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# LOGO! 8 Threshold Function "Brightness Control" for KNX

LOGO! 8, LOGO! CMK2000

<https://support.industry.siemens.com/cs/ww/en/view/109748587>

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# 1 Introduction

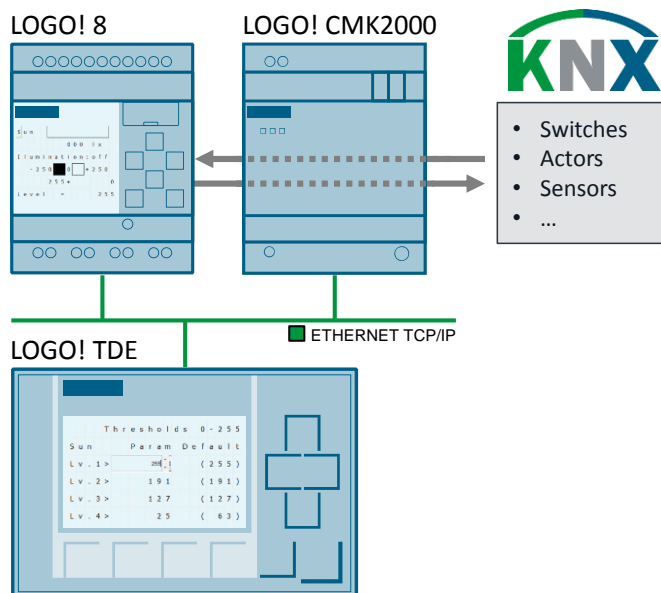
This application example offers you a threshold function for brightness control for LOGO! 8. The expanded application of the application example (see chapter 4) processes percentage values, so that this example can be adapted to your own task more easily.

The integrated functions of a LOGO! 8 offer many options for quick and easy solutions for automation tasks. Pre-programmed function blocks support you when creating a project, e.g. week timer, pulse generator, astro timer, yearly timer, stopwatch and simple logic gates.

The LOGO! text display unit (TDE) and the integrated LOGO! 8 web server offer additional options for control and monitoring with function keys and message texts.

The communication module CMK2000 from Siemens provides a solution for communication in building automation with LOGO! 8. The communication module enables communication between a LOGO! 8 and any KNX device via the KNX building system bus.

Figure 1-1: Hardware setup for the application example



## Advantages

The combination of the logic function in LOGO! 8 and the CMK2000 module offers you the following advantages:

- Task can easily be expanded with additional functions
- Integration of LOGO! inputs and output into a KNX system
- Combine these tasks with other application examples for LOGO! and the KNX system.

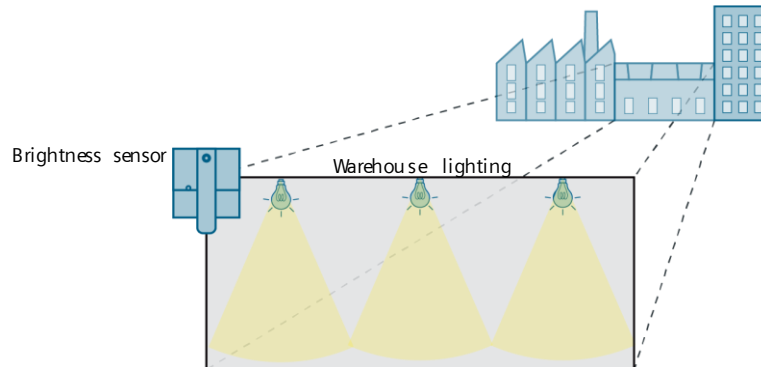
## Target group

This application example is aimed at experienced KNX users who seek to expand their KNX system with the functionalities of a LOGO! 8.

## 1.1 Task Description

An industrial warehouse is to be illuminated in four intensity levels depending on the brightness outside as shown in [Figure 1-2](#).

