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Excel 12

THE solution for Integrated Room Control

Objectives for Integrated Room Control

Objectives

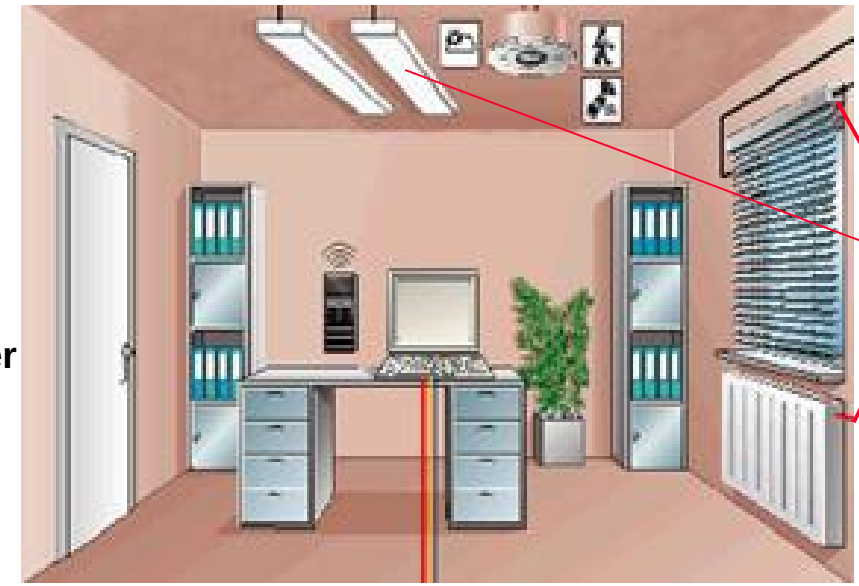
- Increase portfolio towards an integrated room solution.
- Reduce total loop cost

PAST

Philips **Light Controller**

Somfy **Sunblind Controller**

Honeywell XL10 FCU



NOW

Excel 12

FCU + Light + Sunblind

Excel 12 – the "**All-in-One**" integrated room controller

- $90 reduced hardware cost per room
- $30 installation savings per room
- 20 % additional energy savings

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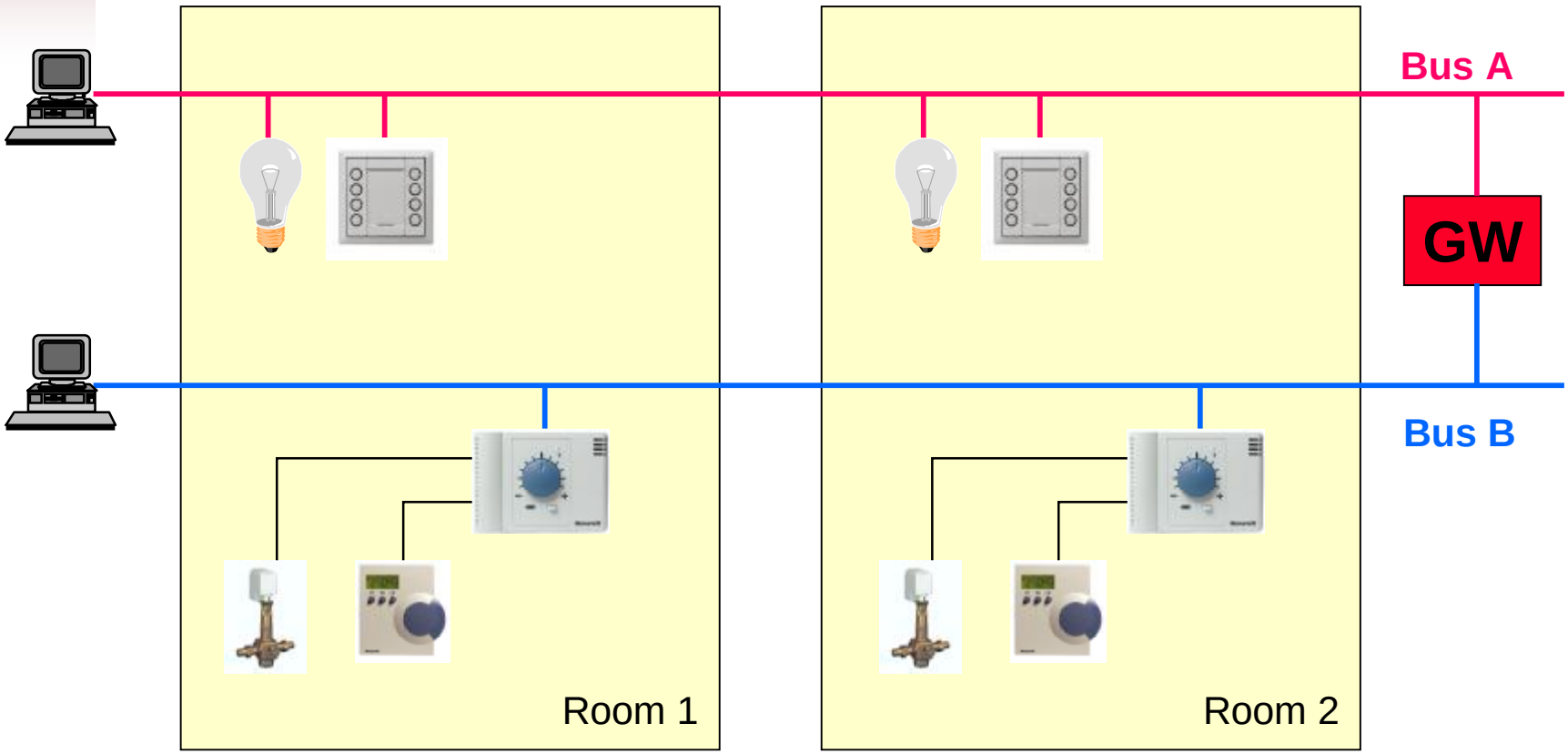
Advantages of LONWORKS Technology

Conventional System Setup



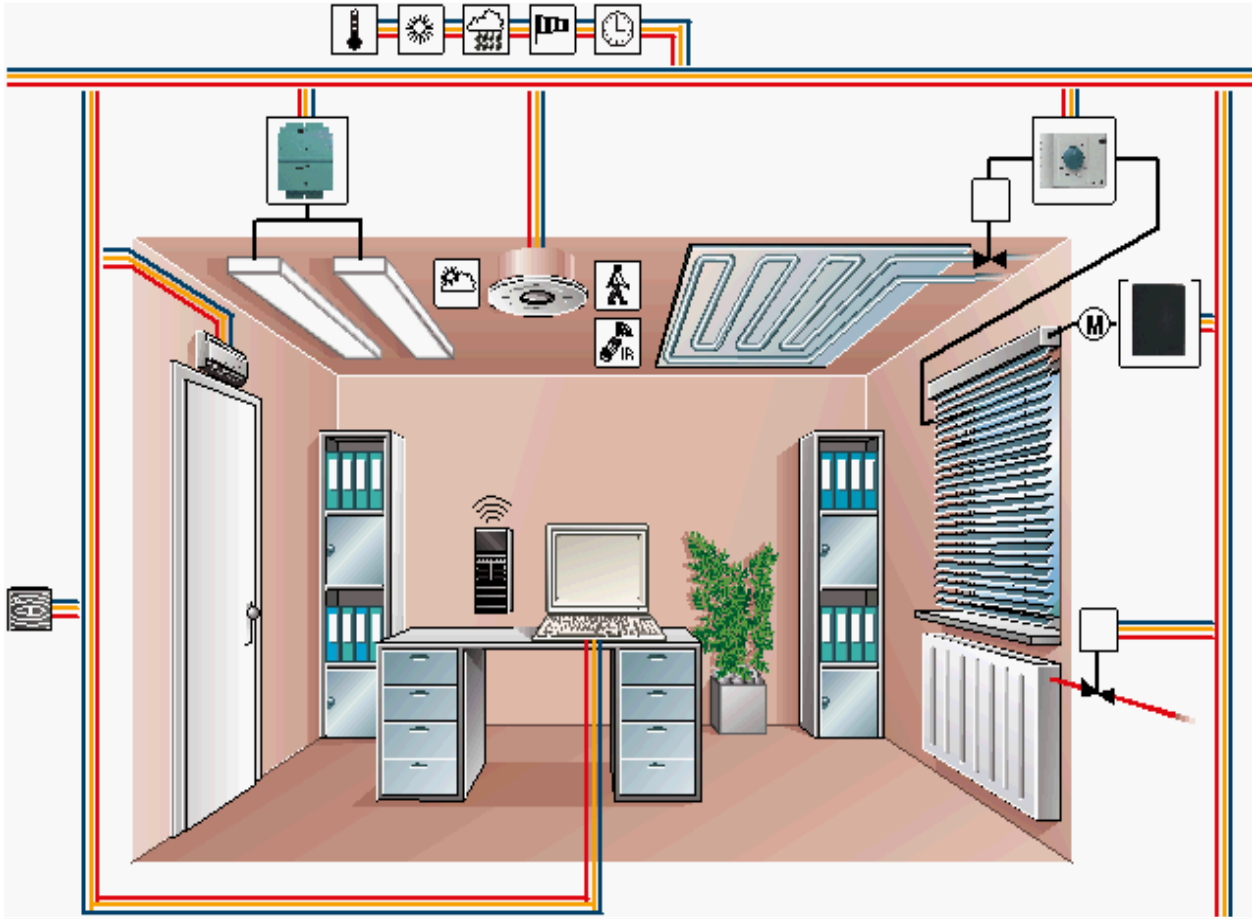
Advantages of LONWORKS® Technology

Conventional System Setup

- Conventional installation with discrete wiring or separate bus systems for each application
- Separate operator units per application
- Separate workstation for each application or costly integration via gateway
- Data exchange between applications only possible via gateway and provide often limited functionality only
- Extensions and modifications are costly

Advantages of LONWORKS® Technology

Complete System with LONWORKS®



Advantages of LONWORKS® Technology

Fully Integrated Room Automation

- **Common network for all applications**
  - ⇒Less wiring
  - ⇒Less installation expenditure
  - ⇒Reduced fire burden

- **Joint usage of operators units and sensors**
  - ⇒Lower device costs
  - ⇒Lower wiring costs
  - ⇒Improved system performance
  - ⇒Standardized operation philosophy

Advantages of LONWORKS® Technology

Fully Integrated Room Automation

- **Joint workstation**
  - ⇒Global availability of all data
  - ⇒Standardized user interface
  - ⇒Reduced training effort
  - ⇒Increased performance / reliability (problems are detected early)

- **Easier integration of products from different manufacturers**
  - ⇒Achieved due to LON interoperability
  - ⇒No gateways, no special programs
  - ⇒Less additional costs, less dependency

