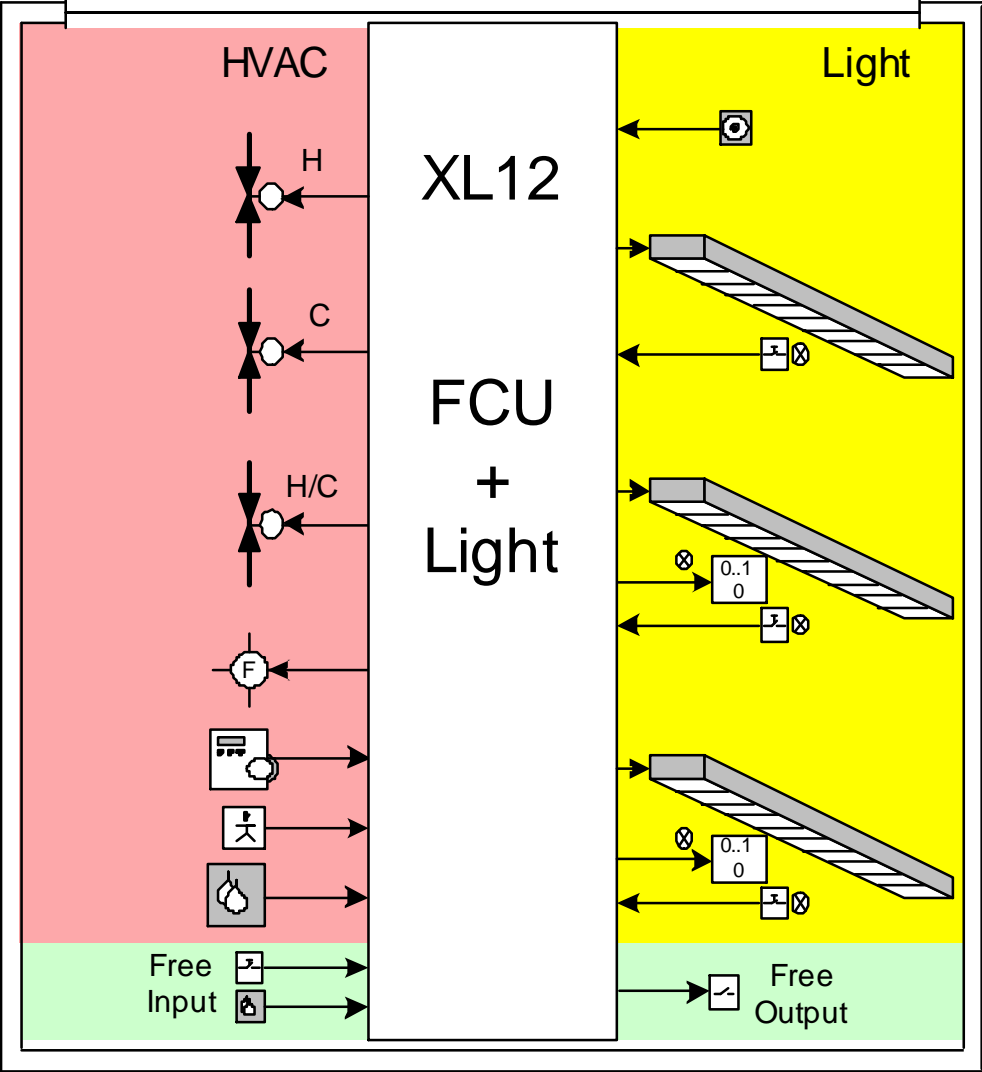
Room Temp.+fan speed or
 Bypass+set point+LED out

Occupancy Sensor

Condensation Switch

Free Inputs:

