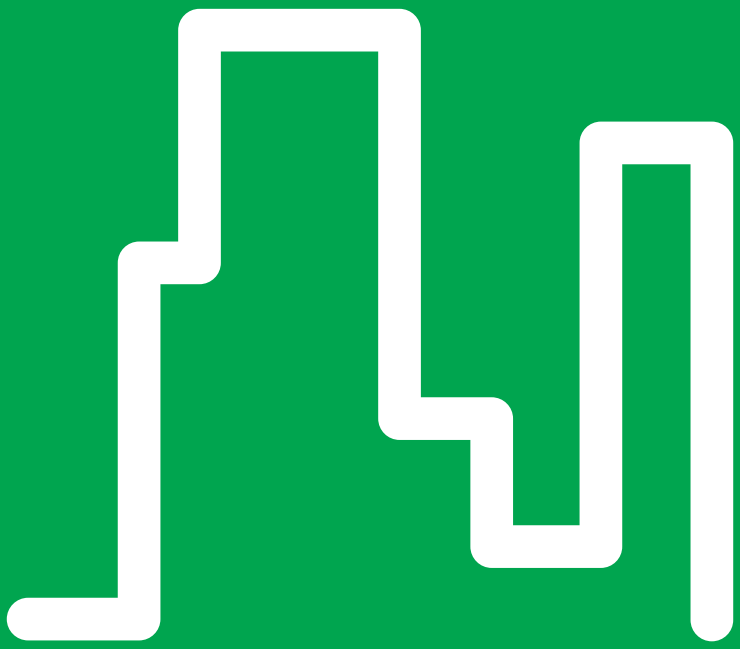
SeeTool - Solutions for KNX

Office building segment



Application 8.7.0.0.0.4

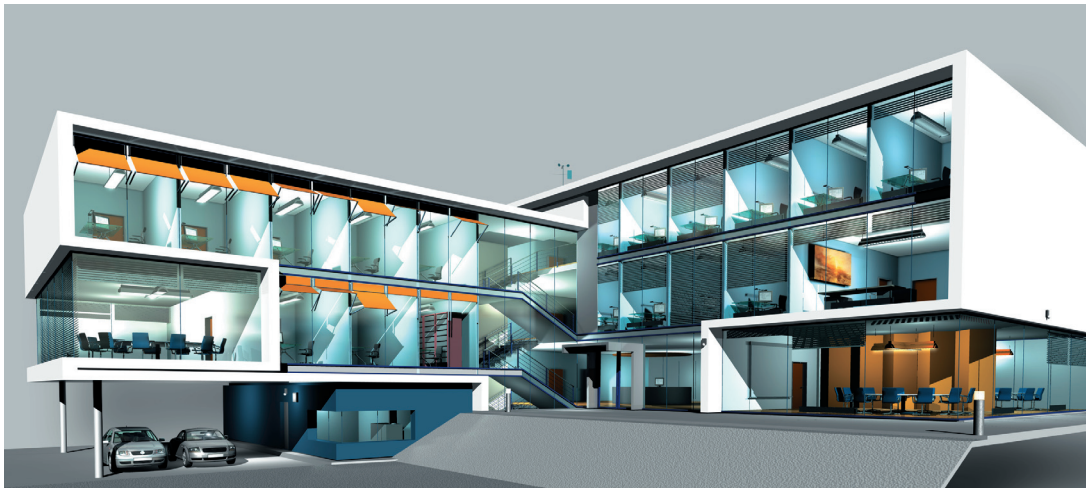
Movement dependent automatic light control with light regulation and manual control, temperature control (heating with thermoelectric valve drive 230V), single room

Schneider Electric

Lighting and temperature control functions

Lighting control functions: The lights are automatically switched ON or OFF dependant on people's movement and existing brightness. When the lights are on, the light controller in the presence detector maintains the decided lux set point by dimming the lamp actuator dependant on the available daylight. In addition three predefined light levels and a permanent OFF can be activated manually by push-button.

Temperature control functions: Temperature controller tries to keep room temperature at it's setpoint by controlling thermoelectric valve drives 230V for heating via a KNX heating actuator. The movement detection will automatically set the temperature control either into comfort or standby mode.



Application areas

The application is defined to be used in office rooms and/or conference rooms where the level of light will be kept constant taking into account the amount of natural light. The solution offers sophisticated control of the lighting and heating with an automatic movement detector and additional manual control plus an open window sensing function to set temperature at comfort and standby mode.