- **Lower costs for extensions, modifications and changes**
  - ⇒System is configured “logically” instead of physically
  - ⇒Software modification instead of hardware wiring
  - ⇒No software modifications on existing units

Advantages of LONWORKS® Technology

Advantages of Open, Interoperable Decentralized Control Networks

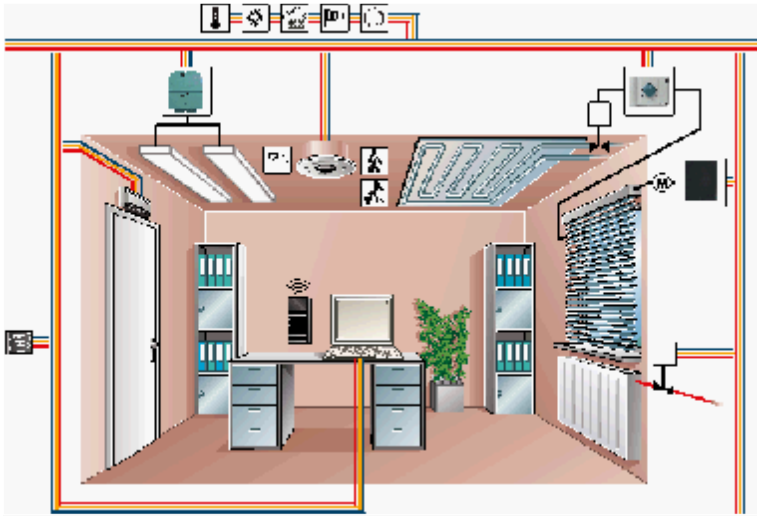
- **Problem-free data exchange with primary control**
  - ⇒**Simple transmission of signals for energy optimization**

- **Availability of mass-produced products on the market**
  - ⇒**Ability to select from extensive range of units**

Requirements on Integrated Room Applications

Integrated Room Control Requirements

- Room temperature control with multiple sequences
- Switch, dim, control lighting
- Operate, optimize sunblind
- Record consumption values
- Cross-application functions
- Integration on the basis of LONWORKS®



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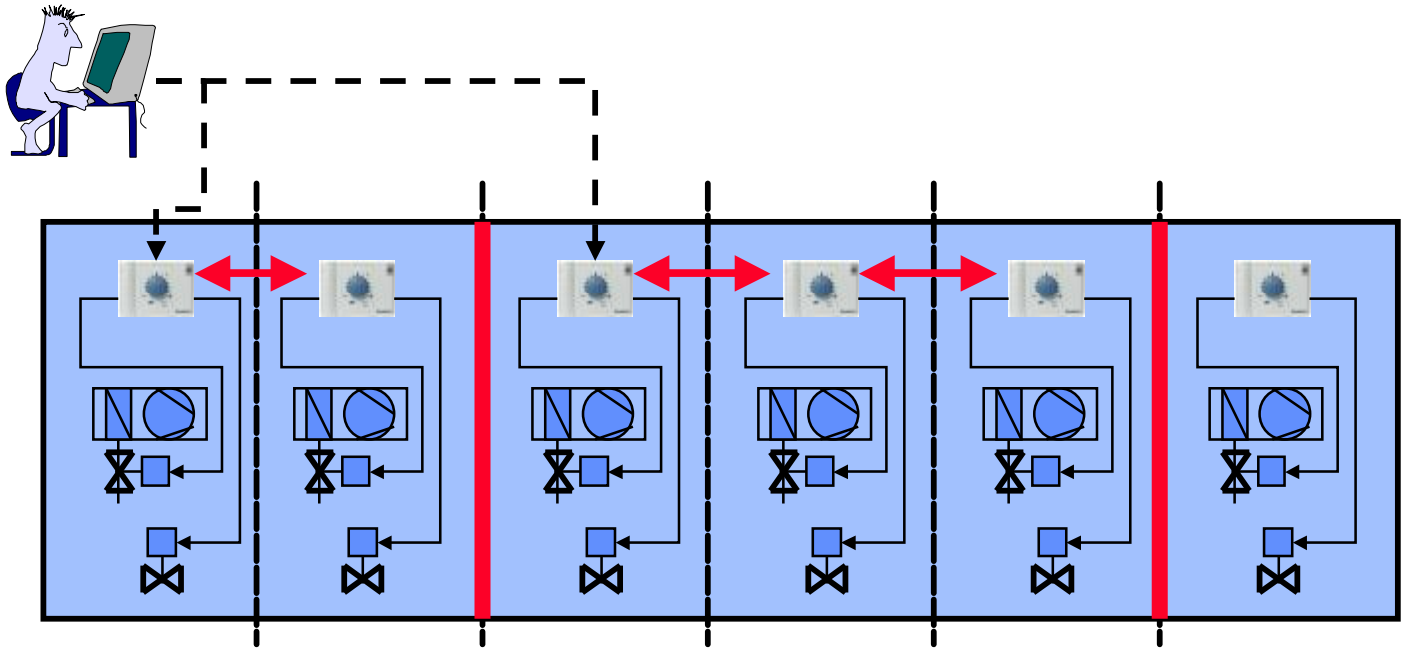
Requirements on Integrated Room Applications

Flexible Room Configuration Requirements

- Setup on the basis of axis concept with operational units
- Adaptation to changes in room utilization by means of software tool without any need for re-installation



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Integrated Room Controller Excel 12

- **Temperature control with heating/cooling sequence (also radiant cooling chilled) control**
  - ⇒ **Floating outputs, thermal actuators, multi-position outputs, pulse duration modulation**
  - ⇒ **Three-stage fan activation**
  - ⇒ **Cooling valve is closed if condensation is detected**
- **Control of two light circuits**
  - ⇒ **Switching**
  - ⇒ **Dimming**
- **Sunblind control**
  - ⇒ **For actuators without incremental transmitter**
  - ⇒ **Up, down, stop commands**
  - ⇒ **Position command (height and slat angle)**
  - ⇒ **Safety functions**
  - ⇒ **Automatic and override input**

Integrated Room Controller Excel 12

Excel 12 Hardware Variants

Order number	Power Supply 1: 110Vac, 2: 230 Vac, 3: 24 Vac, 4: 100Vac	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)*	*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**
W7704D1024	**4**	**4**	**11**	3	2	6	**1**	**6**	3	*J	1	1	1	**2**

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

***J:** Japanese wall module

Relays: continuous 6 A
50 A for 10 ms

Analog outputs

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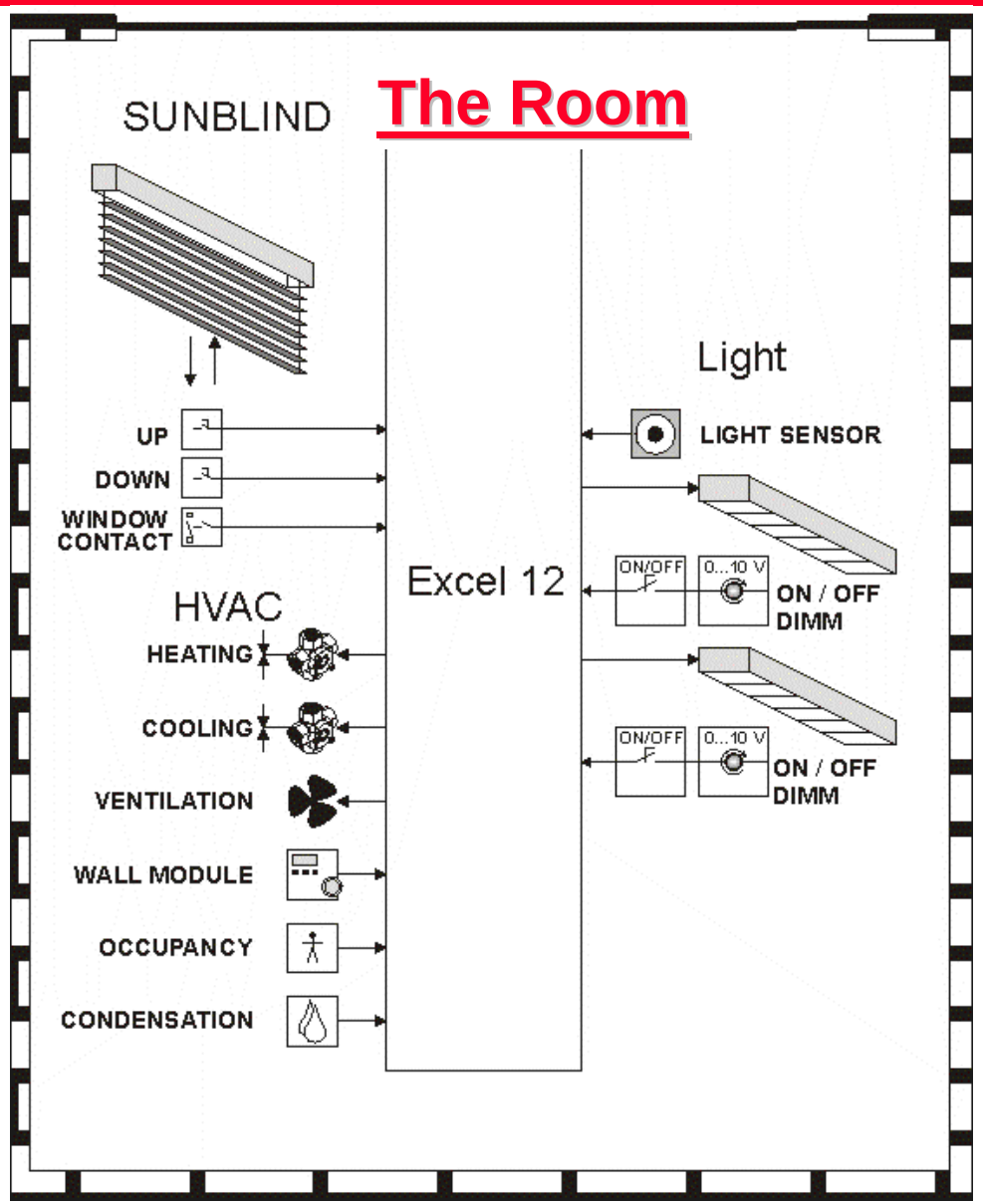
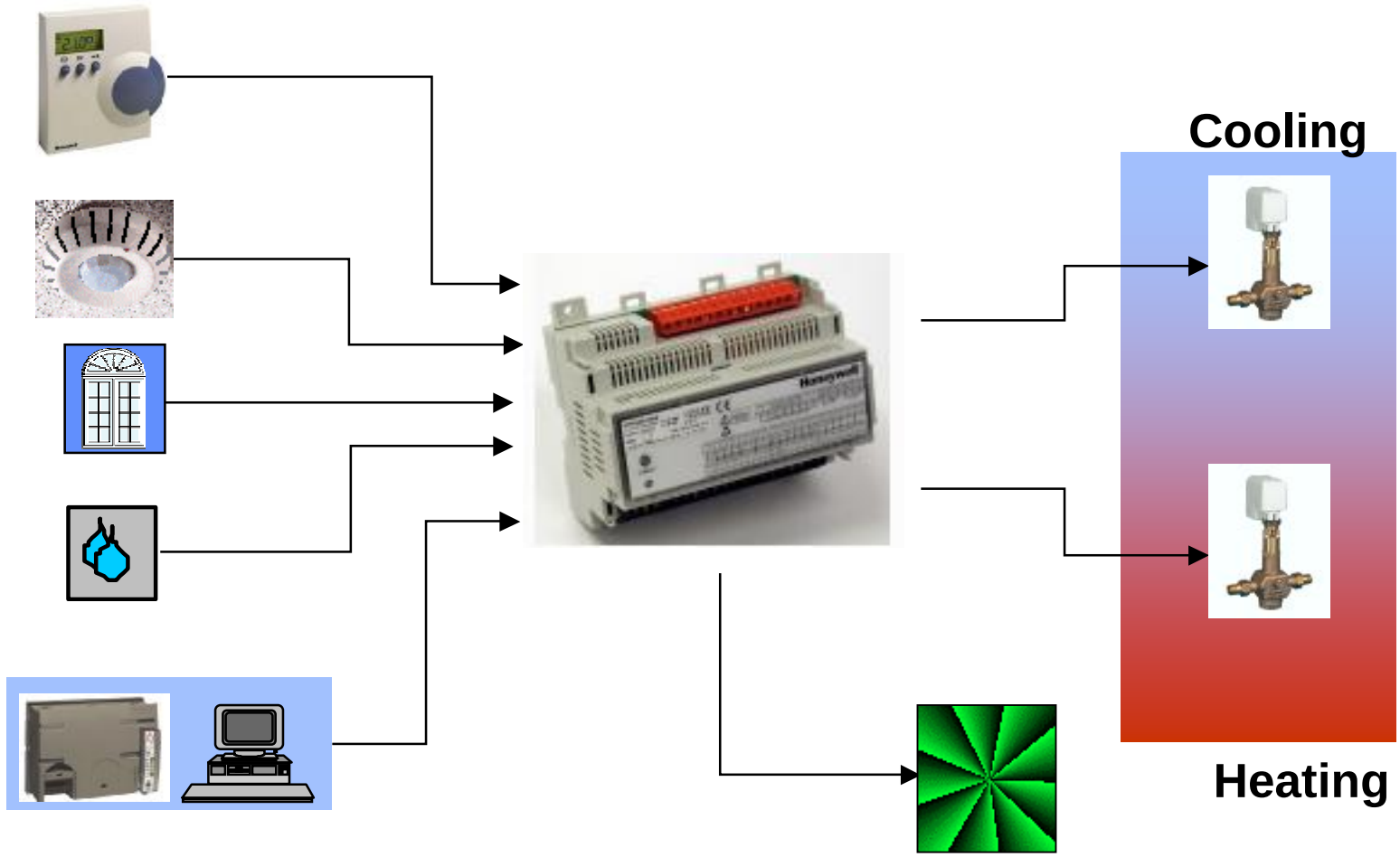
Excel 12 Application