Figure 1-2: Principle (lighting of warehouse depending on solar radiation)



The four intensity levels are specified depending on the solar radiation and their output signal is specified with 0= dark to 255= maximum lighting. The four intensity levels are designated as Level (1, 2, 3, 4) in the switching program and are defined in [Table 1-1](#). The table shows the natural lighting intensities outside.

The intensity levels of the warehouse lighting are to be adjusted manually as well (depending on the specific lighting conditions on site). This adjustment is to be made with the LOGO! TDE or the web server.

However, the preset switching thresholds for the lighting intensity (in Lux) can only be changed by directly configuring the specific blocks in the LOGO! switching program.

A dimmer function is to be used for a stepless adjustment of the warehouse lighting intensity. The lighting is to be switched from a central position, the LOGO! TDE or via the web server. A secure network connection is a mandatory prerequisite for this.

Table 1-1: Warehouse lighting depending on lighting intensity (brightness outside)

Lighting intensity in Lux	Meaning	Note
<b>Warehouse lighting according to previously made setting (⇒manual switching off)</b>		
130,000lx	Clear sky and sun in zenith	-
90,000 lx	Clear sky, sun elevation 60°	Noon in summer
<b>Level 4: Warehouse lighting preset to 10%⇒25</b>		<b>Sun from 20,000lx</b>
20,000 lx	Clear sky, sun elevation 16°	Noon in winter
19,000 lx	Clouded sky, sun elevation 60°	Noon in summer
<b>Level 3: Warehouse lighting preset to 50%⇒127</b>		<b>Sun from 6,000lx</b>
6,000 lx	Clouded sky, sun elevation 16°	Noon in winter
<b>Level 2: Warehouse lighting preset to 75%⇒191</b>		<b>Sun from 300lx</b>
750 lx	Twilight; sun slightly below horizon	-
<b>Level 1: Warehouse lighting preset to 100%⇒255</b>		<b>Sun up to 300lx</b>
3 lx 0.27 lx 0.02 lx 0.002 lx	Twilight (sun 6° below horizon) / full moon in zenith, medium distance from earth Crescent moon with 45° elevation, medium distance from earth Star light and air glow	-

## 1.2 Mode of operation

The task is implemented in the LOGO! switching program with the settings from [Table 1-1](#).

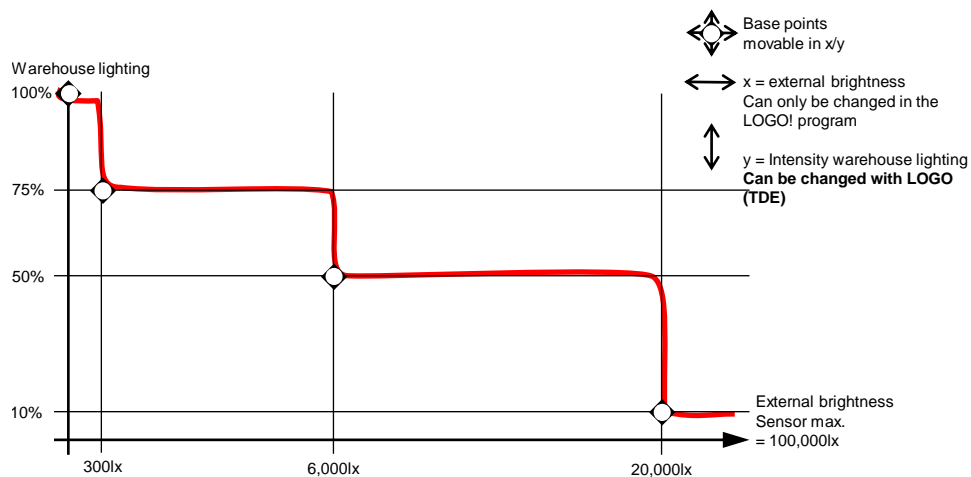
The four support points consist of the threshold values for the brightness outside and the respective intensity levels for the desired lighting inside.

[Figure 1-3](#) shows the four support points that are offset in x and y direction via the configuration.

The switching threshold in relation to the brightness outside is changed in x direction. This change can only be made in the LOGO! switching program in this application example.

