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LOGO!
Conveyor Control
System

LOGO! 8

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Table of contents

1 Introduction and task description

This application example offers you a finished circuit for LOGO! 8 for controlling four conveyor belts via digital inputs and outputs.

⚠ WARNING	**This example demonstrates the functional implementation with LOGO!**
	Possible requirements regarding functional safety (e.g. EMERGENCY stop) are not part of this example.
	The user is responsible for compliance with the relevant guidelines!

The integrated functions of a LOGO! 8 offer many additional possibilities to solve applications in various areas quickly and easily.

With LOGO!, prefabricated function blocks support project creation, e.g. weekly time switch, pulse generator, astro timer, seasonal time switch, stopwatch and simple logic gates.

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

Advantages of LOGO! versus a conventional electrical installation

Using LOGO! 8 offers you the following advantages:

- Extendibility of the software program to include further tasks.
  In addition to the conveyor belts, other conveyor systems can be planned depending on the situation, e.g. a lifting platform or an unloading aid for vehicles.

- Simple, star-shaped wiring of the components

- Use of simple switches (circuit breakers) or buttons

- Fewer components are required compared to a conventional solution.

Target group

This application example is aimed at specialist electrical installation staff.

Task description

In a conveyor belt system, transported goods are to be moved over four conveyor belts set up one behind the other, as shown in Figure 1-1.

The conveyor belts should start running one after the other by pressing one button and stop one after the other by pressing another button.

During startup, the conveyor belt (4) starts first, followed by (3), (2) and (1) after a time delay.

When the system is stopped, conveyor belt (1) should stop first so that no transported goods will continue to be moved.

When conveyor belt 2 is idling, it stops after a defined period of time has elapsed.

Conveyor belts 3 and 4 then stop after a corresponding delay.

This guarantees that the system will not start under full load the next time it is started.

If a fault occurs in a conveyor belt, the preceding conveyor belts are switched off.

Select a LOGO! variant for 24V or 230V according to the drive control for the conveyor belts.

The integrated LOGO! web server function can also be used to remotely control the system via smartphone or tablet.

Figure 1-1: Controlling a conveyor belt system with LOGO! and LOGO! TDE
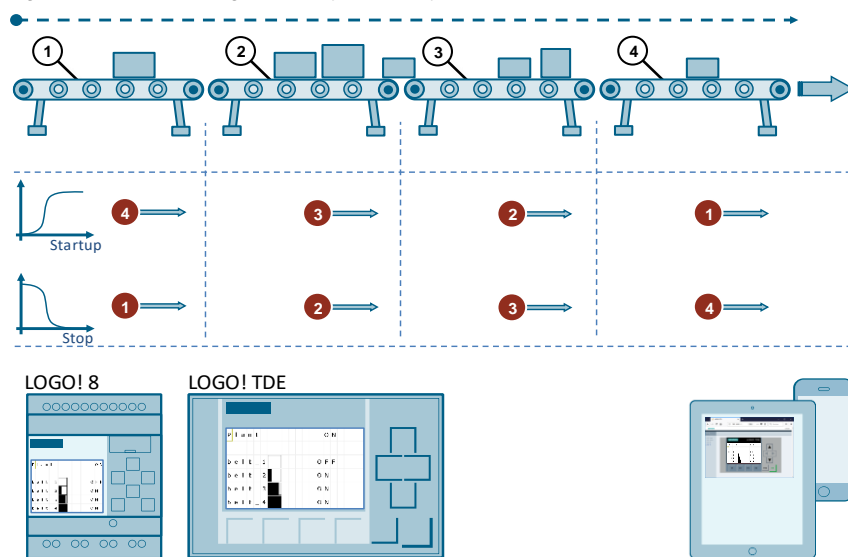
2 Components used

The application example uses the LOGO! base unit and a digital expansion module as shown in .