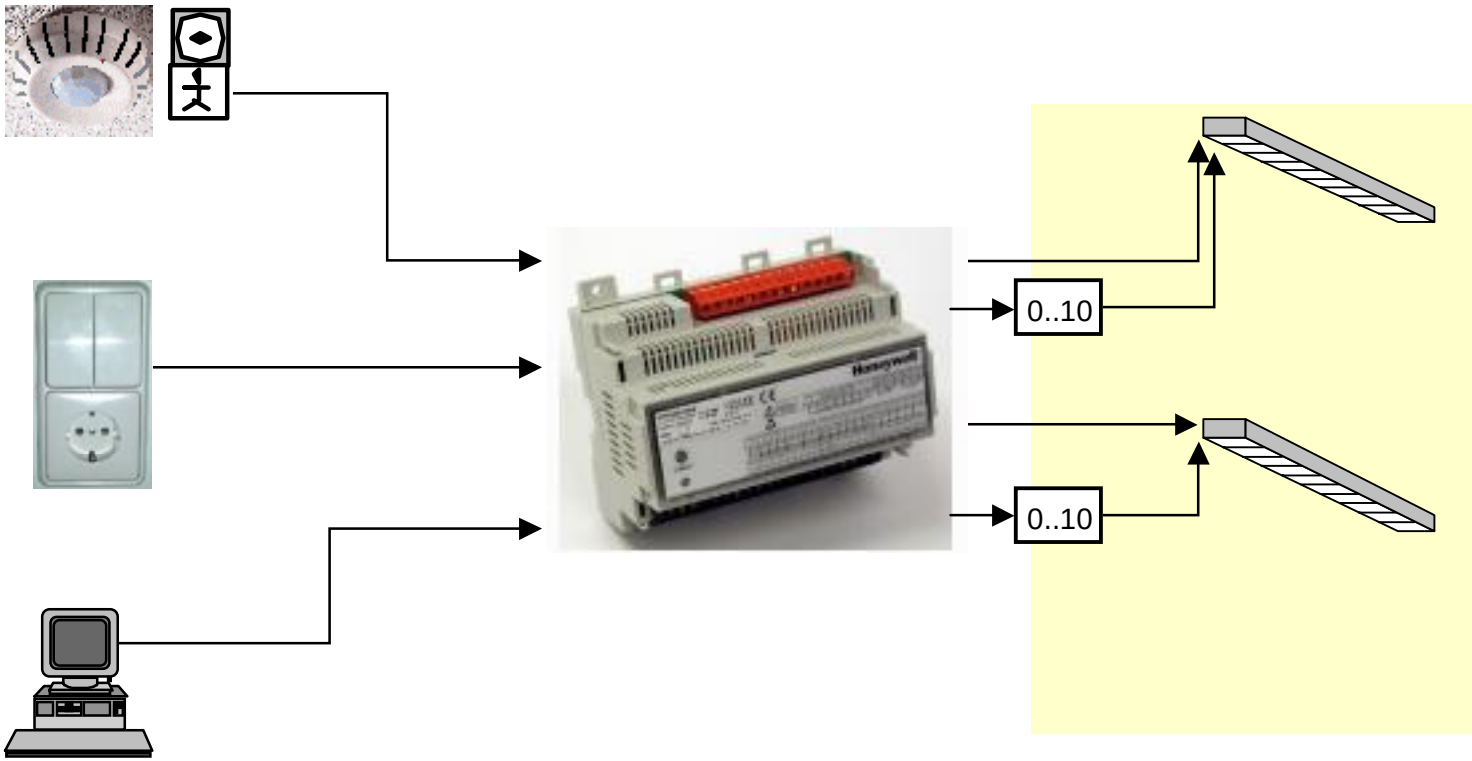
Excel 12 Application

Temperature Control



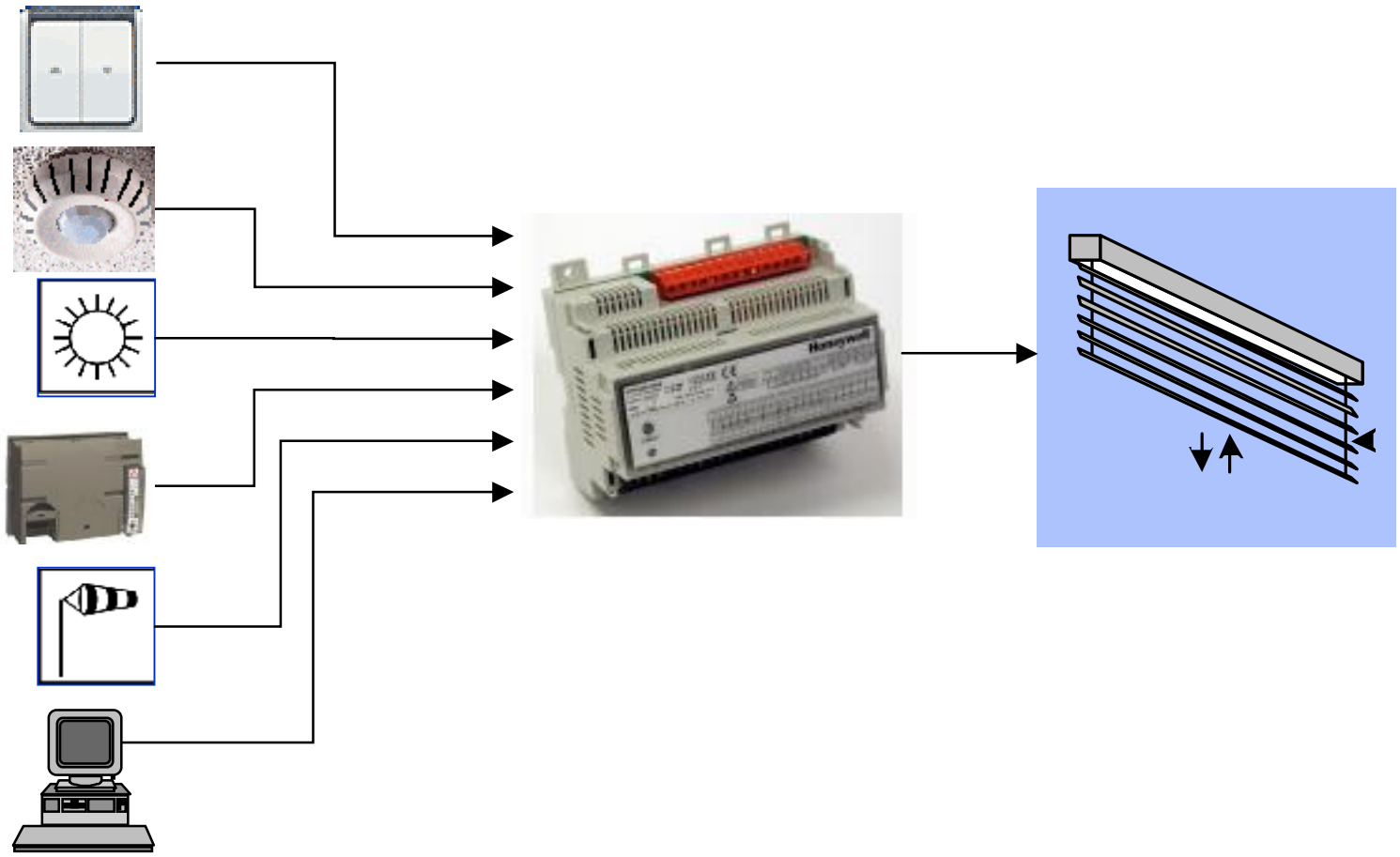
Excel 12 Application

Light Control



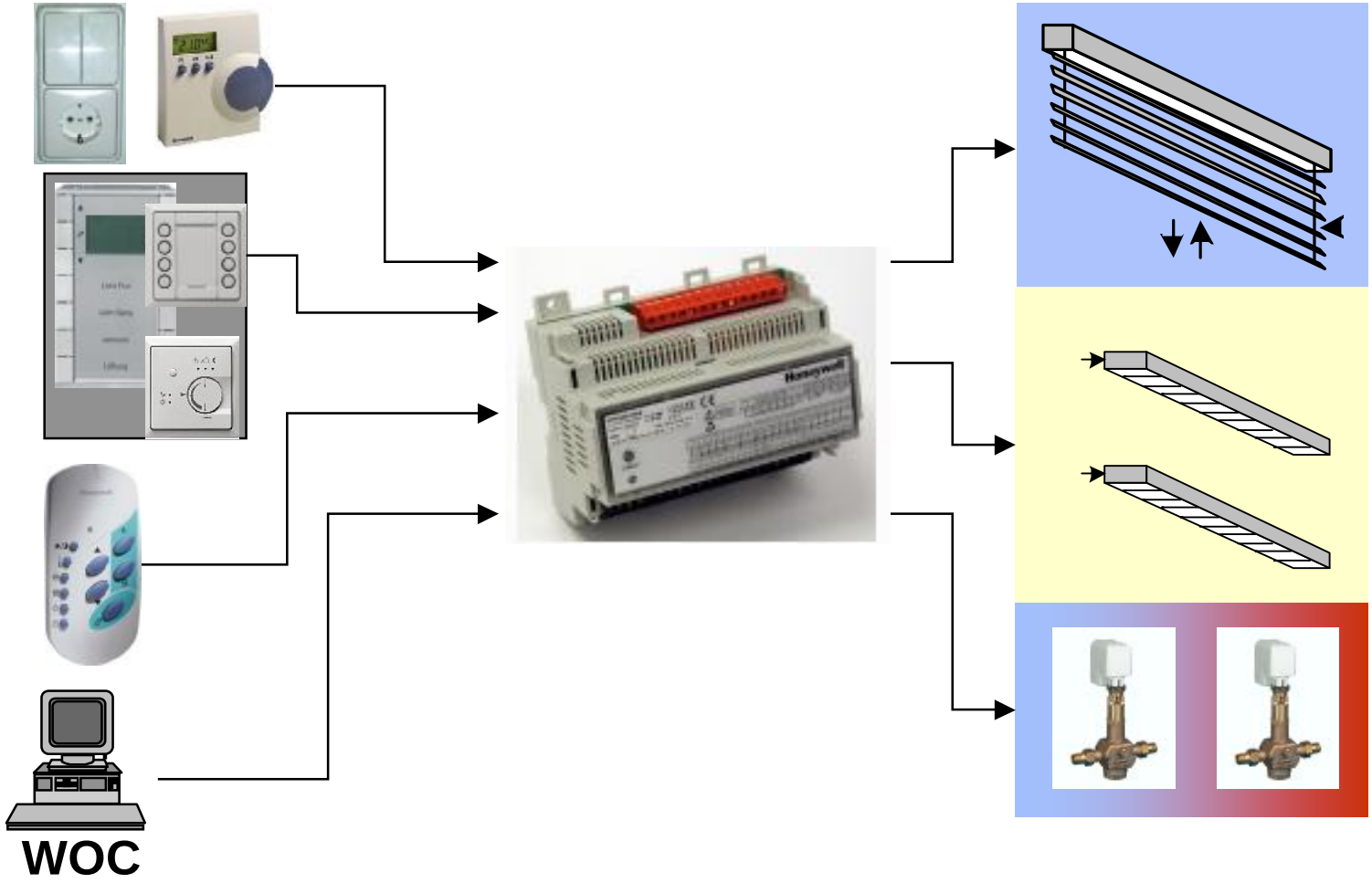
Excel 12 Application

Sunblind Control



Excel 12 Application

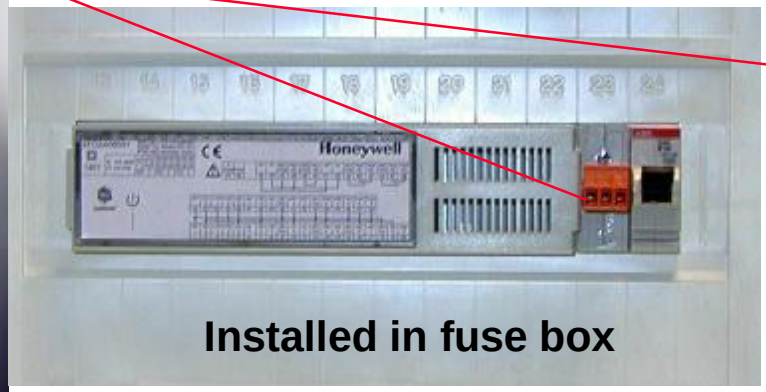
User Interface



Excel 12 Installation

Installation Friendly

- Compact design fitting into fuse boxes
- Different power supplies (12 Vac, 100 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



Installed in fuse box

Advantages of “All-in-One” Applications

Advantages of an Integrated Solution

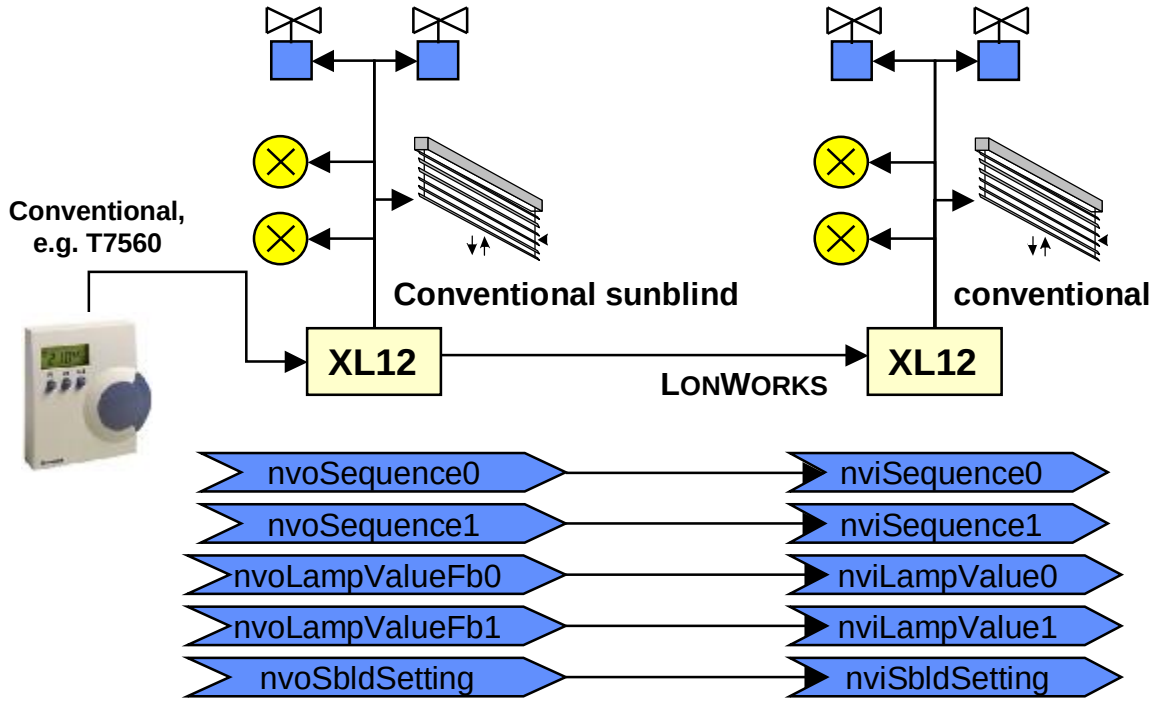
- **All the control functions in one unit**
  - ⇒ **Designed for flexible room applications (adjustable via software)**