Temperature / percentage
 or digital



Light Sensor

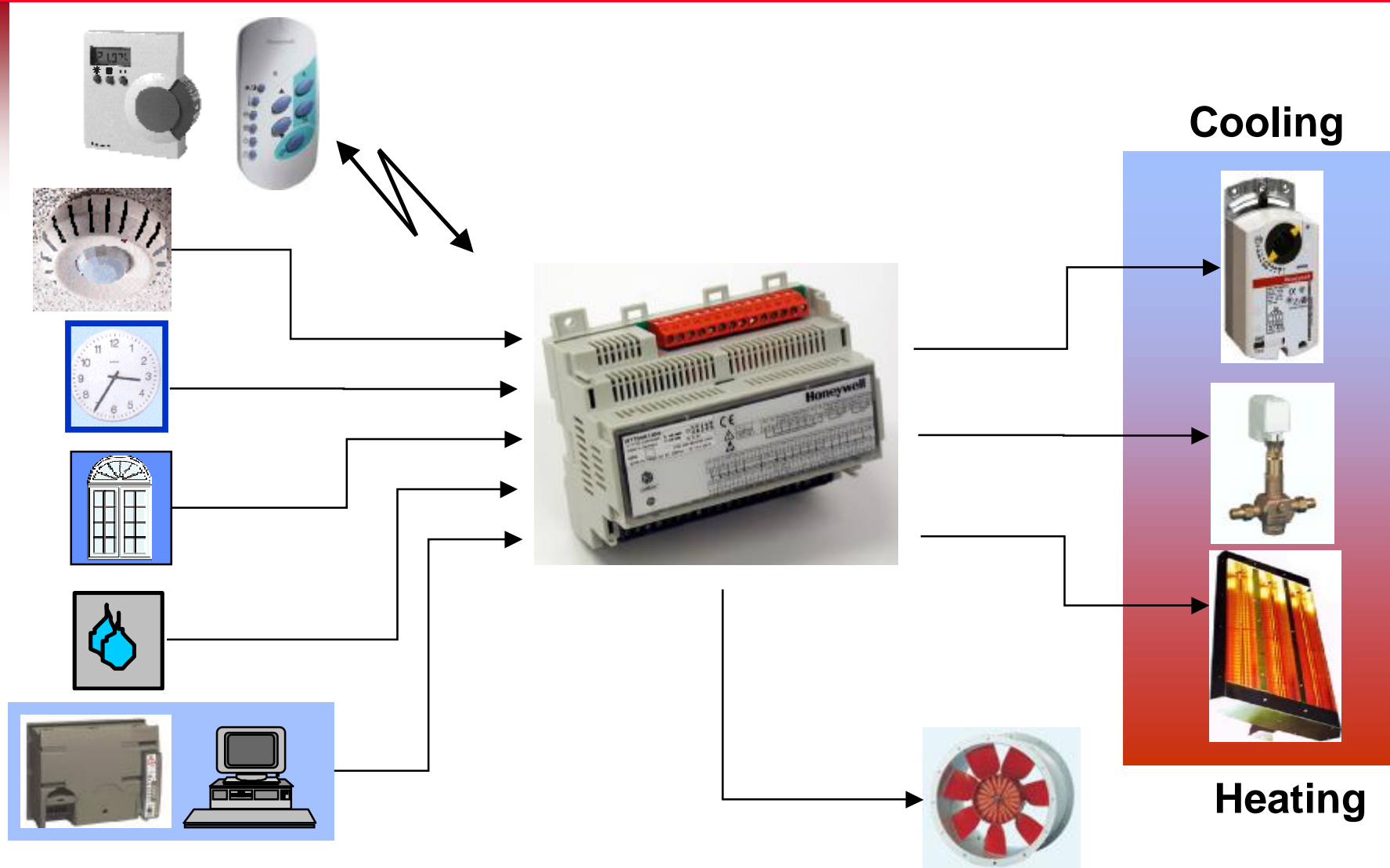
1 x Light:
 On / Off

2 x Light:
 Constant light / dimming
 or On / Off

Free Digital Outputs

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Excel 12 – Temperature Control



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Excel 12 – Temperature Control

Overview:

∅ LONMark profiles “Space Comfort Controller” and “Occupancy Sensor” supported

∅ Functions

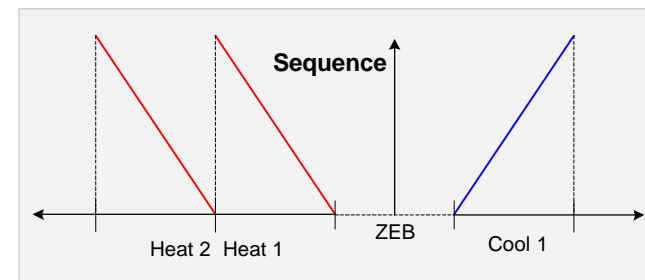
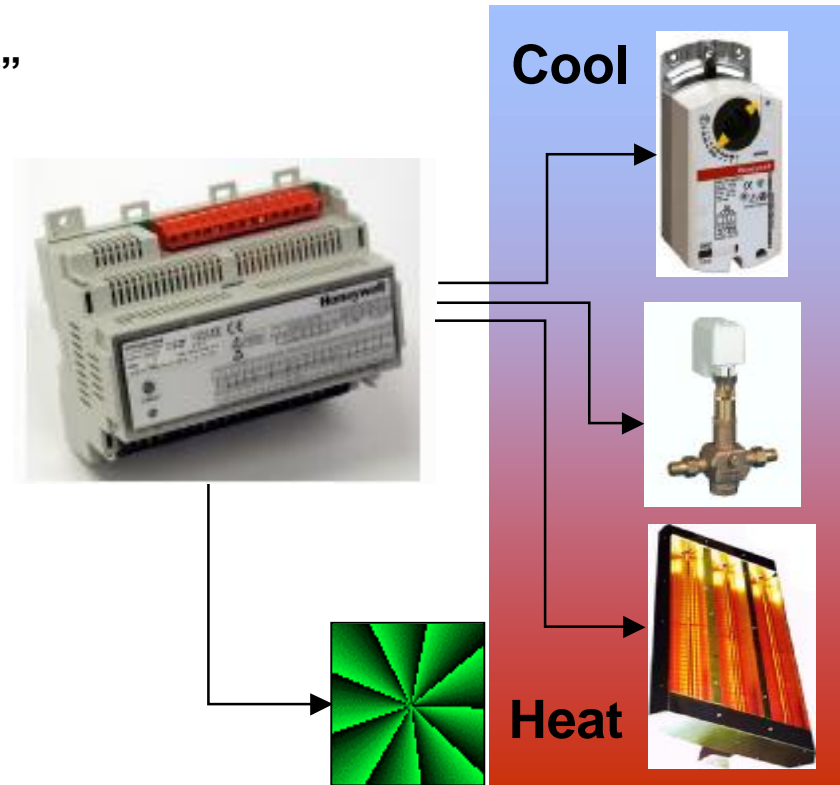
- Three sequences with zero energy band
- Changeover operation
- Chilled ceiling control with condensation switch
- Two control limits (min/max heat or cool)