The intensity level of the warehouse lighting changes the support point in y direction. These changes can be made by entering the value in the LOGO! TDE or on the web server.

Figure 1-3: Warehouse lighting depending on brightness outside



### Note

A functional description of the logic function can be found as a comment of the switching program under LOGO! Soft Comfort:

> "Tools" > "Select Hardware" > "Offline settings" > "Comment".

**Tip:** Activate the "Comment" option box under "Tools" > "Options" > "Print" for the function description to be printed together with the program.

The expansion of the example uses standardized percent values and contains eight switching levels. The expansion is suitable as a general method for your individual project and is described in [chapter 4](#).

You can individually expand both switching programs, e.g. with additional monitoring or alarm functions for the current switching states.

## 2 Setup and description

### 2.1 Components used

This application example was created with the following components:

Table 2-1: Hardware and software components for the application example

Component	Number	Article number	Note
LOGO! Soft Comfort V8.1	1	6ED1058-0BA08-0YA1	Upgrade to V8.1 can be found at <a href="http://www.siemens.com/logo">http://www.siemens.com/logo</a>
ETS5 Demo A maximum of 5 KNX devices per project	1	Download	<a href="https://www.knx.org/knx-en/software/ets/download/index.php">https://www.knx.org/knx-en/software/ets/download/index.php</a>
LOGO! Power	1	6EP3332-6SB00-0AY0	-
LOGO! 8 12/24 RCE	1	6ED1052-1MD00-0BA8	-
LOGO! CMK2000	1	6BK1700-0BA20-0AA0	Product data base ETS5: <a href="http://www.siemens.com/gamma-td">http://www.siemens.com/gamma-td</a>
LOGO! TDE	1	6ED1055-4MH00-0BA1	Optional components
Siemens GAMMA KNX Power Supply	1	5WG1 125-1AB12	320 mA
Siemens GAMMA KNX bus coupler	1	5WG1 117-2AB12	-
Siemens GAMMA KNX room control unit	1	5WG1 2272AB11	Product data base ETS5: <a href="http://www.siemens.com/gamma-td">http://www.siemens.com/gamma-td</a>
Siemens GAMMA KNX 3-Gang Button	1	5WG1 223-2DB13	Product data base ETS5: <a href="http://www.siemens.com/gamma-td">http://www.siemens.com/gamma-td</a>
Siemens GAMMA KNX/IP interface	1	5WG1 148-1AB12	Required for programming the KNX devices. Alternatively: USB interface
Brightness sensor Combined sensor for brightness and temperature	1	5WG1 254-3EY02	Product data base ETS5: <a href="http://www.siemens.com/gamma-td">http://www.siemens.com/gamma-td</a>

This application example consists of the LOGO! and ETS programs.

Table 2-2: Components and programs for the application example

Component	File name	Note
Documentation	109748587_LOGO8_Threshold_DOC_en.pdf	-
LOGO! 8 programs	109748587_LOGO8_Threshold_basic_en.lsc 109748587_LOGO8_Threshold_extended_en.lsc	Requirement: LOGO! Soft Comfort V8.1
ETS5 projects	109748587_LOGO8_Threshold_en.knxproj	Project for "basic" and "extended" Requirement ETS5 software