Energy savings

Combining the presence and daylight function with temperature control to the room application, we are able to utilize the daylight and temperature factors to optimize and save energy during the active period of use throughout the year. Presence dependant lighting control plus daylight harvesting can achieve a 65% electricity saving compared to installations without automatic function. At temperature side presence dependant control can lead to savings of up to 5% yearly in compare to rooms without automatic control functions.

Future proof

The application is prepared and defined for integration into a Building Management System if required, through the open technology communication network.

Flexibility

For optimized costs the device's functional interaction is predefined. Functionality can be modified or changed at any time in the lifecycle and allows a maximum of flexibility and adaptation when walls are removed and rooms combined.

Reliability

Design, planning and installation documents are pre-defined which makes the entire building process faster and more reliable. User documents and descriptions are prepared to assist in user training. The application works as an individual, stand alone room control unit or combined with the entire network.

Lighting

up to 65% energy saving

Temperature

up to 5% energy saving

EN 15232
A class solution

tested & validated

Technical specifications

Functions

Lighting control: The lights are automatically switched ON when a person enters the room and the brightness value is below the selected brightness threshold. If no movement is detected within a delay time of 25 minutes, the light will be dimmed down to minimum. If no movement is detected for another 5 minutes the light will be switched off.

When the lights are on, the light controller in the presence detector maintains the decided lux set point by sending dimming telegrams to the lamp actuator.

If the daylight will increase, the regulation dims down the artificial light. If it decreases, the regulation will dim up the artificial light.

The lux set point after download and power failure is adjustable by ETS software. The default lux setpoint at the reference surface (e.g. desk) is 500 lux ±20% hysteresis.

The user can also select the lux setpoint by the push-button unit. Button 1 will give high brightness (500 lux), button 2 will give medium brightness (300 lux) and button 3 low brightness (100 lux). With button 4 permanent-OFF can be activated. The light will then be off until one of the other buttons is pressed. When permanent OFF is activated the status LED next to the button is blinking.

Temperature control: Temperature controller tries to keep room temperature at it's setpoint by controlling valves. Heating is controlled by a thermoelectric valve drive 230V via a KNX heating actuator.

Movement detection will automatically set the temperature control into comfort-mode. To save energy this will not happen until a person has been in the room for more than 3 minutes. In this way the temperature control is not affected if someone is present in the room just for a short period of time. If no movement is detected within a delay time of 25 minutes the temperature control is set into standby-mode.

Comfort-mode: default room temperature setpoint 21 °C

Standby-mode: default room temperature setpoint 19 °C

The setpoint can be adjusted by the user +/- 3°C from given setpoint. This is done by pushing „invisible“ buttons on both sides of the display frame.

Technical specifications

Components

functions

Application consists of one presence detector, one DIN-rail 0-10V control unit (mounted in the cabinet or close to the room), one room temperature controller with buttons, one heating actuator and one thermoelectric valve drive 230V.

MTN647091	KNX Control Unit 0-10V REG-K/1-gang with manual mode
MTN630919	KNX ARGUS Presence with light control and IR receiver
MTN645129	KNX Heating actuator REG-K/6x230/0.05A
MTN639125	KNX Thermoelectric valve drive 230V (here for heating purposes)

Design ranges

(Frames not included. Other designs and colours available.)