∅ Physical outputs

- Floating
- Staged output (1 to 3)
- PWM outputs
- Thermal actuators

∅ Fan control

- Up to three-stage fan with three relays 6 A at NO contact



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Excel 12 – Temperature Control

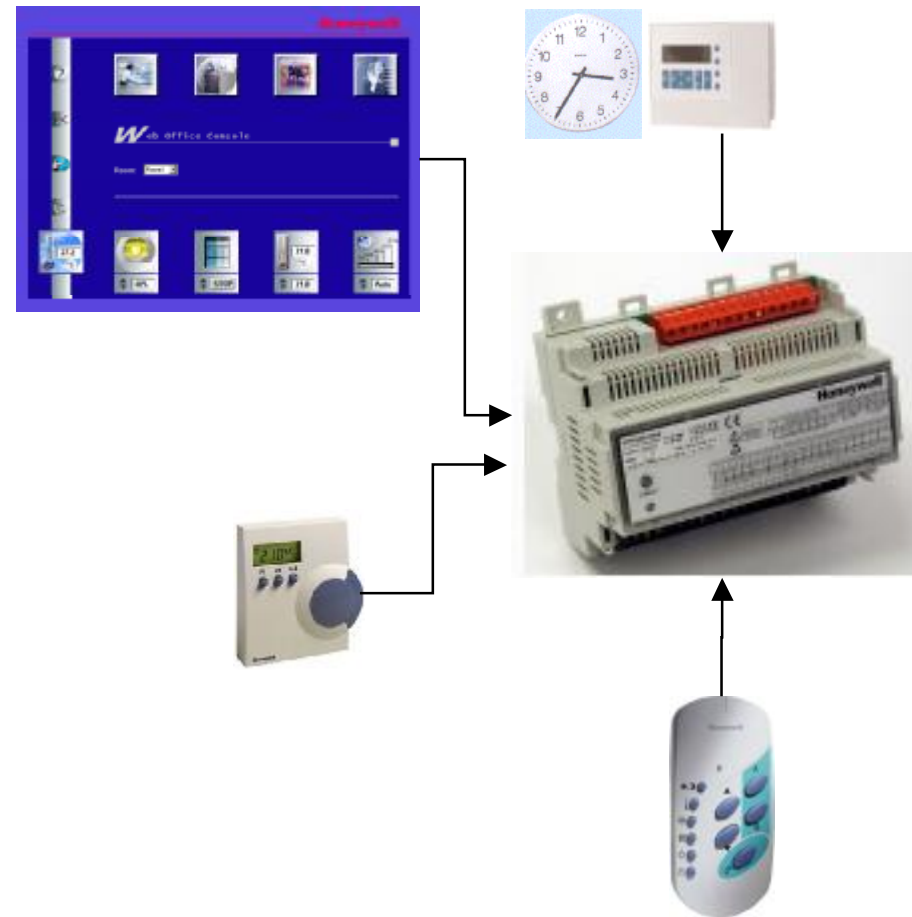
Operation:

∅ Physical inputs

- Room temperature
- Set-point adjustment, absolute or relative
- Fan speed switch 0-A-1-2-3
- Occupancy sensor input

∅ Network variables for LON access, e.g. from WOC, EBI, XL500 controller or wireless wall module / hand-held via ZAPP