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

Component	Quantity	Article number	Note
LOGO! Soft Comfort V8.2 DVD	1	6ED1058-0BA08-0YA1	You can find an upgrade to V8.2 at: http://www.siemens.de/logo
LOGO! POWER 24 V / 1.3 A	1	6EP3331-6SB00-0AY0	-
LOGO! 12/24 RCE	1	6ED1052-1MD08-0BA0	4 relay outputs
LOGO DM16 24R	1[1]	6ED1055-1NB10-0BA2	8 relay outputs
LOGO! TDE	1	6ED1055-4MH08-0BA0	Optional components
Alternatively	**Quantity**	**Article number**	**Note**
LOGO! 230RCE	1	6ED1052-1FB08-0BA0	230V version with 4 relay outputs
LOGO DM16 230R	1[1]	6ED1055-1FB10-0BA2	

[1] You can replace two identical DM8 expansion modules with one DM16 expansion module of the same type (and vice versa) without changing the switching program.

Note

If you want to use the application example with a LOGO! 230RCE (for 230V), you will find additional information in the following article:

TDE central control for general users:

- https://support.industry.siemens.com/cs/ww/en/view/109755864

This application example consists of these instructions and the LOGO! switching program.

Table 2-2: Connectors for our application example

Component	File name	Note
Documentation	109766186_LOGO!_ConveyorControlSystem_de.pdf	-
LOGO! Program	109766186_LOGO!_ConveyorControlSystem_de.zip	Requirements: LOGO! Soft Comfort V8.2

LOGO! TDE

The LOGO! TDE external text display for LOGO! 8 provides you with an inexpensive and central user interface for your applications. You can adjust parameters and use the LOGO! TDE for troubleshooting. The configuration of LOGO! TDE and the internal LOGO! display is done using the same function block.

The use of the TDE allows the display of all messages via the integrated web server and thus also the control of applications via a smartphone.

3 Commissioning

This Chapter includes basic information on the commissioning of the LOGO! 8 applied here.

| Note	For further information on mounting and wiring, please refer to the manual (\3\), Chapter: (LOGO! mounting and wiring). Follow the connection instructions in the product information supplied with your device.

Connecting LOGO! TDE

The LOGO! TDE must be operated with a voltage of 12V DC or 24V AC/V DC and is installed separately. Siemens recommends protecting the LOGO! TDE by means of an 0.5 A fuse at the power supply.

The voltage connection is not polar. If you connect a DC power supply to the LOGO! TDE, you can connect the positive supply line or the negative supply line according to Figure 3-1 (2) either to pin 1 or to pin 2. Pin 3 must be connected to the ground.

Communication to LOGO! takes place via the Ethernet interface (1).

Figure 3-1: Connection of LOGO! TDE
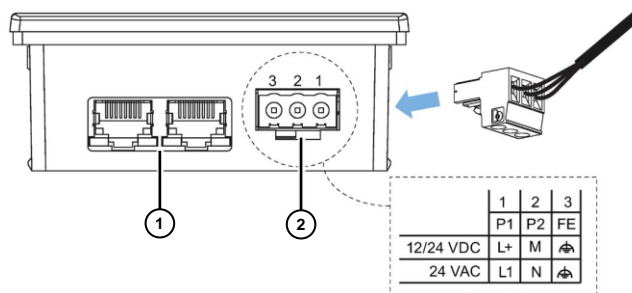
Note	The connection settings between LOGO! and LOGO! TDE can be found in the manual (\3\), Chapter: (LOGO! TDE settings menu). You can find information on the LOGO! web server settings here: • Activating the web server • Operating the virtual base module on the web server

Commissioning the application example

Proceed as follows:

1. Start the LOGO! Soft Comfort V8.2
2. Open the supplied LOGO! example program *.lsc
3. Transfer the program to LOGO!

Note	In the application example, the IP address 192.168.0.3 has been preset for LOGO! You will find a description of the general procedure for assigning the IP address of a LOGO! 8 in the manual (\3\), Chapter: (Configuring network settings).

4 Principle of operation of the switching program

This application example shows the LOGO! switching program and the functions it contains for the LOGO! Soft Comfort software.

For the purposes of illustrating the LOGO! switching program, the simulation function is available in LOGO! Soft Comfort, allowing you to test individual adaptations directly. Follow the course of the red active switching signals in the LOGO! switching program.

In Table 4-1 shown below, all input and output signals of the application example are listed.

Please note that the inputs [I7] and [I8] of the LOGO! base unit are used as digital inputs. In LOGO! Soft Comfort, [I7] and [I8] are used at the factory as analog inputs [AI1] and [AI2].