EXXACT

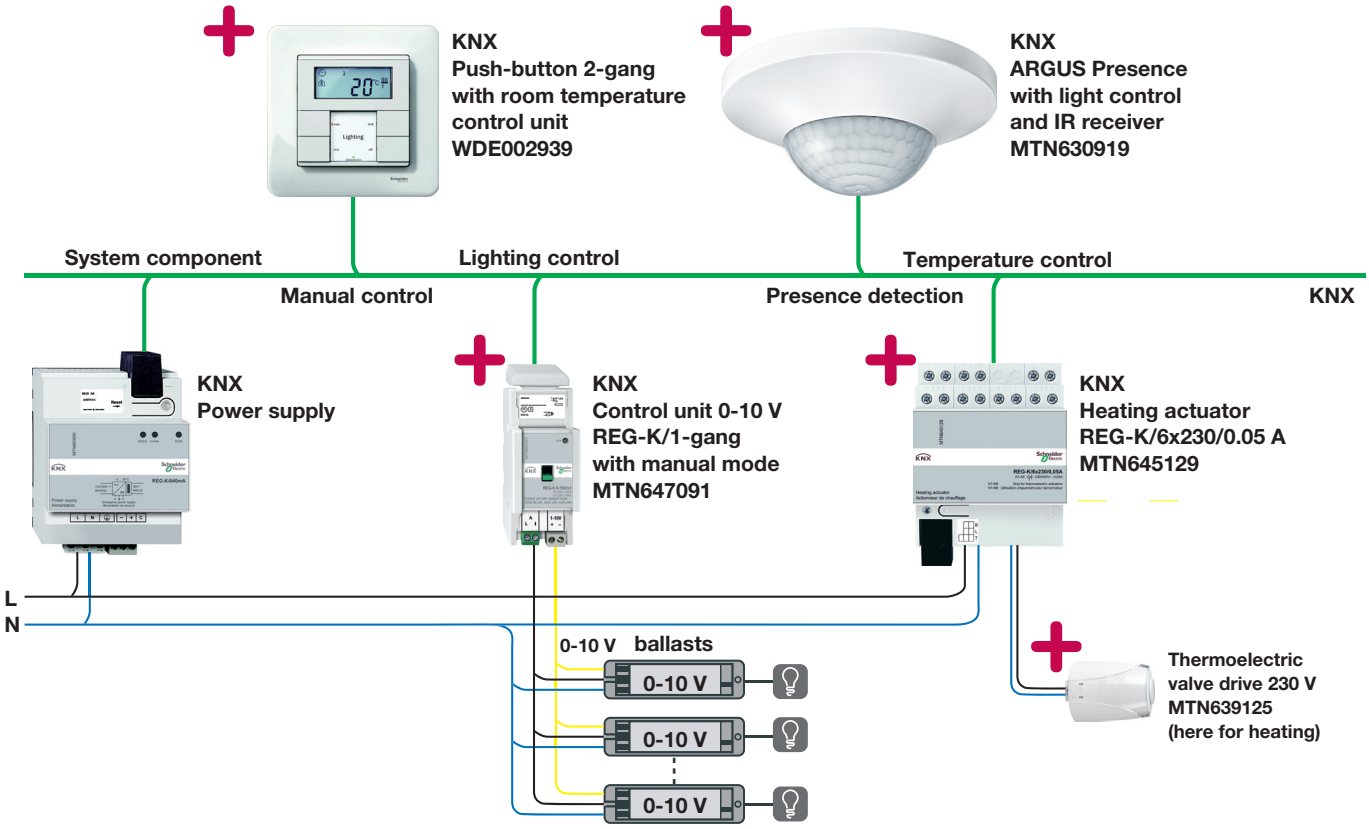
WDE002939	KNX PB 2-gang with room temperature control unit

Installation

The presence detector is intended for ceiling mounting in a size 60 mounting box. It can also be mounted to ceilings using the surface mounting housing for ARGUS Presence (art.no. MTN550619).

Technical specifications

Wiring diagram



things work together

Technical specifications

Note

Number of controlled electronic interfaces highly depends on used ones, check with manufacturer recommendations.

An electronic interface takes high inrush current. It is recommended that Type C MCB's (Miniature Circuit Breaker's) are used. Using Type B leads to decreased number of units.

settings

Configuration

The ETS tool is used to set the parameters for the devices in the application and to define the functional relationship between the devices by group addresses.

The following parameters and group address relations must be set and assigned. The parameters should be set first and in the described order. The parameters which can be changed to fine tune the application are described further on.

KNX Argus presence with light control				
12	Switch object 1	Block 2	1 bit	–> 2/1/3
60	Switch output	Closed-loop	1 bit	–> 1/1/1
61	Dimming output	Closed-loop	4 bit	–> 1/1/2
62	Setpoint 1	Closed-loop	1 byte	–> 1/1/3
64	Fb. operat. mode	Closed-loop	1 bit	–> 1/1/9
70	Value input	Closed-loop	1 byte	<– 1/1/8
71	Lux value setting	Closed-loop	2 byte	<– 1/1/7
107	Result. act. value	Send	2 byte	–> 1/1/6 (optional)
109	Status feedback	Safety pause	1 bit	<– 1/1/4
110	Status feedback	Brightness	1 byte	<– 1/1/5