  - ⇒ **Reduced installation device and installation cost**
  - ⇒ **Price advantage compared to solutions involving integration of 3-rd party devices**

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

- **No restriction of the openness**
  - ⇒ **Supports LONMARK®**
  - ⇒ **LNS plug-in and device resource files are available**

Example of Flexible Room Applications

Example for Flexible Room Usage



- **Direct Master / Slave Connection**
  - **XL12 with conventional units (FCU, lights ans sunblind) in each axis**
  - **XL12 master with operator unit**
  - **XL12 master controls outputs of XL12 slave**
  - **Associated axes connected up via LonWorks**

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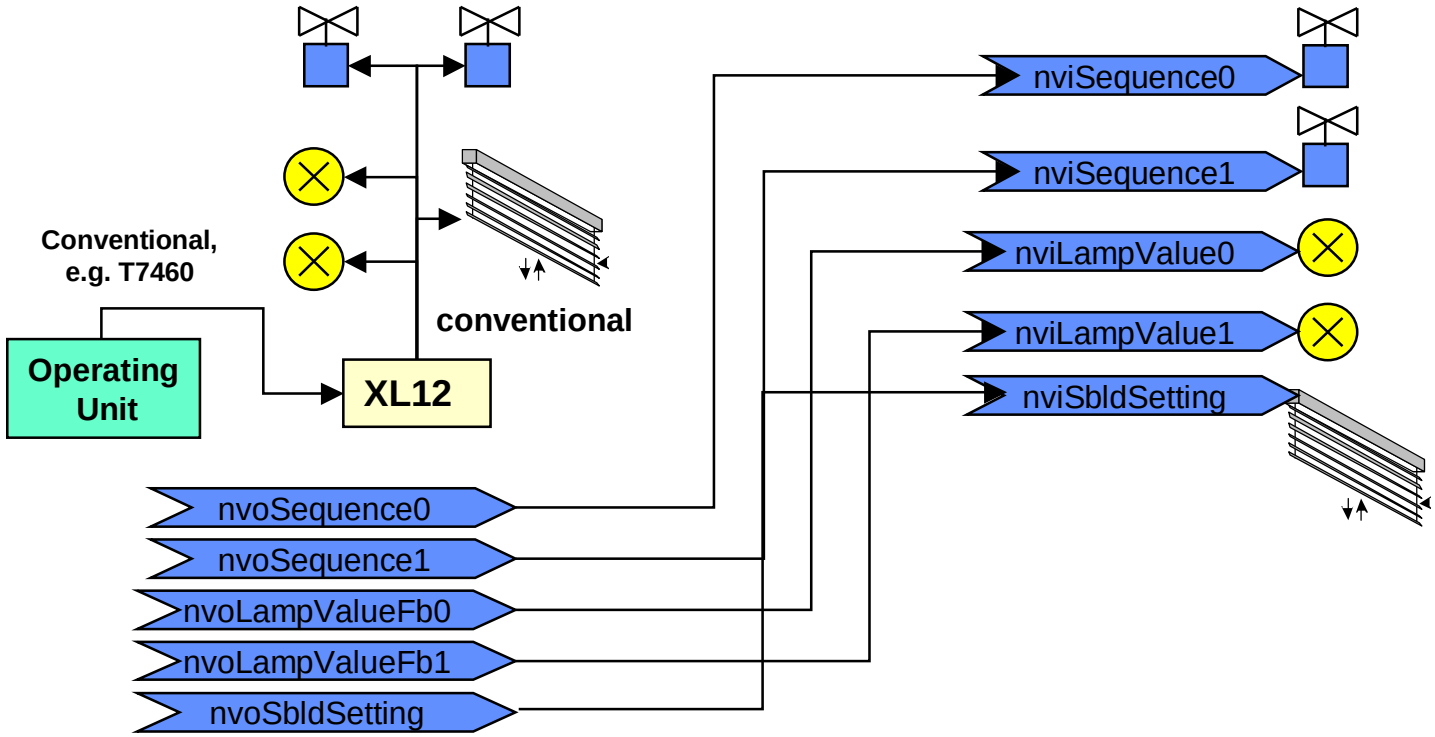
Example of Flexible Room Applications