Note	Change these settings as follows: > "File" > "Properties" > "I/O Settings" > "Activate 0 AI".

Table 4-1: Input and output signals in LOGO!

Signals	Keys/switches	Description
Input [I1]	(Close) button	Conveyor belt 1 (ON)
Input [I2]	(Open) button	Conveyor belt 1 (OFF)
Input [I3]	(Close) button	Conveyor belt 2 (ON)
Input [I4]	(Open) button	Conveyor belt 2 (OFF)
Input [I5]	(Close) button	Conveyor belt 3 (ON)
Input [I6]	(Open) button	Conveyor belt 3 (OFF)
Input [I7]	(Close) button	Conveyor belt 4 (ON)
Input [I8]	(Open) button	Conveyor belt 4 (OFF)
Input [I9]	(Open) button	Conveyor belt 1 (fault)
Input [I10]	(Open) button	Conveyor belt 2 (fault)
Input [I11]	(Open) button	Conveyor belt 3 (fault)
Input [I12]	(Open) button	Conveyor belt 4 (fault)
Input [I13]	(Close) button	Operation (time delay ON)
Input [I14]	(Open) button	Operation (time delay OFF)
Input [I15]	Switches	Operation (ON / OFF)
Outputs [Q1] to [Q4]	Conveyor belt drives [1] to [4]	

Note	You will find a functional description of the LOGO! switching program as a comment on the switching program under LOGO! Soft Comfort: 　　　　　> "File" > "Properties" > "Comment" Alternatively:　　> "Extras" > "Device selection" > "Comment" **Hint:** Select "Extras" > "Options" > "Print" and check the "Comment" box to print the function description together with the program.

Basic switching functions

Figure 4-1 shows the LOGO! switching program for the conveyor belt system. The system contains a part for automatic operation (position 1) and the individual operating devices for the conveyor belts (2).

In the switching program, the incompatible operating states of the system are locked against each other by simple logic blocks.

The individual switching functions are described specifically in the following pages of this documentation.

Figure 4-1: LOGO! switching program – Overview

Basic switching functions and display of the message texts

For the purpose of illustrating the system states, various message texts have been planned which are displayed in Figure 4-2. The red positions (1-4) represent the active operation, the white positions represent the result.

The system is switched to the "ON" or "OFF" operating state (position 1) via the [I15] button.

The "OFF" operating state is signified by a passive "green" in the LOGO! display and the LOGO! TDE, the "ON" operating state is signified by an active white backlight on both displays.

For "ON", message text [B010] is activated where the message text priority is set to "OFF" via the priority of message text [B045].

If the system is switched on, you have the option of controlling the conveyor belts individually using the respective buttons, or of having the conveyor belts switched on automatically using button [I14] (2) with a time delay. The startup of each conveyor belt is symbolized by a bar diagram in the message text.

If you wish to specifically switch off the system, press the button on [I13] (3).

Depending on the task description, the conveyor belts switch off one after the other. The message text display changes to "Orange" and the LOGO! TDE displays the remaining time until the respective conveyor belt is switched off.

If a fault is detected on a conveyor belt, it switches to the "OFF" operating state along with the preceding conveyor belts and the message text is set to "Red".

After the fault has been rectified, you can switch the affected conveyor belts on again manually or start them automatically using [I14].