General	
Actual value correction:	enable
Actual value (0-2000 Lux) installation site	
Lamp switched off:	_____
Max. brightness of lamp:	_____
Actual value (0-2000 Lux) reference surface	
Lamp switched off:	_____
Max. brightness of lamp:	_____
[Optional, to check regulation after download]	
Send actual value cyclically	
reference surface:	enable
Time base, send lux value:	1 s
Time factor, send lux value:	60
Block configuration	
Move/presence block 1:	disable
Move/presence block 2:	enable
Light control:	enable
Block 2 general –> Movement sensors	
Sector-orientated settings:	enable
Dead time, beginning of movement:	enable
Time base:	1 min
Time factor:	3
Block 2 general –> Brightness	
Movement detection is:	brightness independ.
Block 2 general –> Time	
Time base for staircase timer:	1 min
Time factor for staircase timer:	25

KNX Push-button 2-gang with RTC				
0	Object A	PB 1	2 byte	–> 1/1/7
3	Object A	PB 2	2 byte	–> 1/1/7
6	Object A	PB 3	2 byte	–> 1/1/7
9	Value object A	PB 4	1 byte	–> 1/1/8
11	Status feedb. object	PB 4	1 bit	<– 1/1/9
47	Comfort input	Control	1 bit	<– 2/1/3
62	Correcting variable heating (basic level)	Control	1 byte	–> 2/1/1

Push-button 1	
Select push-button function:	Edges with 2 byte values
Push-button 1 – edges values	
Value 1 = basis * factor [= 500]	
Basis (possible values in brackets):	0,32 (0 to 655,04)
Factor (0-2047):	1562
Push-button 2	
Select push-button function:	Edges with 2 byte values
Push-button 2 – edges values	
Value 1 = basis * factor [= 300]	
Basis (possible values in brackets):	0,16 (0 to 327,52)
Factor (0-2047):	1875
Push-button 3	
Select push-button function:	Edges with 2 byte values
Push-button 3 – edges values	
Value 1 = basis * factor [= 100]	
Basis (possible values in brackets):	0,08 (0 to 163,76)
Factor (0-2047):	1250

Technical specifications

Configuration

KNX Argus presence with light control		
General light control		
Automatic:	at object value 0	
Memory behaviour:	parameterised setpoint value	
Extended controller parameters:	enable	
General light control –> Control response in automatic mode –> Times		
Time base for staircase timer:	1 min	
Time factor for staircase timer:	25	
General light control –> Control response in automatic mode –> Brightness		
Nominal value (10-2000 Lux) reference surface:	500	
Hysteresis (10%-50%):	20	
General light control –> Switching off in automatic mode		
Time base, dimming down time:	1 min	
Time factor, dimming down time:	5	

	KNX Control unit 0-10V REG-K/1-gang			
1/1/1 –>	0	Switch object	Channel 1	1 bit
1/1/2 –>	1	Dimming object	Channel 1	4 bit
1/1/3 –>	2	Value object	Channel 1	1 byte
1/1/4 <–	8	Status feedb. switch	Channel 1	1 bit
1/1/5 <–	9	Status feedb. value NOTE: The read flag (R) must be set	Channel 1	1 byte
1: General				
Status switch:	active status resp. object			
Status value object:	active status resp. object			
1: Dimming time reduction				
Set 0:	dimming time reduction			
for value telegram at:	6%			

KNX Push-button 2-gang with RTC		
Push-button 4		
Select push-button function:	Switching	
Object A:	1 byte in steps 0-100%	
Value:	0%	
Trigger status LED:	Flashes when status feedback object equals 1	
Control general		
Use control:	Yes	
Controller type:	Heating	
Duration of comfort extension:	None	
Setpoint adjustment maintained after change in operation mode:	Yes	
Control general –> Actual temperature (resultant)		
Correct internal actual temperature factor [-128...127] * 0,1 K:	0	
[NOTE: See description „fine tuning"]		
Control general –> Control heating		
Select heating system:	Adjustment via control parameter	
Proportional range for heating in 0,1 K [10-255]:	40	
Reset time for heating [1-255 min]:	20	

	KNX Heating actuator			
2/1/1 –>	0	Output 1	Control value	1 byte
General				
Cyclic time (PWM of outputs):	2 minutes			
Output 1				
Type of control value:	1 byte			

settings

Technical specifications

Group addresses

Address	Name (proposal)	Function
1/1/1	Room 001 Light On/Off	Light on/off by the light controller
1/1/2	Room 001 Light Dimming	Light dimming up/down by the light controller
1/1/3	Room 001 Light Value	Light absolute value by the light controller
1/1/4	Room 001 Light Status switch	Feedback from actuator, On/Off
1/1/5	Room 001 Light Status value	Feedback from actuator, 0-100%
1/1/6	Room 001 Light Resulting actual value	Measured lux value by light controller (corrected value)
1/1/7	Room 001 Light Lux value setting	Different lux values from push-button
1/1/8	Room 001 Light Permanent OFF (0%)	Permanent OFF, movement detector disabled
1/1/9	Room 001 Light Feedb. operation mode	Indication permanent off (0) and automatic regulation (1)
2/1/1	Room 001 Heating control value	Heating 0-100%, sent by the room temperature controller to the heating actuator
2/1/3	Room 001 Comfort/Standby mode	Change between comfort (1) and standby (0) mode