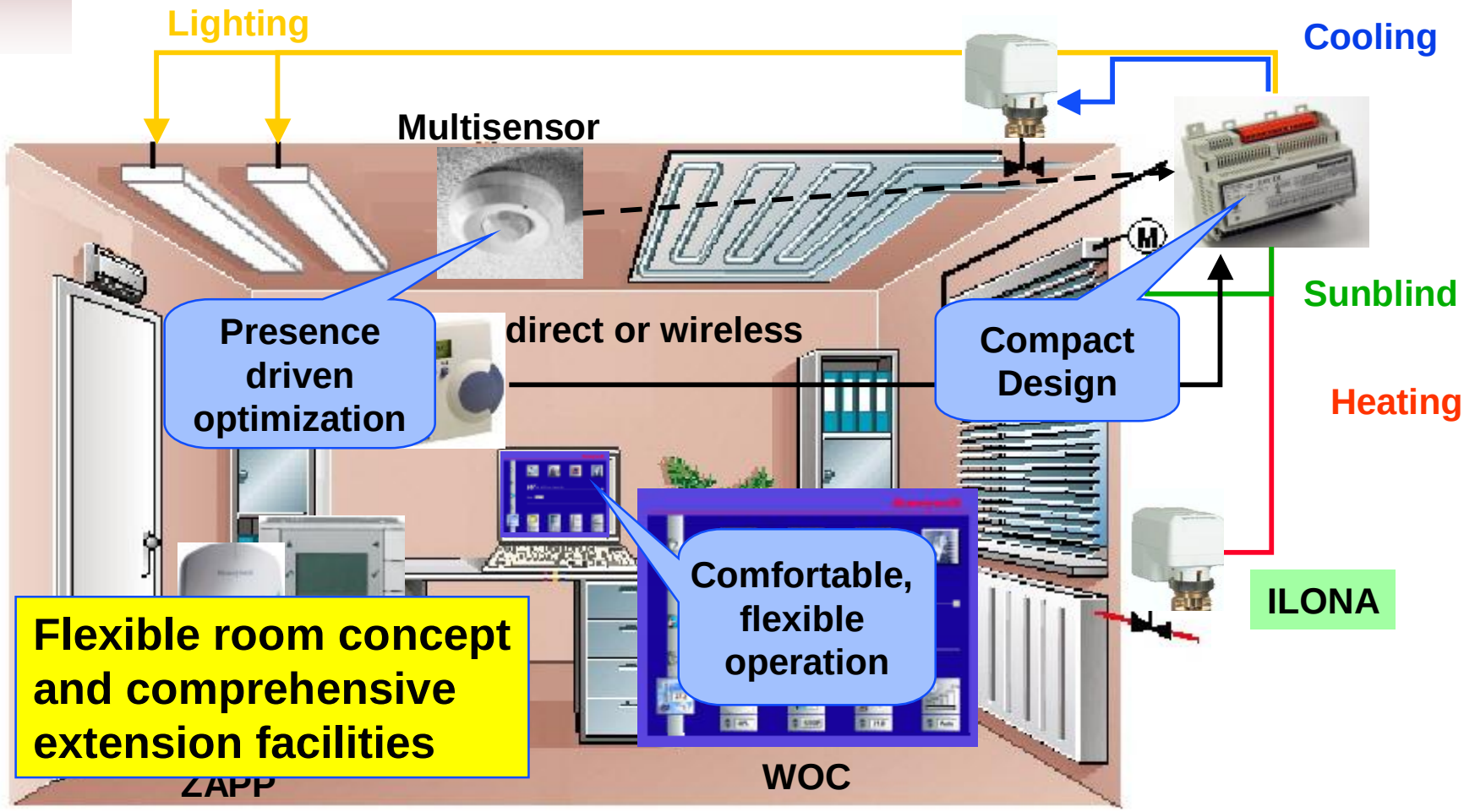
Support of LON Actuators



Binding to LON actuators (nowadays rarely used due to high cost)

Room Concept for Office Building with Excel 12

Flexible room concept and comprehensive extension facilities



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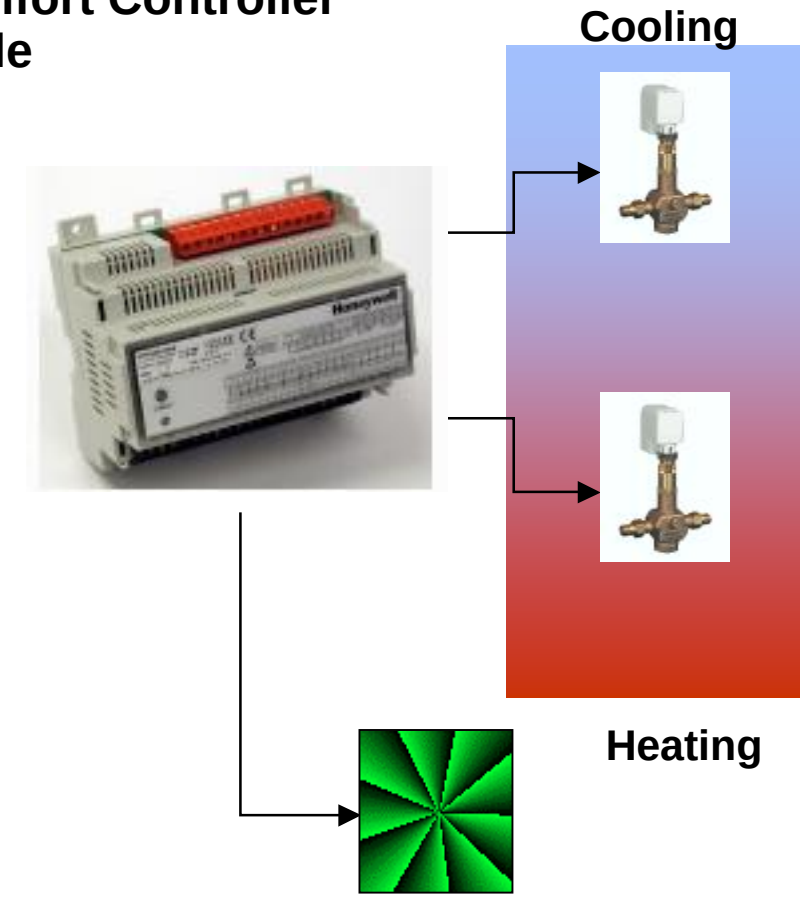
Detailed Functions Of Excel 12

Temperature Control

Overview

- Supports LonMark “Space Comfort Controller” and “Occupancy Sensor” profile
- Universal application
  - Sequence control
  - Fan coil
  - Chilled ceiling control
- Functions
  - Two sequences
  - Changeover operation
  - Sequence operation with neutral center position
- Phys. 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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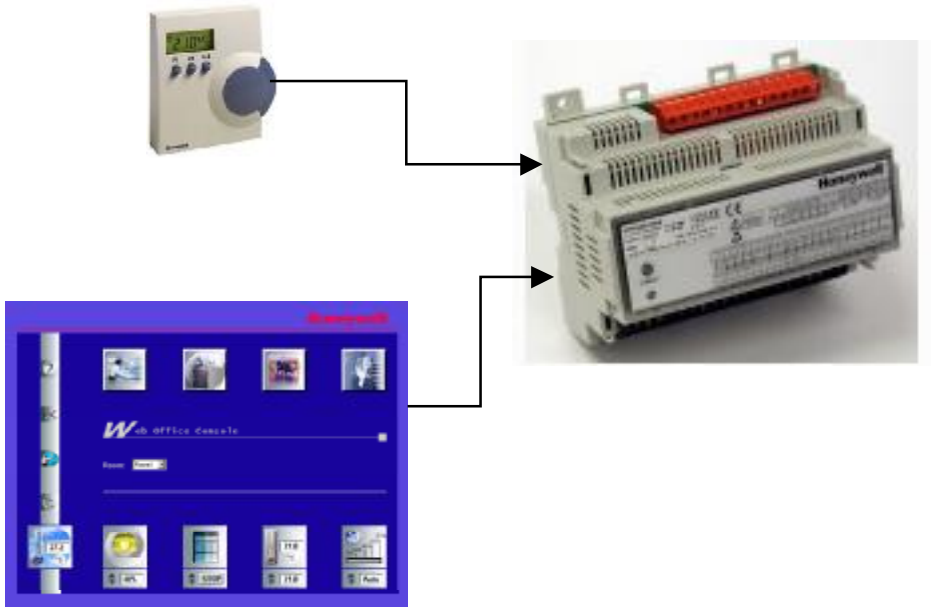
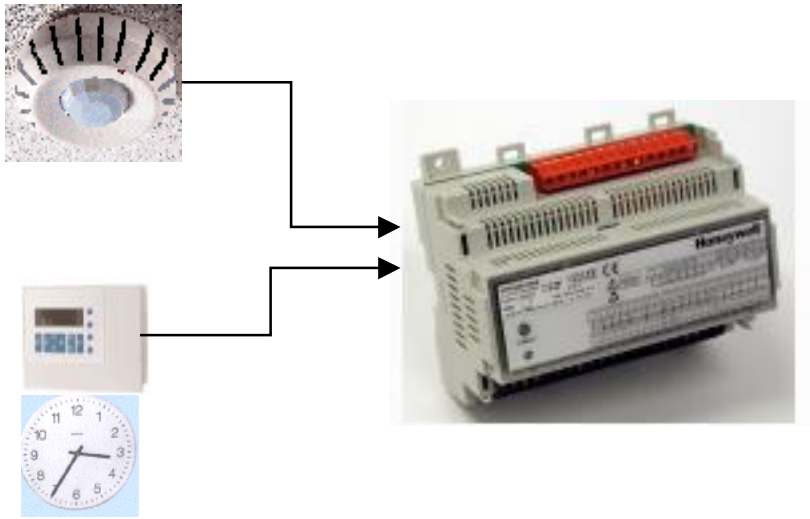
Temperature Control