Figure 4-2: Basic switching functions and display of the message texts
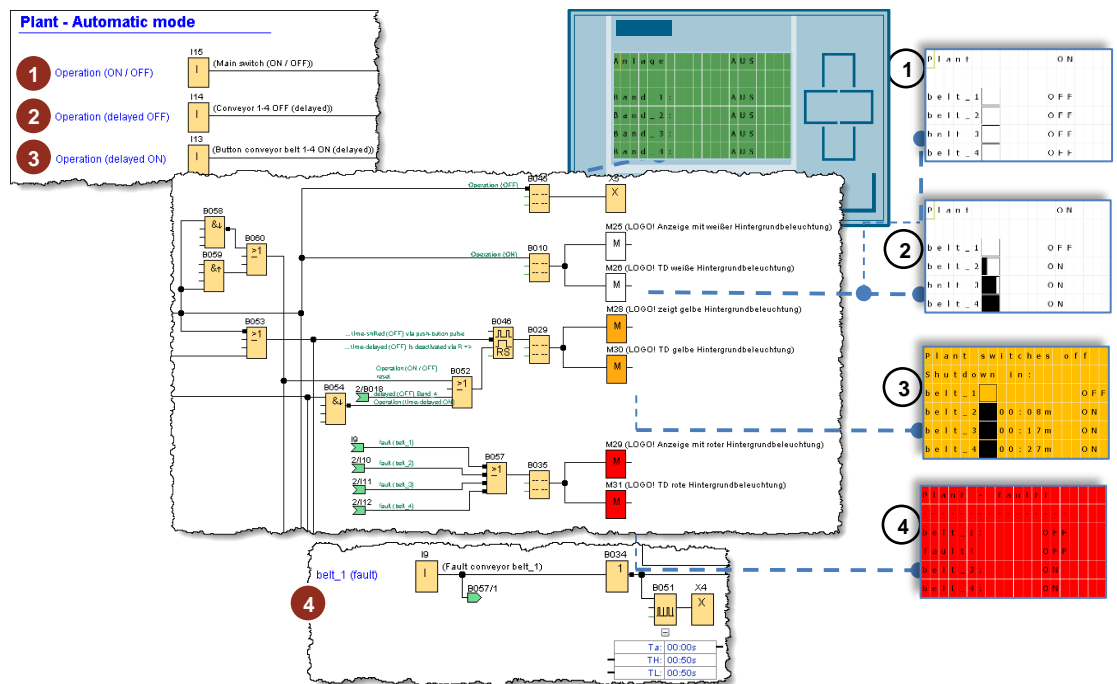
| | Note | For better understanding, use the simulation function of LOGO! Soft Comfort ([F3] button). The blue strings represent the LOW signal, the red strings the High signal. |

Figure 4-3 on the following page shows essential individual functions at the respective positions in the context of the LOGO! circuit program.

- **Position (1)** – Reset trigger during operation (ON/OFF)

When switching [I15] from "ON" to "OFF", a trigger is generated via the negative edge evaluation [B058] (1). When switching from "ON" to "OFF", the evaluation takes place via a positive edge [B059].

Using the OR operation [B060], the system is always reset to the initial state in this way when the operating states are changed.

- **Position (2)** – Signal origin as help text on blocks

In the circuit, you will find text fields at the inputs and outputs of each block, indicating the function and origin of a signal (2).

Specifically, the trigger resets the delayed switching on of "Belt_1" at block [B044].

- **Position (3)** – Block for switching off with time delay

Switching off the conveyor belts with a time delay is carried out by opening [I14]. In this way, the trigger input at the "Storing switching on delay" [B016] block is negated to stop "Belt_2" (3) with a delay.

After the set time has elapsed, within the block parameters, the belt is switched off via the reset trigger on the latching relay block [B003].

- **Position (4)** – Alternating fault message in message text

If a fault (4) is detected on a conveyor belt, it is output on the LOGO! display and the TDE.