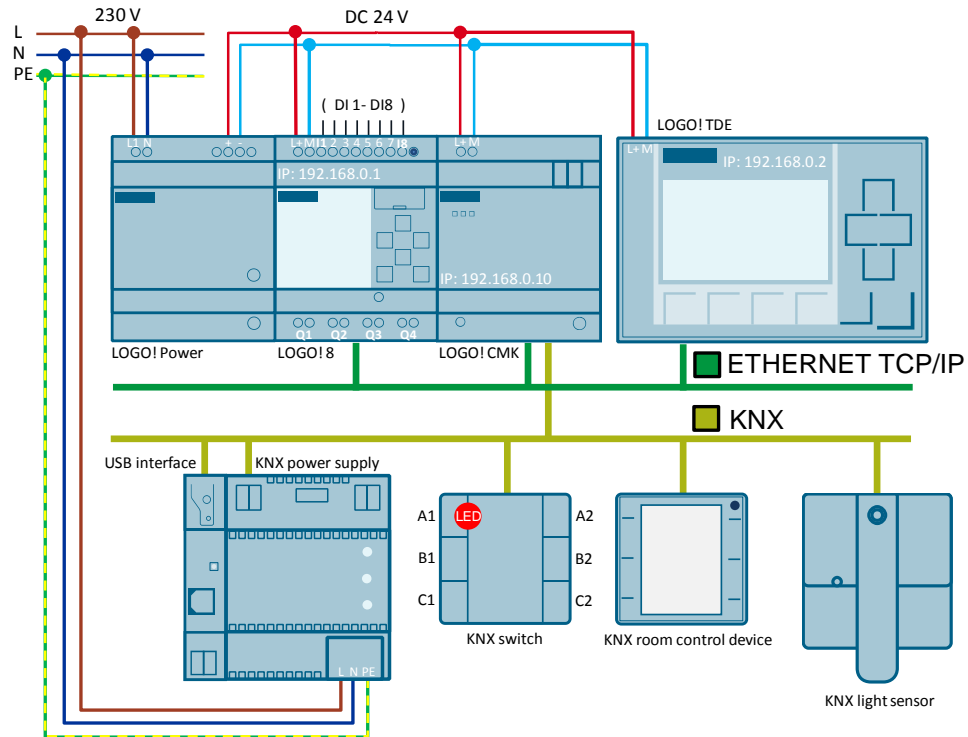
## 2.2 Hardware setup

[Figure 2-1](#) shows the hardware setup for this application example.

The assignment of the digital input and output signals of LOGO! 8 for the basic sample project can be found in [Table 2-3](#) and for the expansion in [Table 4-1](#).

The assignment of the KNX communication objects and the group addresses can be found in [Table 2-4](#).

Figure 2-1: Hardware configuration for the application example



### Note

LOGO! TDE is an optional component.  
You can also use its functions (message texts and function buttons) via the integrated LOGO! web server.



## 2.3 LOGO! program

The LOGO! switching program in [Figure 2-2](#) consists on the input side of the central switch-on function at position (1), the connection to the brightness sensor (2) and a dimmer to adjust the warehouse lighting (3).

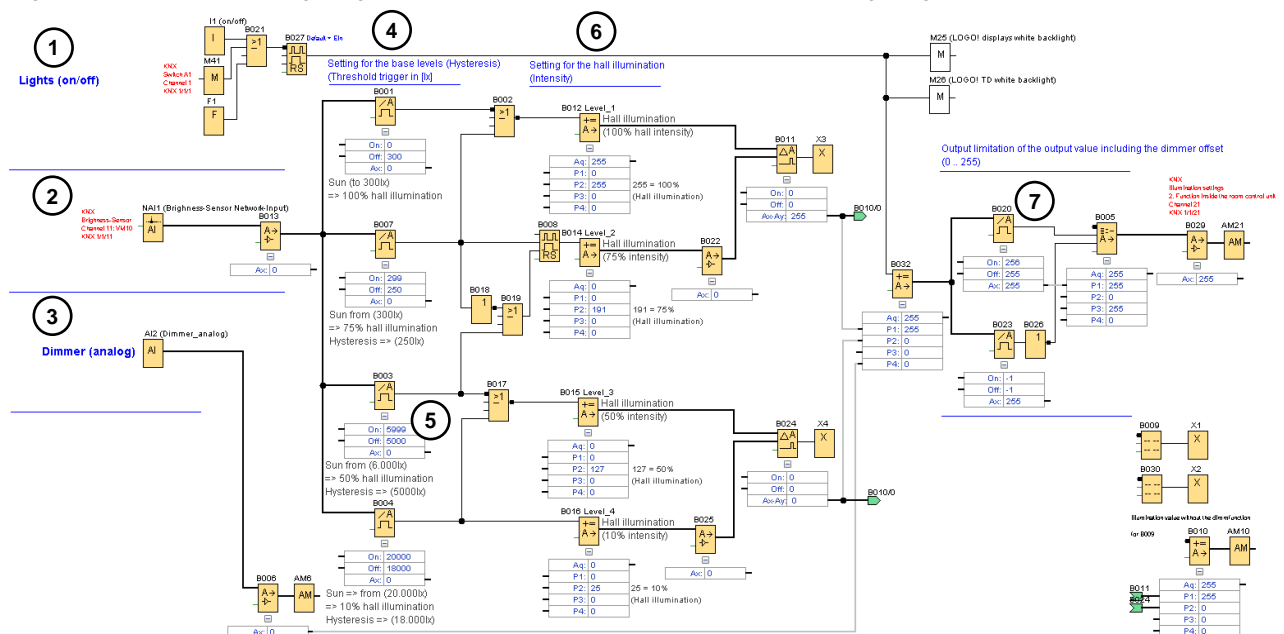
The input signal of the brightness sensor is first classified by the four switching thresholds of the support points according to [Table 1-1](#).