settings

Technical specifications

Actual value correction

settings

The measured brightness value (actual value) can be corrected. A distinction is drawn here between the installation location of the presence detector and the reference area (a desk surface, for example). The brightness value of the reference area is determined with the aid of actual value correction and taking the brightness value measured by the presence detector at the installation location and an internal adjustment curve into account. In the case of light regulation it is not the brightness value at the installation location which is important but the brightness value at the reference area (desk).

For actual value correction you will need a luxmeter (example: Roline TES-1335 or equivalent).

Four measurements are required for actual value correction:
- With the artificial lighting switched OFF, brightness is measured at the presence detector installation location.
- With the artificial lighting switched OFF, brightness is measured at the reference area (desk, for example).
- With the artificial lighting switched ON (maximum brightness), brightness is measured at the presence detector installation location.
- With the artificial lighting switched ON (maximum brightness), brightness is measured at the reference area (desk, for example).

The measurements can be done in daylight but not in clear sunshine, best condition is cloudy weather.

To switch ON to maximum brightness a value telegram 100% can be sent from ETS to the value object of the control unit, for example. Note: the presence detector should not be in operation at this time.

The four lux values measured must be entered as parameters in ETS.

Parameter page	Parameter	Value
General	Actual value installation site, Lamp switched OFF	0…2000 lux
General	Actual value installation site, Max brightness of lamp (100%)	0…2000 lux
General	Actual value reference surface, Lamp switched OFF	0…2000 lux
General	Actual value reference surface, Max brightness of lamp (100%)	0…2000 lux

Technical specifications

Fine tuning

fine tuning

Some parameters can be changed to fine tune the solution to the building and specific requirements. Parameter which may need to be adjusted are listed below, our recommendation in brackets.

KNX ARGUS presence detector with light control and IR receiver:
The staircase timer (delay time) will be retriggered by every detected movement when the light is on. The light will be dimmed down to minimum if no movement has been detected within the specified time.

If no movement is detected the light will stay on minimum level for a time period specified by the parameter „dimming down time“. After this time the light will be switched off.

Parameter page	Parameter	Value
General light control –> Control response in automatic mode –> Times	Time base for staircase timer	1s/1 min/1h (1 min)
General light control –> Control response in automatic mode –> Times	Time factor for staircase timer	1-255 (25)
General light control –> Switching off in automatic mode	Time base, dimming down time	1 s/1 min/1 h (1 min)
General light control –> Switching off in automatic mode	Time factor, dimming down time	1-255 (5)

Delay time = Time base x Time factor
Dimming down time = Time base x Time factor

Lux level setpoint in reference area

Parameter page	Parameter	Value
General light control –>l Control response in auto. mode –> Brightness	Nominal value reference surface	10-2000 lux (500 lux)
General light control –>l Control response in auto. mode –> Brightness	Hysteresis	10%-50% (20%)

The actual brightness value (corrected measured value) can be sent cyclically to the bus via communication object 107. This can be used for test purpose together with ETS. If it is used for other purposes, the value should not be sent too often for bus load reasons. If there is no receiver to display the value in the project, the function should be disabled after the test phase.

Parameter page	Parameter	Value
General	Send actual value cyclically, reference surface	enable/disable (disable)
General	Time base, send lux value	1s/1 min/1 h (1 min)
General	Time factor, send lux value	1-255 (30)

Cycle time = Time base x Time factor

Technical specifications

Fine tuning

The delay time for changing between standby-comfort is dependent on presence activity in a room. To save energy the switch-over from standby to comfort is done when movement is detected after a specified dead time. Then a staircase timer is started which will be retriggered by every detected movement. If no movement is detected the staircase timer will run out and standby mode is activated again.

fine tuning

Parameter page	Parameter	Value
Block 2 general –> Movement sensors	Dead time, Time base	1s/1 min (1 min)
Block 2 general –> Movement sensors	Dead time, Time factor	1-255 (3)
Block 2 general –> Times	Time base for staircase timer	1s/1 min/1h (1 min)
Block 2 general –> Times	Time factor for staircase timer	1-255 (25)

KNX Push-button 2-gang with room temperature control unit:
Push-buttons:
The end user can select brightness level (lux value) with push-button 1, 2 and 3. These values can be changed with the parameters of the push-buttons.