- Room temperature
- Set-point adjustment
- Fan speed command
- Occupancy mode



Excel 12 – Temperature Control

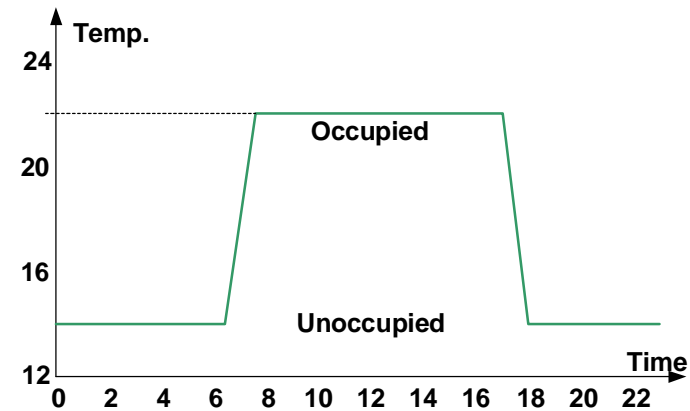
Occupancy functions:

∅ Occupancy mode changed by

- sensor
- XL500 occupancy schedule

∅ Bypass button for

- Manual presence detection
- Extension of the occupied time



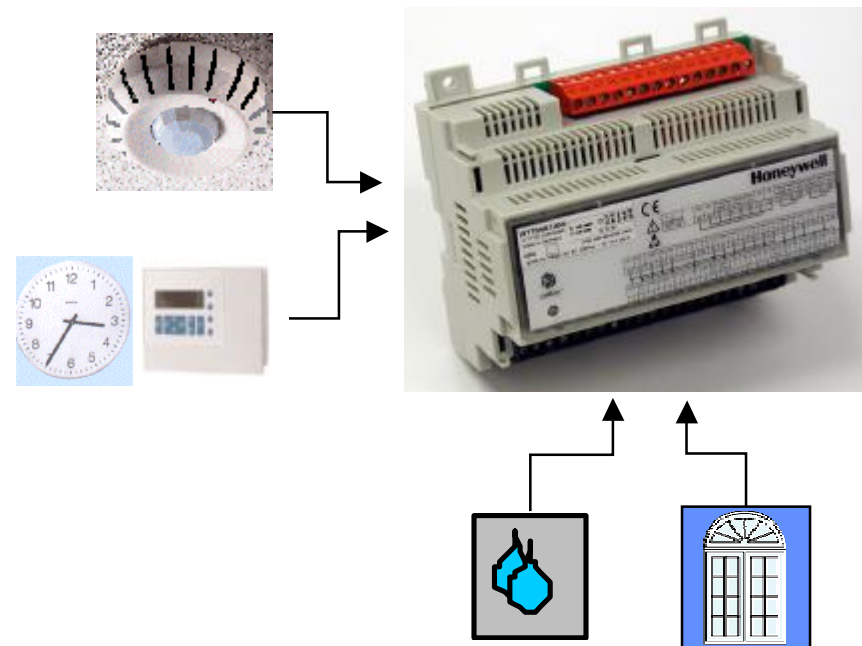
Safety Functions:

∅ Condensation switch

- binary input (no dew-point calculation)

∅ Energy hold off

- binary input or via NV
- Heating / cooling is stopped in case of energy hold off



Excel 12 – Temperature Control

Control Limits:

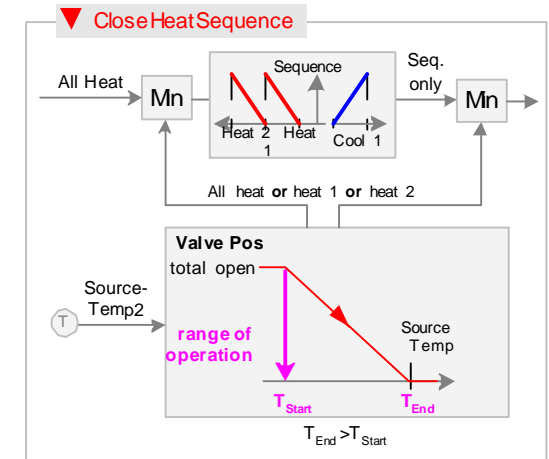
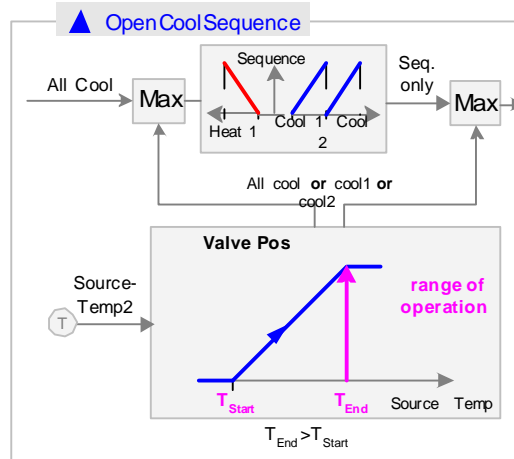
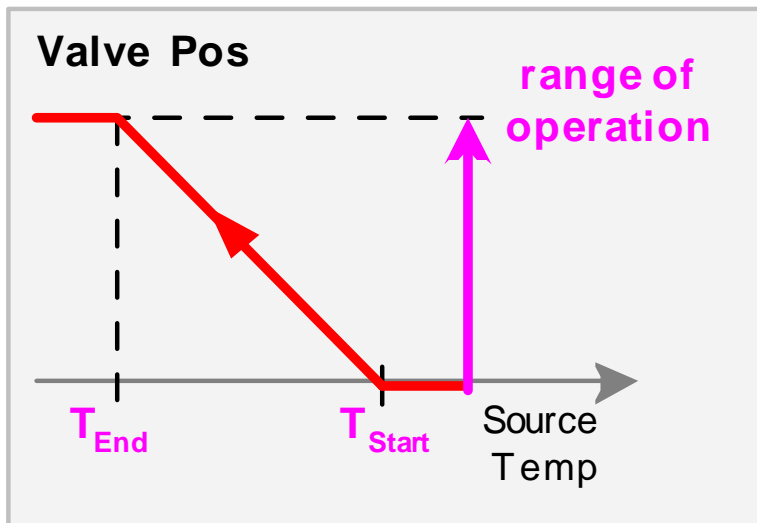
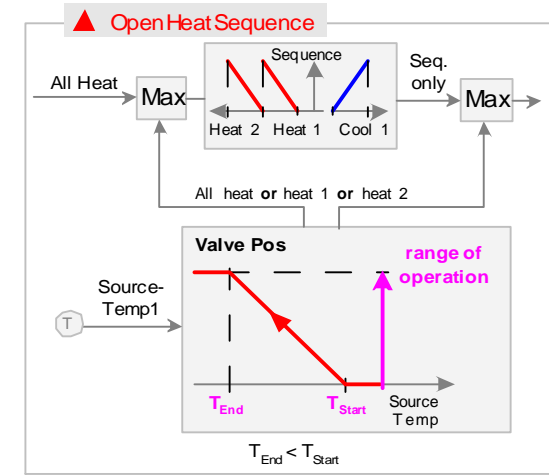
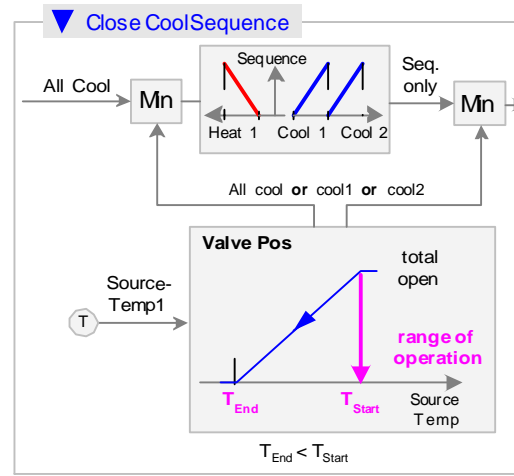
∅ Keep temperature above limit