[Figure 2-2](#) shows the switching thresholds at position (4) that you can only adjust in the LOGO! switching program. The brightness outside can undergo dynamic changes, e.g. by passing clouds, which delivers constantly changing illumination values from the brightness sensor. For this case, a switching hysteresis is included in the switching program that, for example, lowers the lighting in case of a brightness overshoot at position (5) of 6000 lx, but only increases the lighting intensity to the old value in case of a brightness undershoot of 5000 lx.

In the next step at position (6), the intensity settings for the lighting are made. This setting is made during online operation of the program at LOGO! TDE or the web server. A short intensive brightness change at the sensor, for example caused by a tree in the wind, is not realized in this application example. However, it is easy to implement such an expansion with a switching time delay with LOGO! Soft Comfort.

The dimmer can be used to steplessly adjust the brightness. The analog output value is in this case within the limits of 0 to 255. The output value limits are ensured by the threshold switches [B020] and [B023] at position (7).

Figure 2-2: LOGO! switching program for the application example (basic switching program)



Use the LOGO! Soft Comfort simulation function for a direct graphic display of the dependencies in the switching program. Active connections (signals) are displayed in red, passive connections in blue.

Table 2-3 shows the input and output signals from Figure 2-2.

Connect the LOGO! to KNX as explained in the following chapter 2.4.

Table 2-3: Input and output signals in the LOGO! (Basic switching program)

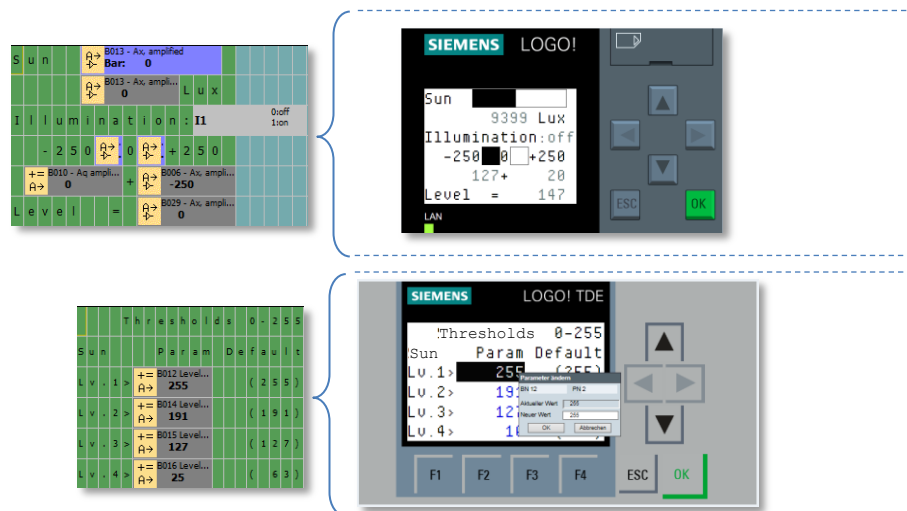
Signals	Description
[I1], [F1], [M41]	Switching the brightness-dependent lighting on and off. Release signals from KNX to LOGO! (Table 2-4)
[NAI1] Analog network input	The brightness value of the KNX sensor is connected to VM10 via the analog network input [NAI1]. VM means "variable memory"
[AI2] Analog input (dimmer)	The dimmer can be used to set an offset value for the output value of the control. This offset is between (-250...0...+250) The output value is limited to the values (0 ... 255).
[AM21] ⇒ KNX value	Control value (level) of the warehouse lighting (0 .. 255). This value is display at the KNX room control unit in the application example, see Table 2-4.