Operation



- Physical inputs
  - Room temperature
  - Set-point adjustment, absolute or relative
  - Fan speed switch 0-A-1-2-3
- Bypass button for
  - Manual presence detection
  - Operation time prolongation
- Network variables for
  - Room temperature
  - Set-point adjustment, absolute or relative
  - Fan speed command
  - Room operating mode

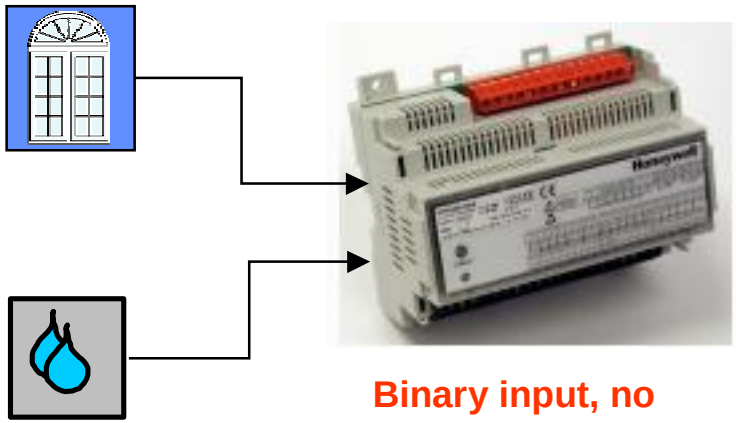
Occupancy Driven Functions



- **Occupancy sensor**
  - via digital input
  - alternatively via LON
- **Function**
  - Occupancy sensor switches “Comfort” / “Standby” during day
  - Operating time prolongation via room control unit
  - Occupancy schedule from XL50 / 500 switches day / night operation

Temperature Control

Safety Functions

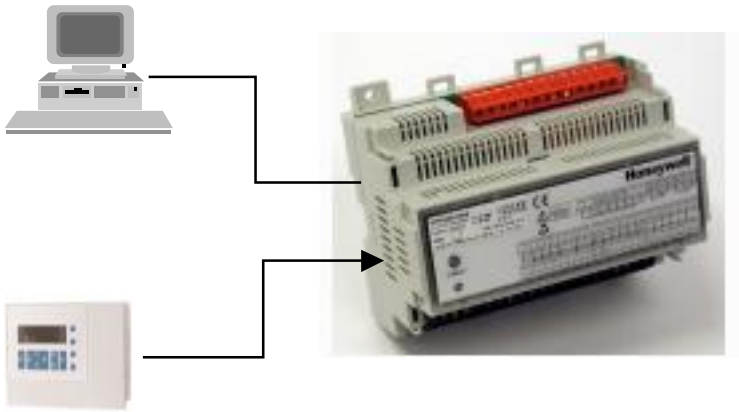


Binary input, no dew-point calculation

- Window
  - Physical binary input
  - Alternative network variable
  - Closes valves when window is open
- Condensation
  - Physical binary input
  - Closes cooling valve in case of condensation

Temperature Control

Strategies and Central Functions

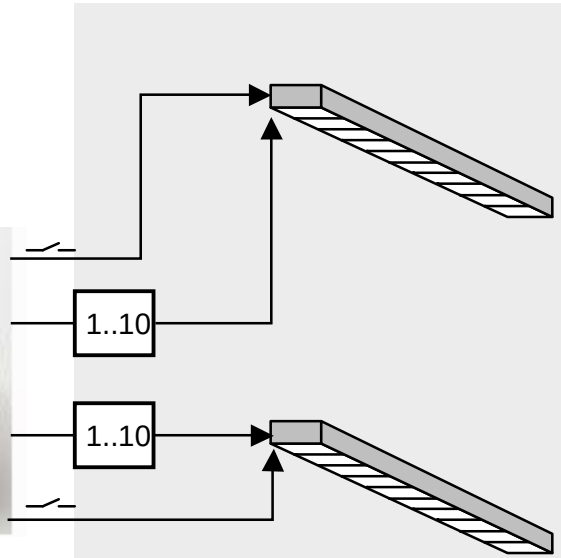


- NVs for strategies of higher-level controller (XL50 / 500), e.g. summer compensation
  - Room operating mode
  - Fan speed control
  - Valve override
  - Set-point adjustment
- NVs to control and visualize the application

Light Control

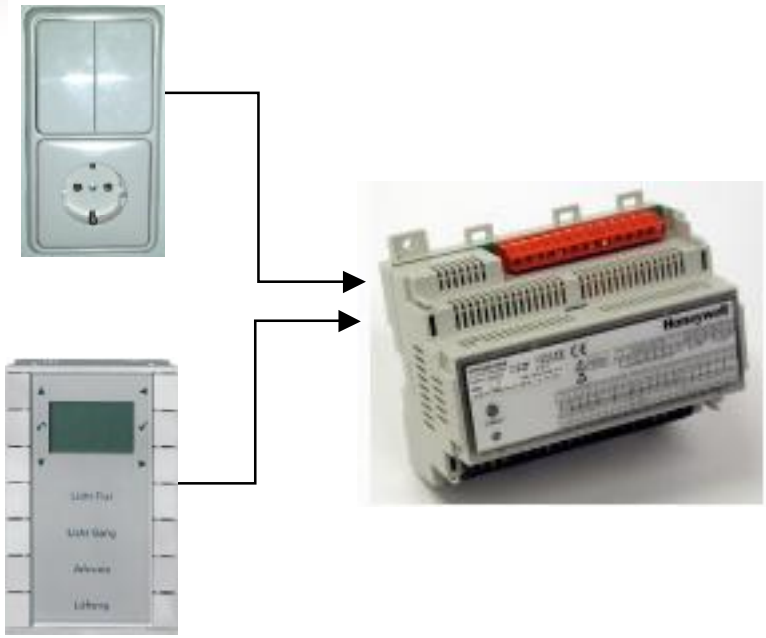
Overview

- **Control of two light circuits**
  - **Supports LonMark profile “LampActuator”**
  - **Two relays with 6A continuous load (NO contact)**
  - **Suitable for high switching currents at make (50 A / 10 ms)**
  - **Two outputs 1...10V for dimming**
  - **Independent switching and dimming of the 2 light circuits**



Light Control

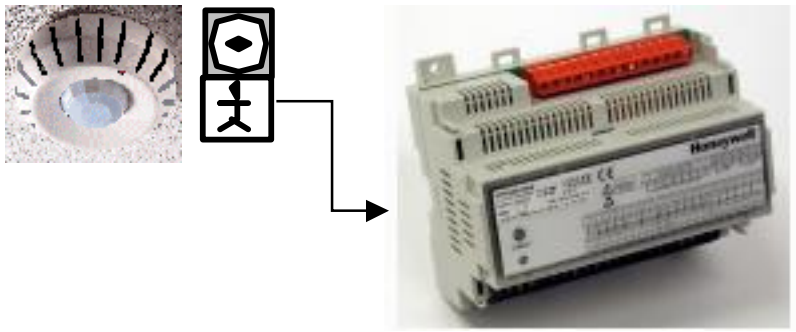
Manual Operation



- Two physical binary inputs for push buttons
- Operation with one button (toggle button)
  - Short press of button: alternates On/Off
  - Long press of button: alternates dim up/down
- Alternatively, two NVs from LON wall module

Light Control

Automatic Operation



Switching of lights depending on brightness and presence

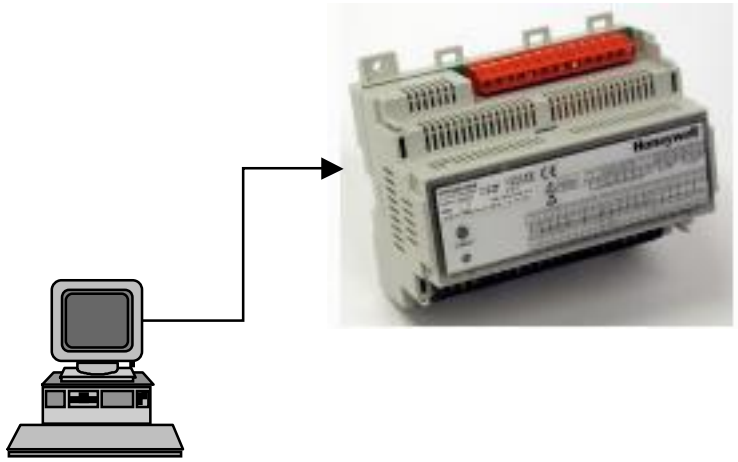
- Physical inputs for room brightness (0...10V) and presence (binary)
- Alternatively, NVs

Switching dependent on (config.):

- Only presence-driven On/Off
- Presence/brightness-driven On
- Brightness-driven Off
- Presence-driven Off
- Button On, presence-driven Off, e.g. floor lights
- Configurable On / Off after power-up

Light Control

Central Functions

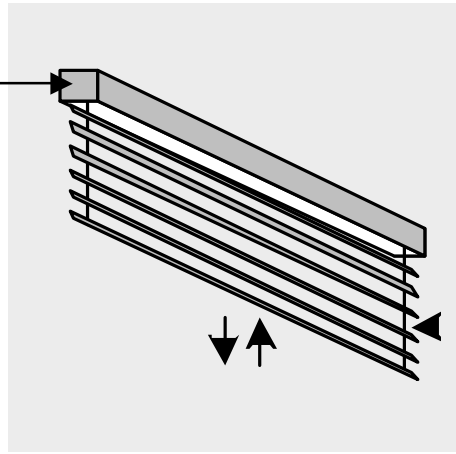


- Central control/ visualization
  - Display of light status
  - On/Off/Dim commands from supervisor
  - Time or event-driven commands, e.g. switch off at evening time