The trigger generator [B049] alternately displays the text "Belt_3" and "Fault" in the message text.
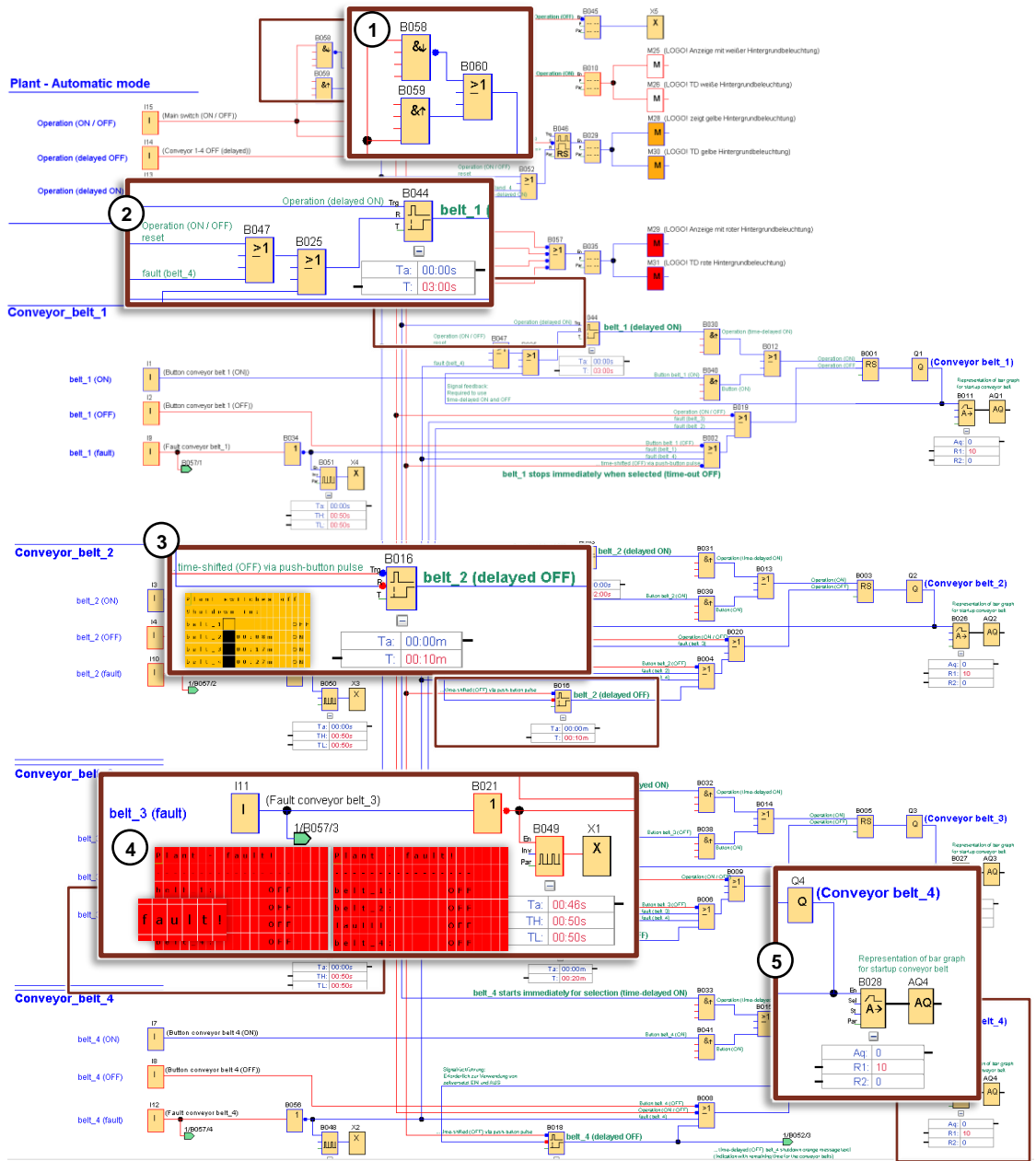
- **Position (5)** – Display of the conveyor belt startup in the message text

When a conveyor belt is switched on, startup bar diagrams signal the startup of respective conveyor belt.

Block [B028] "Analog ramp" for Belt_4 is used for this purpose.

Figure 4-3: Individual functions in the LOGO! circuit program

Configuration of a message text

As shown above, message texts are used for the respective operating status of the system and the conveyor belts.

Figure 4-4 an example of the structure of a message text based on switch off with time delay. Here, the respective parameters of the circuit blocks are integrated in the message text.

Figure 4-4: Configuration of a message text

5 Appendix

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5.1 Links and Literature

Table 5-1: Links and Literature

Nr.	Thema
\1\	Siemens Industry Online Support https://support.industry.siemens.com
\2\	This entry https://support.industry.siemens.com/cs/ww/en/view/109766186
\3\	LOGO! 8 user manual https://support.industry.siemens.com/cs/ww/en/view/109741041
\4\	LOGO! logic module (application examples, expansion modules) https://www.siemens.com/global/en/home/products/automation/systems/industrial/plc/logo.html

5.2 Change documentation

Table 5-2: Change documentation

Version	Date	Change
V1.0	05/2019	First edition