### 2.3.1 Message texts

The message text display consist of the following windows:

- Current illumination level at the brightness sensor with the control value (level) of the warehouse lighting and the dimming function.  
The bar chart for the lighting intensity was limited to the highest switching threshold at 20,000lx.  
(Displayed on the LOGO! display and/or the web server)
- Setting the intensity levels for the warehouse lighting.  
(Displayed on the LOGO! TDE and/or the web server)

Figure 2-3: Message texts (lighting intensity / intensity of warehouse lighting)



#### Note

A configuration mode for individual block parameters is offered for specific function blocks.

A detailed description can be found in the LOGO! 8 manual in chapter: [8.1 "Switching to parameterization mode"](#).

Manual: <https://support.industry.siemens.com/cs/ww/en/view/100761780>.

## 2.4 Mounting the LOGO! into KNX

LOGO! 8 is integrated into a KNX system via the LOGO! communication module CMK2000.

The bi-directional data exchange between LOGO! and the KNX devices is made via configurable communication channels of the LOGO! CMK2000.

For the channels, you parameterize inputs and outputs, flags or variable memories as signals in the LOGO!.

The following [Table 2-4](#) shows the signals of the LOGO! for this application example and the communication direction between LOGO! and KNX for the switching program in this application example. The ETS5 project included in the delivery contains the LOGO! CMK2000 configured for use with the specific hardware from [Table 2-1](#).

Table 2-4: KNX group addresses and LOGO! channels for communication

Signals in the LOGO!	KNX Group address	Channel Communication between LOGO! and KNX	Description
Inputs			
Flags [M41]	1/1/1	KNX to LOGO! (Channel 1)	Activates the function KNX button A1 (upper left)
Network input [NAI1] VM addr. (10)	1/1/11	KNX to LOGO! (Channel 11)	Input channel for the KNX brightness sensor
Output			
Analog flag [AM21]	1/1/21	LOGO! to KNX (channel 21)	KNX room control unit (Receives analog 2 byte value via second function.)

### Note

In this application example, a 3-gang button with status LEDs and a room control unit with configurable functions are used for switching and displaying KNX signals.

### 2.4.1 Configuration of LOGO! CMK2000

**Note**

In this application example, the KNX devices and the LOGO! communication module CMK2000 have been integrated into the ETS software as "devices".

The basic prerequisites for the signal exchange between LOGO! 8 and the KNX system bus are shown below.

The LOGO! CMK2000 communication module is configured via the ETS software.

Configuration of LOGO! CMK2000:

- General settings for LOGO! CMK2000 and the settings for the channels for the communication between LOGO! 8 and KNX are made in the "Parameters" window.
- Select the LOGO! basic module with which the signal and data exchange is to be performed in the general parameters.
- You have to assign valid IP addresses for the LOGO! base module and the LOGO! CMK2000.
- Enter a password for the web interface.
- One channel of the CMK2000 is configured in the ETS software for the direction "from LOGO! to KNX" and one for the direction "from KNX to LOGO!".
- The LOGO! CMK2000 communication channels must be connected with the group addresses of the KNX devices in the "Communication objects" window.

## 3 Commissioning

Proceed as follows to commission the application example:

### LOGO!

1. Start LOGO! Soft Comfort V8.1
2. Open the LOGO! example program included in the delivery:  
"109748587\_LOGO8-KNX\_Threshold\_basic\_en.lsc"
3. Load the program to the LOGO!