Parameter page	Parameter	Value
Push-button 1 – edges values	Value 1 = basis * factor (500 lux) Basis	0,01-327,68 (0,32)
Push-button 1 – edges values	Factor	0-2047 (1562)
Push-button 2 – edges values	Value 1 = basis * factor (300 lux) Basis	0,01-327,68 (0,16)
Push-button 2 – edges values	Factor	0-2047 (1875)
Push-button 3 – edges values	Value 1 = basis * factor (100 lux) Basis	0,01-327,68 (0,08)
Push-button 3 – edges values	Factor	0-2047 (1250)

Note: Temperature controller parameter pages uses the unit Kelvin's (K) for relative temperatures and Celsius (°C) degrees for absolute temperatures 1K = 1°C

Room temperature controller:
Default setpoints for heating (depends on presence in a room)

Parameter page	Parameter	Value
Control general –> Setpoints	Heating, setpoint for comfort	5-40°C (21°C)
Control general –> Setpoints	Heating, setpoint for standby	5-40°C (19°C)

The user is allowed to adjust the default setpoint +/- within specified limits

Parameter page	Parameter	Value
Control general	Max. upper setpoint adjustment	0-10 K (3 K)
Control general	Max. lower setpoint adjustment	0-10 K (3 K)

Technical specifications

Fine tuning

Value correction of measured temperature:
The temperature in the room is measured by the internal temperature sensor in the room temperature controller. The actual temperature is shown in the display. If the value is not representative for the room it is possible to adjust it by parameter. Actual temperature = measured temperature + adjustment value.

Parameter page	Parameter	Value
Control general –> Actual temperature (resultant)	Correct internal actual temperature factor (-128...127) * 0,1 K	0

Parameters for tuning heating control (Xp and Ti)

Parameter page	Parameter	Value
Control general –> Control heating	Proportional range for heating in 0.1K	10-255 (40)
Control general –> Control heating	Reset time for heating in min	1-255 min (20)

Power failure behaviour

Behaviour when bus voltage fails: relay no (Light is OFF).

Behaviour when bus voltage returns: switch off relay (Light is OFF).

Technical specifications

User manual

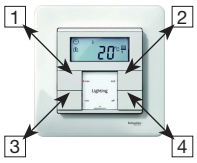
The user manual provided for the application is an end users training material and can be installed at site when final submission is made.

Please do no forget to cut out this quick guide for the user and attach to the wall next to the entrance to the room. Also, make sure the customer is aware of the installed applications function.

Quick guide

This room is equipped with a movement dependent automatic light control with light regulation and manual control, temperature control.

Automatic mode operation
Lighting control
The lights are automatically switched ON when a person enters the room and the brightness value is below the selected brightness threshold.
If no movement is detected within a delay time of 25 minutes, the light will be dimmed down to minimum. If no movement is detected for another 5 minutes the light will be switched off. When the lights are on, the light controller in the presence detector maintains the decided lux set point by sending dimming telegrams to the lamp actuator. If the daylight will increase, the regulation dims down the artificial light. If it decreases, the regulation will dim up the artificial light.



Manual mode operation
The user can also select the lux set point by the pushbutton unit. Button 1 will give high brightness (500 lux), button 2 will give medium brightness (300 lux) and button 3 low brightness (100 lux). With button 4 permanent-OFF can be activated. The light will then be off until one of the other buttons is pressed. When permanent OFF is activated the status LED next to the button is blinking.

06-10 Application 8.7.0.0.0.4

Schneider Electric

service for your customer

Technical specifications

User manual

Quick guide

This room is equipped with a movement dependent automatic light control with light regulation and manual control, temperature control.

Automatic mode operation
Temperature control, heating
Movement detection will automatically set the temperature control into comfort-mode.
To save energy this will not happen until a person has been in the room for more than 3 minutes. In this way the temperature control is not affected if someone is present in the room just for a short period of time. If no movement is detected within a delay time of 25 minutes the temperature control is set into standby-mode.
Comfort-mode:
default room temperature set point 21 °C

Standby-mode:
default room temperature set point 19 °C

The set point can be adjusted by the user +/- 3°C from given set point. This is done by pushing „invisible“ buttons on both sides of the display frame.

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