Sunblind Control

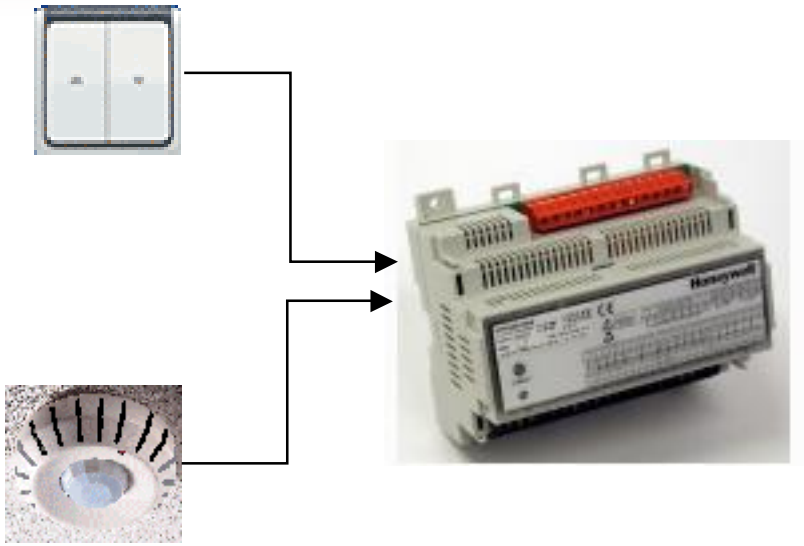
Overview

- Outputs for one actuator
  - Supports LonMark profile “Sunblind Actuator”
  - Two relays 6A continuous load
  - Functions Up/Down/Stop
  - For actuators without incremental transmitter
  - Slat angle adjustment via runtime



Sunblind Control

Manual Operation

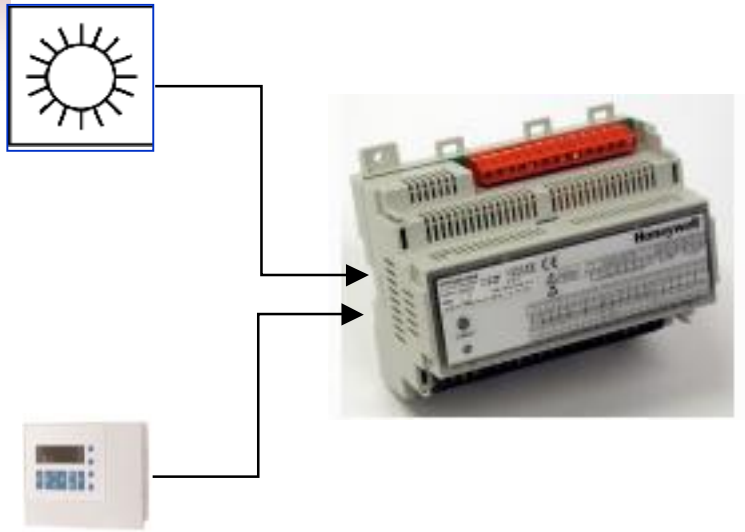


Push button inputs

- Digital input for push buttons
- Short press of button = short drive command (while button remains pressed)
- Long press of button = continuous drive command, short press of button leads to stop
- Alternatively NV with same priority
- Manual command overrides automatic until room operating mode changes

Sunblind Control

Automatic Operation

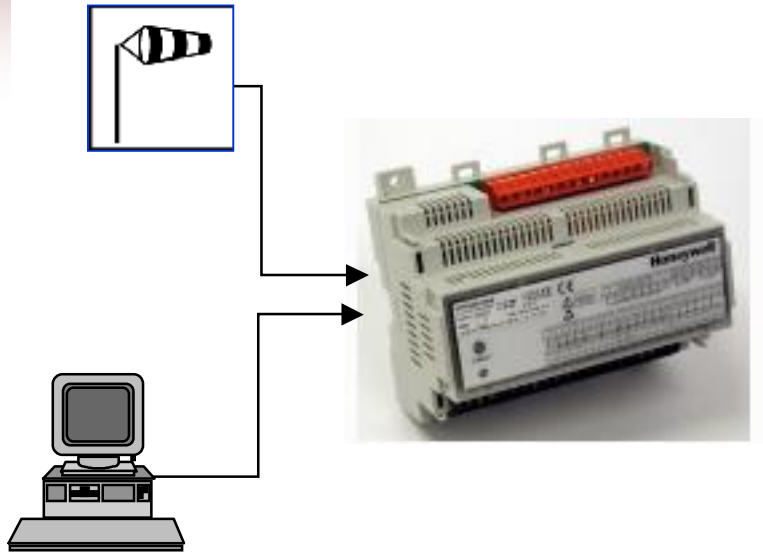


- NV for outdoor brightness
- Exceeding the “bright” level causes the sunblind to descend (shade)
- Falling below the “dark” level causes sunblind to ascend
- “Bright” / “dark” level adjustable
- Manual command overrides automatic

- **Energy optimization**
  - Selection if energy optimization shall be used for occupied, standby or unoccupied room mode
  - The sunblind is opened/closed for heating load/cooling load in the room mode which uses energy optimization.
- **Further automatic functions from external device via NV, e.g. slat angle adjustment in line with the sun's position.**

Sunblind Control

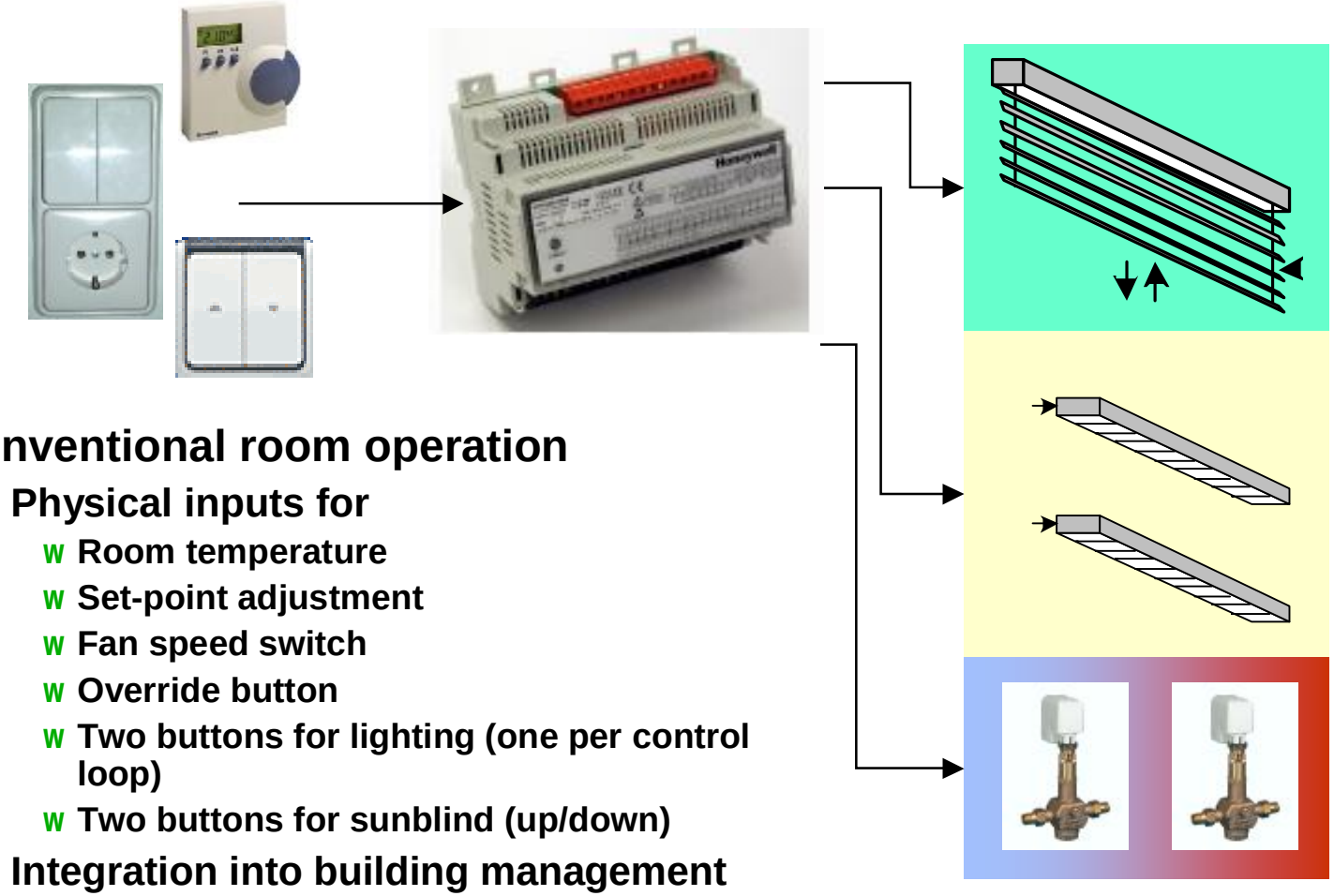
Safety Functions



- Wind safety function
  - NV for wind speed
  - Adjustable level for “Sunblind up” wind speed.
  - Response delay and return to normal delay
- Further safety functions
  - NV for further safety functions, e.g. rain, risk of freezing
  - Safety override NV is usable for prioritized central control, e.g. sunblind up for window cleaning
  - Visualization of all the major parameters

Standard Operation

Room Operation With Standard Devices (no LON)



Conventional room operation

- Physical inputs for
  - Room temperature
  - Set-point adjustment
  - Fan speed switch
  - Override button
  - Two buttons for lighting (one per control loop)
  - Two buttons for sunblind (up/down)
- Integration into building management system via Excel 12