### Note

In this application example, the LOGO! IP address has been preconfigured as 192.168.0.1.

How to set the IP address of a LOGO! 8 can be found in the manual in chapter:  
[3.8.1 "Configuring network settings"](#)

### KNX

The following requirements apply to the KNX application:

- The physical addresses "1.1.1", "1.1.2", "1.1.3" and "1.1.4" are freely available in your KNX system.
- The communication interface has been defined in the ETS software.  
(Menu bar: "ETS > Bus")
- The bus connection with KNX participants has been established.  
(e.g.: via the USB interface or the IP interface).

1. Start the ETS software.
2. Click "ETS" in the ETS menu bar.
3. Select the "Overview" tab.
4. Click on the "Import project" symbol.
5. Navigate to the path of the KNX project: "109748587\_LOGO8-KNX\_Threshold\_basic\_en.knxproj"
6. In the "Devices" window, select the button and the LOGO! CMK2000.
7. Click the "Download" button and select "Download all".
8. Follow the instructions in the container "Pending Operations" and press the programming button of the respective device.

### Note

Further information on the programming button can be found in the "LOGO! CMK2000" manual:

<https://support.industry.siemens.com/cs/ww/en/view/109481657>

Technical product information GAMMA KNX 3-Gang Button:

<https://support.industry.siemens.com/cs/ww/en/view/87668166>  
(in the manual called Commissioning key "F9")



## 4 Adjustments and expansions

Based on the basic application example, the following expansion is designed for eight support points.

The sensor input is not assigned a specific value, but is standardized to a percent value.

[Figure 4-1](#) shows the functional expansion of the application example.

The signal assignment can be found in [Table 4-1](#).

### 4.1 Functional expansions in the application example

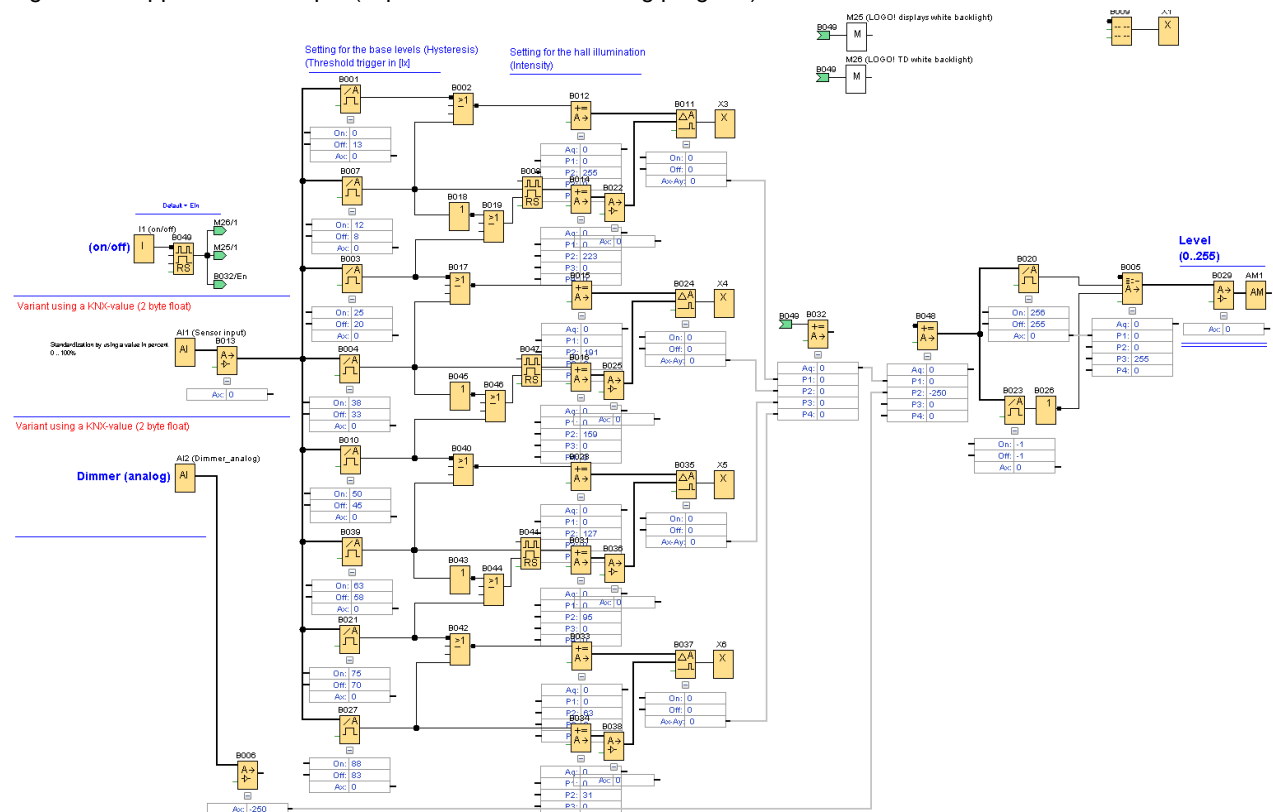
[Figure 4-1](#) shows the evaluation of the eight support points. The percentage input value 0 to 100% is equally distributed to the eight switching thresholds with a switching hysteresis of 5%.