- Stop cooling
- Start heating

∅ Keep temperature below limit

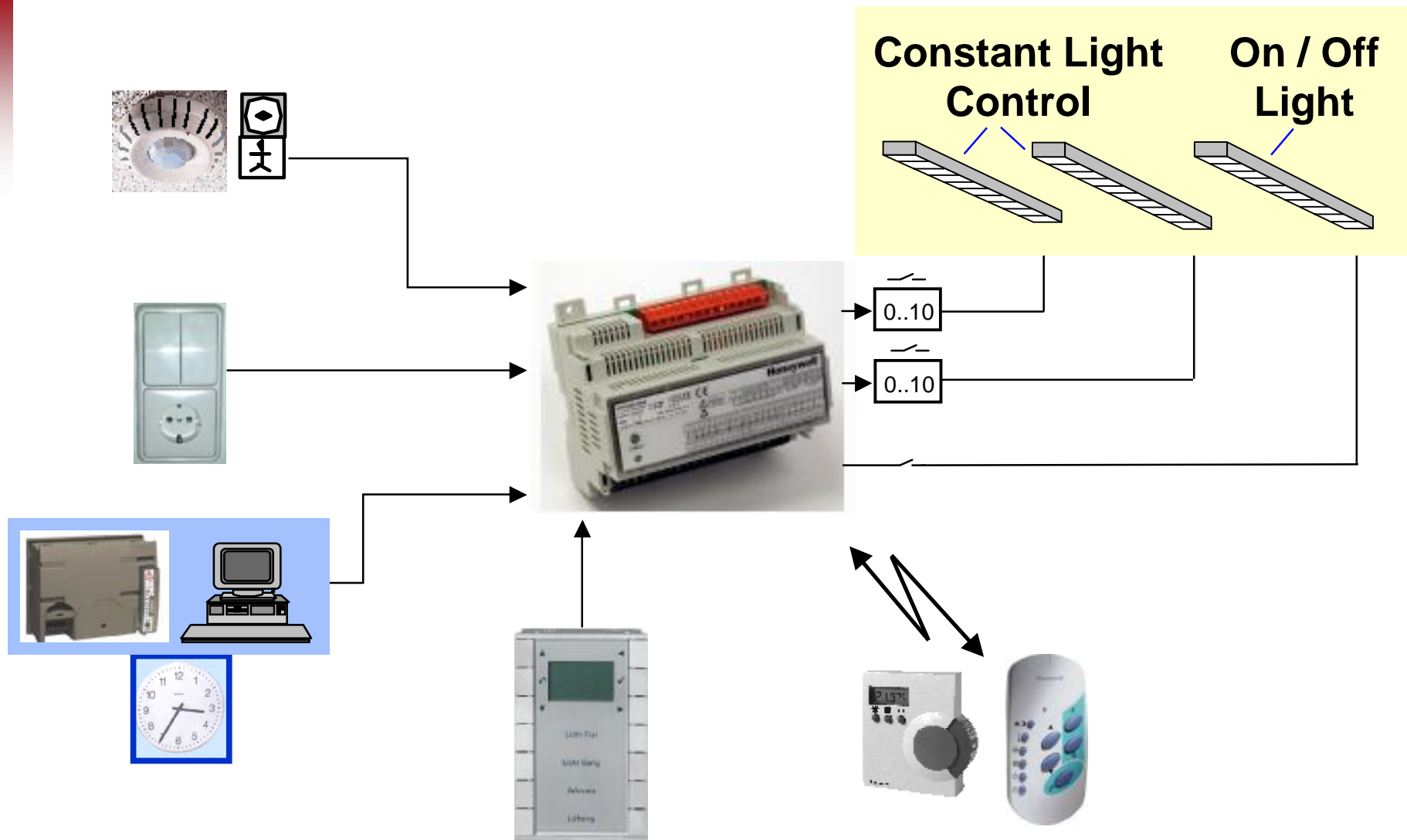
- Start cooling
- Stop heating

∅ T_{Start} , T_{End} and range are configurable



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Excel 12 – Light Control

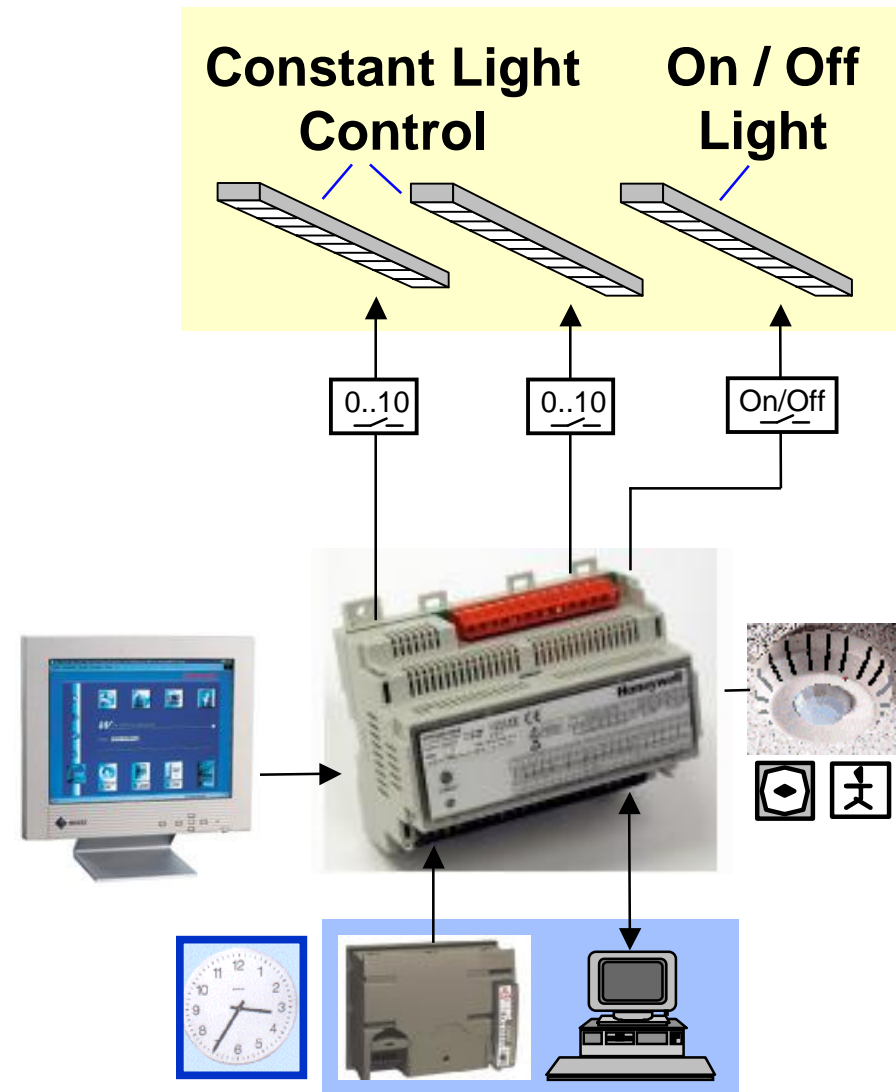


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Excel 12 – Light Control

Functionality

- ∅ LONMark profile “Lamp Actuator”
- ∅ LON functionality
 - Lights are switched according to occupancy schedule running on XL500
 - Override / monitoring via EBI
 - WOC can be used for office control
- ∅ Grouping of lights is supported, e.g. one push button is used to switch 3 lights
- ∅ Soft on / off
- ∅ LON and hard wired light sensors are supported (LON has priority)
- ∅ LON or hard wired occupancy sensors are supported

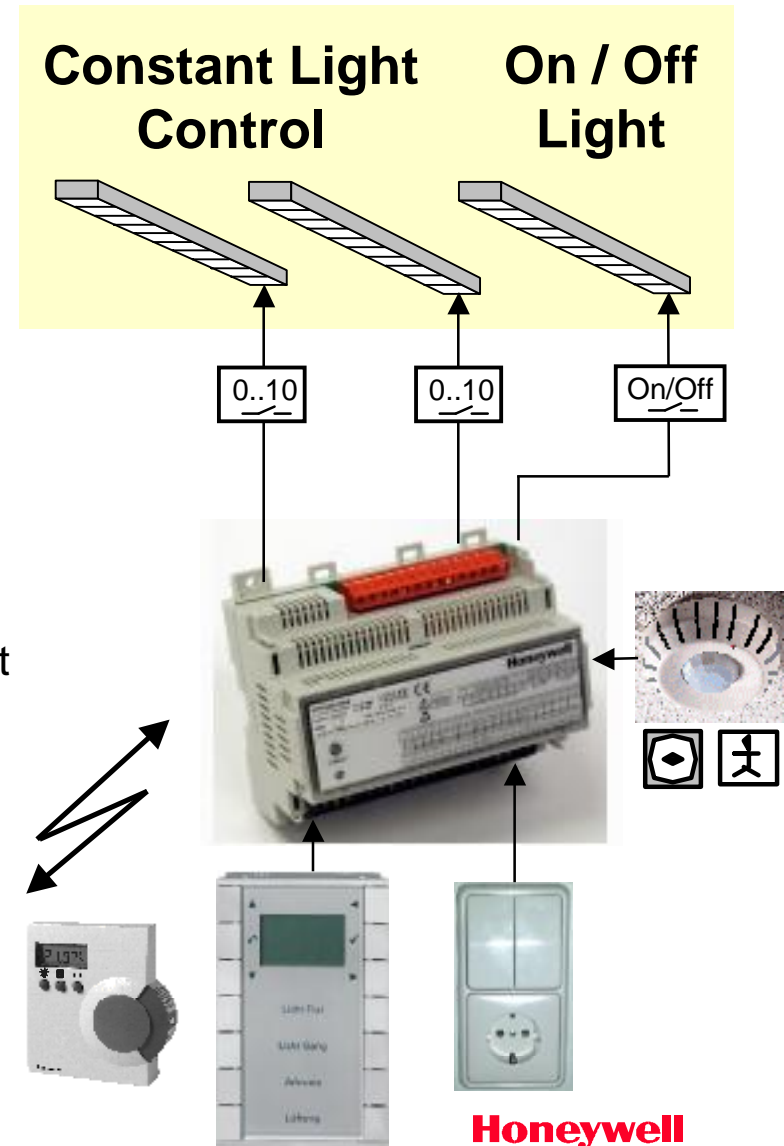


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Excel 12 – Light Control

Functionality

- ∅ **Manual switching / dimming via**
 - Hard wired push button
 - Via LON wall module
 - Via wireless wall module / remote hand held (ZAPP)
- ∅ **Automatic controls for up to 3 lights**
 - Constant light control for up to 2 lights
 - o Independent set-points supported
 - o Control offset for window light supported in order to compensate for additional sun light in window area.
 - o User can override constant light control by manual dimming
 - On / off control for up to 3 lights
 - o Automatic switching dependant on occupancy / light level



Excel 12 –Energy Savings

Energy saving functions:

∅ General

- Occupied, standby, unoccupied mode saves energy if the room is not used. The mode can be changed via occupancy sensor, via LON (time program or building supervisor) or manually by the user (occupancy bypass time via wall module)
- Equipment can be switched off from a building supervisor