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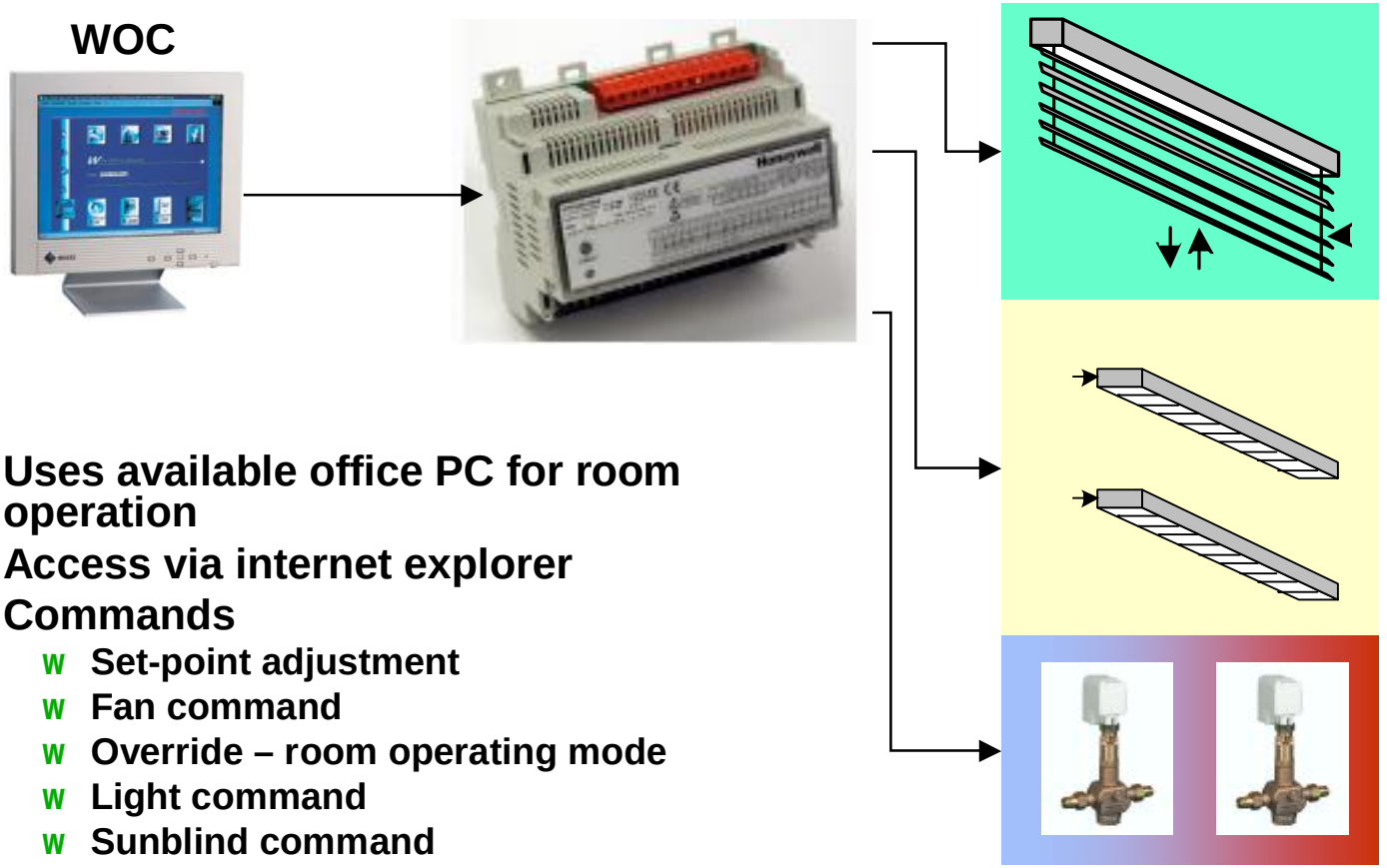
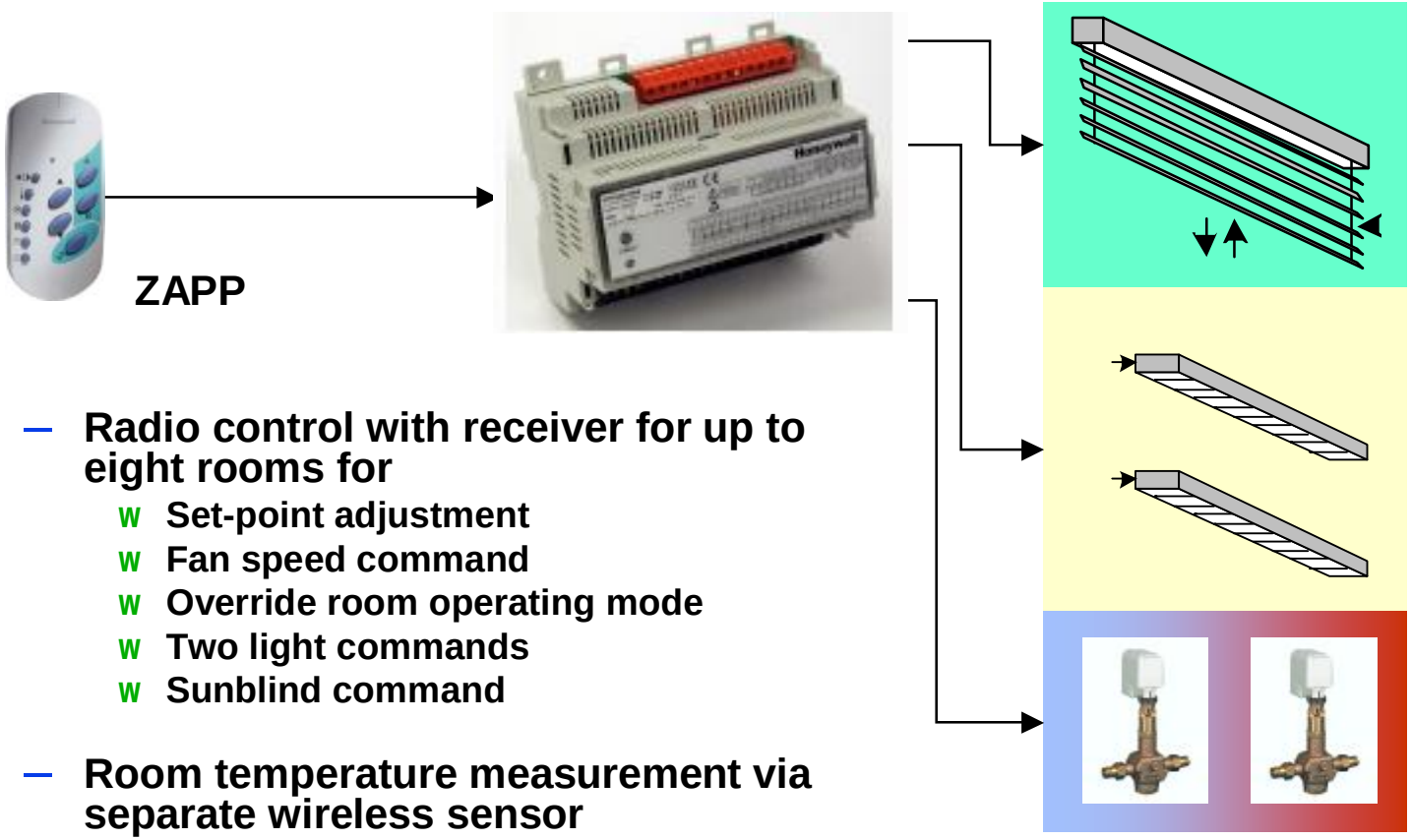
Web Office Console (WOC)

Room Operation via Web Office Console (WOC)



- Uses available office PC for room operation
- Access via internet explorer
- Commands
  - Set-point adjustment
  - Fan command
  - Override – room operating mode
  - Light command
  - Sunblind command
  - Scene adjustment

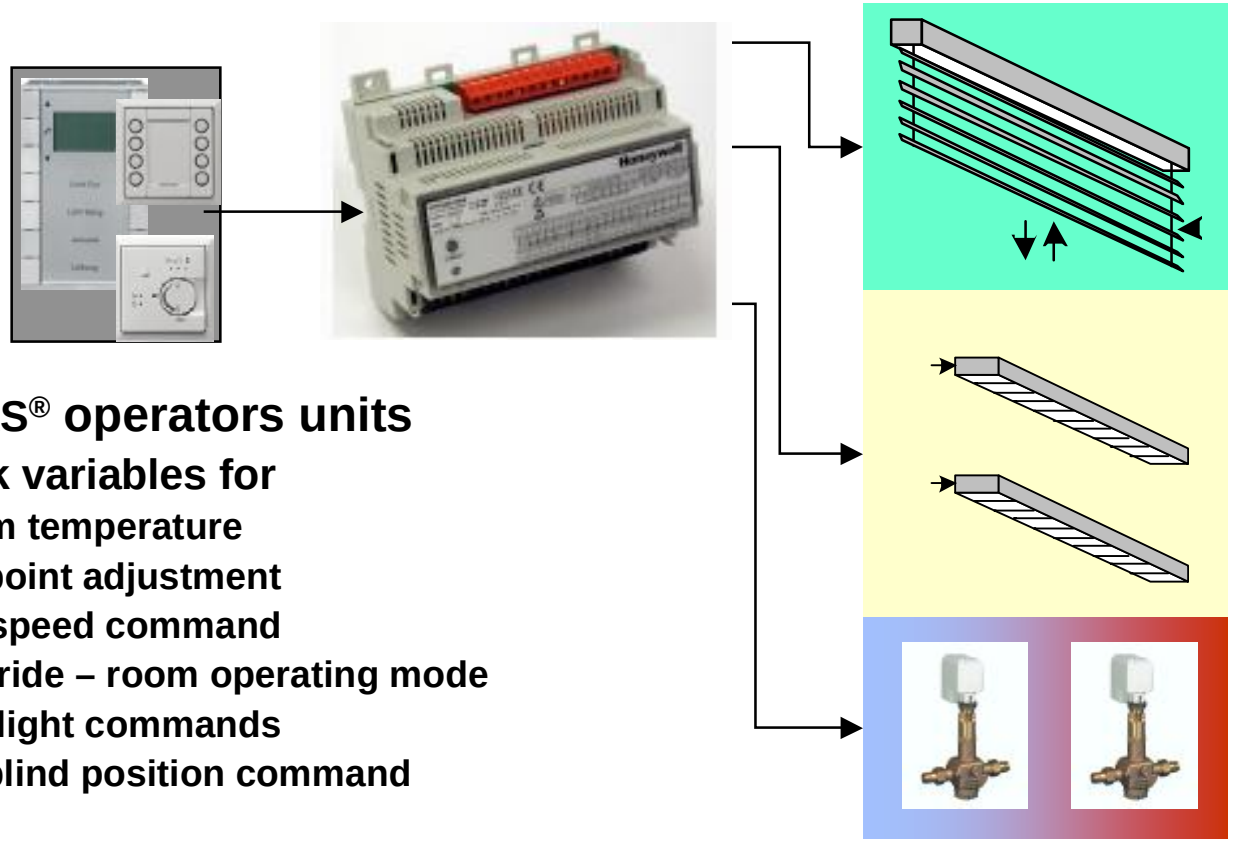
Wireless Room Operation - Excel ZAPP



- Radio control with receiver for up to eight rooms for
  - Set-point adjustment
  - Fan speed command
  - Override room operating mode
  - Two light commands
  - Sunblind command
- Room temperature measurement via separate wireless sensor

LONWORKS® Operator Units

Room Operation via LON



LONWORKS® operators units

- Network variables for
  - Room temperature
  - Set-point adjustment
  - Fan speed command
  - Override – room operating mode
  - Two light commands
  - Sunblind position command

Excel 12 - the “All-in-One” Room Controller