The subsequent arithmetic commands contain a value range from 0 to 255. Eight switching levels result in a linear distribution of the value range of 32 to the next higher level  $0 \Rightarrow 31 \Rightarrow 63 \Rightarrow 95 \Rightarrow 127 \Rightarrow \dots \Rightarrow 255$ .

The output signal for lighting, a heater or other devices is limited to 0 to 255. The dimming function changes the output value between -250 and +250.

Use the LOGO! Soft Comfort simulation function to understand the switching function and to adapt it to your task.

Figure 4-1: Application example (expanded LOGO! switching program)



#### Note

How to implement KNX signals is described in the application example for the simple switching program with four support points, see chapter [2.4](#).

[Table 4-1](#) shows the input and output signals of the expanded switching program.

Table 4-1: Input and output signals in the LOGO! (expanded LOGO! switching program)

Signals	Description
Input [I1]	Lighting control for warehouse lighting is enabled.
Analog input [AI1]	Brightness value is changed via an [AI1]. VM means "variable memory".
Analog input [AI2] Analog dimmer	The dimmer can be used to set an offset value for the output value of the control. This offset is between -250...0...+250 The output value is limited to the values (0 ... 255).
[AM21] ⇒ KNX value	Output value of the warehouse lighting intensity (0 .. 255)

## 5 Appendix

### 5.1 Service and Support

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- Spare Parts Services
- Repair Services
- On Site and Maintenance Services
- Retrofit & Modernization Services
- Service Programs and Agreements

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<https://support.industry.siemens.com/cs/sc>

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<https://support.industry.siemens.com/cs/ww/en/sc/2067>

## 5.2 Links and literature

Table 5-1: Links and literature

No.	Topic
\1\	Siemens Industry Online Support <a href="https://support.industry.siemens.com">https://support.industry.siemens.com</a>
\2\	This entry <a href="https://support.industry.siemens.com/cs/ww/en/view/109748587">https://support.industry.siemens.com/cs/ww/en/view/109748587</a>
\3\	LOGO! 8 Manual <a href="https://support.industry.siemens.com/cs/ww/en/view/109741041">https://support.industry.siemens.com/cs/ww/en/view/109741041</a>
\4\	LOGO! CMK2000 Manual <a href="https://support.industry.siemens.com/cs/ww/en/view/109481657">https://support.industry.siemens.com/cs/ww/en/view/109481657</a>
\5\	Technical product information GAMMA KNX 3-Gang Button <a href="https://support.industry.siemens.com/cs/ww/en/view/87668166">https://support.industry.siemens.com/cs/ww/en/view/87668166</a>

## 5.3 Change documentation

Table 5-2: Document version and change history

Version	Date	Modifications
V1.0	07/2017	First version