∅ Light

- Automatic functions, e.g. off if bright or unoccupied
- Constant light control saves 25-30 % energy (source: OSRAM)
- Window correction for control of 2 lights with one light level sensor



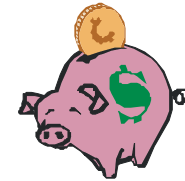
Excel 12 – Energy Savings

Energy saving functions:

∅ HVAC

- Set-point limitation in wall module and set-point / fan reset at night helps saving energy.
- Control limits and adjustable start levels for sequences and fan stages are optimizing the control, e.g. limit expensive electric heating as much as possible.
- Fast and good control (e.g. PI boost) with adjustable zero energy band.
- Energy hold off contact
- Sensor failure detection
- Master /slave functionality (e.g. avoid that 1 FCU heats while the other cools if booth units are in the same room)
- Demand to primary control will help optimizing the primary control
- Adjustable hysteresis and minimum on / off time are reducing unnecessary switching

\$SAVINGS\$



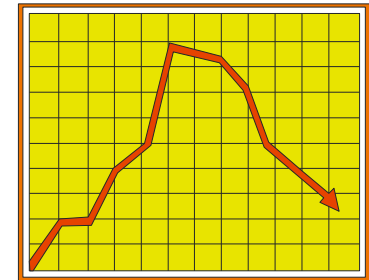
Excel 12 – Monitoring

Monitoring:

∅ Unused analog inputs can be used to monitor any temperature and percentage signal (nvoXL12Status)

∅ The following nvo's may be used to monitor a room:

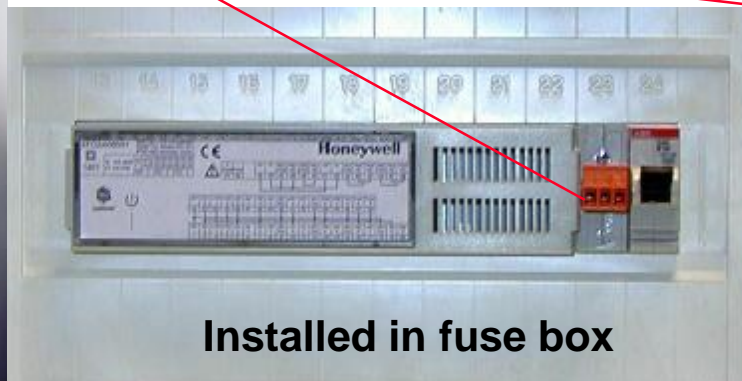
- nvoSpaceTemp: room temperature
- nvoEnergyHoldOff: may be used by primary control to cut off primary energy.
- nvoSequence: sequence level; used for master / slave
- nvoHeatCool: actual heat / cool mode of the controller; used for master / slave
- NvoFanSpeed: fan level; used for master / slave
- nvoEffectOcc: effective occupancy status; used for master / slave
- nvoOccSensor: signal from a hard-wired occupancy connected to XL12
- nvoLampValue: lamp value feed-back, e.g. master slave of additional lamps
- nvoUnitStatus: controller status information, e.g. in alarm, heat / cool status...
- nvoDiagnostic: provides status information for trouble shooting, e.g. sensor failure, valve synchronization, condensation, wait for fan, power up mode, fan interlock etc.



Excel 12 – Installation

Installation Friendly

- ∅ Compact design fitting into fuse boxes
- ∅ Different power supplies (24 Vac and 230 Vac)
- ∅ Optional terminal covers for wall mounting
- ∅ Lon service button easily accessible
- ∅ LNS plug-in available
- ∅ Flash memory for easy application update
- ∅ Optional XAL-Term for LON tool connection and LON termination



Excel 12 – Hardware Variants

Excel 12 Hardware Variants

Order number	Power Supply 2: 230 Vac, 3: 24 Vac	Digital Inputs	Digital Outputs	Normally Open Relays	Change Over Relays	Triacs	Wall Mod LED *W	Analog Inputs (see Note)	NTC20K Sensor (10 bit) + Voltage	NTC20K Sensor (10 bit) / LESST	NTC20K Sensor (10 bit) *W	Fan Speed / Bypass *W	Set Point Knob *W	Analog Outputs (0...10Vdc)
W7704A1004	2	4	9	3	2	4	1	7	3	1	1	1	1	2
W7704B1002	2	4	9	3	0	6	1	7	3	1	1	1	1	2
W7704C1000	3	4	6	0	0	6	1	7	3	1	1	1	1	2
W7704D1008	3	4	11	3	2	6	1	7	3	1	1	1	1	2
W7704D1016	2	4	11	3	2	6	1	7	3	1	1	1	1	2

*W: Signal is used for a hard wired wall module

↑
Relays: continuous 6 A
Maximum peak current
80 A for 20 ms

↑
Analog outputs