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LOGO! 8 Pump control for a cistern

LOGO! 8
LOGO! Soft Comfort V8.2

<https://support.industry.siemens.com/cs/ww/en/view/109755866>

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Table of contents

Legal information	2
1 Introduction	4
2 Task	5
3 Structure and description	6
3.1 Components used.....	6
3.2 LOGO! TDE.....	6
4 Commissioning	7
4.1 Connecting LOGO! 8 to 24V	7
4.2 Connecting LOGO! TDE	8
4.3 Starting the application example	8
5 Mode of operation	9
6 Appendix	13
6.1 Service and Support	13
6.2 Links and Literature	14
6.3 Change documentation.....	14

1 Introduction

This application example offers you a complete control system for LOGO! 8 for a pump of a cistern.

The integrated functions of a LOGO! 8 offer many additional possibilities to solve automation tasks 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! over a conventional electrical installation

The simple integration of LOGO! 8 offers you the following benefits:

- Extendibility of the software program to include further tasks (garden watering, fountain, fill level monitoring)
- Straightforward, star-shaped arrangement of the wiring of components
- Use of simple switches (circuit breakers) or pushbuttons
- Integration of LOGO! inputs and outputs into a KNX system

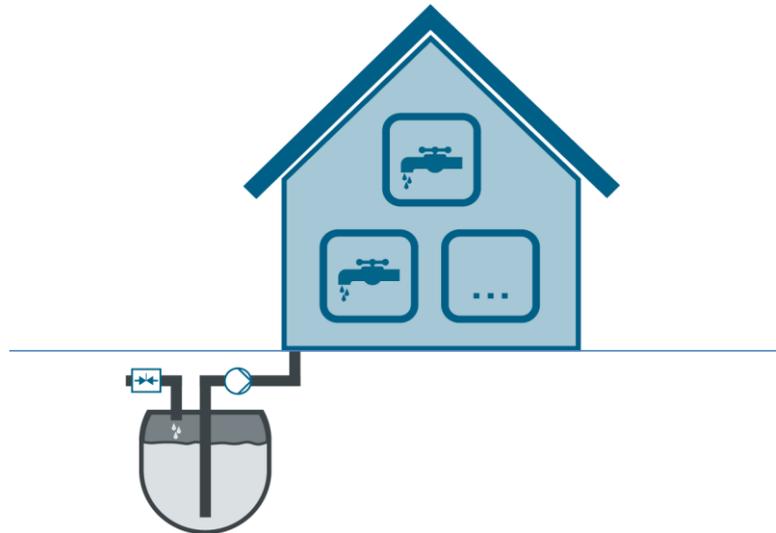
Target group

This application example is aimed at specialist electrical installation staff.

2 Task

A building is to be supplied with a continuous supply of service water. In this application example a pump control for a cistern is realized, as [Figure 2-1](#) shows.

Figure 2-1: Cistern with pump control



The cistern is fed by rainwater and has overflow protection. A pump supplies a building with service water from it, whereby the control was realized with the LOGO! 8.

When the cistern is almost empty, the low level is detected by a level sensor. LOGO! controls a solenoid valve to refill drinking water into the cistern. Manual feed of drinking water is also to be made possible.

The LOGO! system switches on a pump that builds up the required pressure in the service water pipe to 3.5 [bar] to ensure the supply to the building. The pressure in the service water piping may drop to 3 [bar] until the pump starts up again. A pressure sensor transmits a continuous analog value (0-10V) to the LOGO! system.

To prevent the pump from running continuously, the line is closed by a pressure valve, thereby stabilizing the line pressure.

In this application example the pump is operated by a single-phase electric motor equipped with its own pump monitoring and carrying a 24V status signal out, which is connected to the LOGO!

Via the LOGO! display, the web server and via the LOGO! TDE the respective status of the pump control is to be communicated.

In this application example the LOGO! display and the TDE have been configured.

3 Structure and description

3.1 Components used

The application example uses the LOGO! 8 basic unit and the LOGO! TDE for the cistern status display. The components from [Table 3-1](#) are used.

Table 3-1: Hardware and software components for the application example

Component	Number	Article number	Note
LOGO! Soft Comfort V8.2 DVD	1	6ED1058-0BA08-0YA1	You will find an upgrade to V8.2 at: http://www.siemens.com/logo
LOGO! 8.2 12/24 RCE	1	6ED1052-1MD08-0BA0	4 relay outputs
LOGO! TDE	1	6ED1055-4MH08-0BA0	-
LOGO! POWER 24V / 0.6A	1	6EP3330-6SB00-0AY0	24V supply for LOGO! TDE (LOGO! 24 V variants)

Make sure that any switches, sensors and actuators to be connected to LOGO! are compatible with the LOGO! in- and outputs. Refer to the LOGO! 8 manual for the necessary connection indications. The connection diagram and further indications can be seen in [Chapter 4.1](#).

This application example consists of these instructions and the circuit programs.

Table 3-2: Connectors for our application example

Component	File name	Note
Documentation	109755866_LOGO8_PumpControl-Cistern_en.docx	-
LOGO! 8 Programs	109755866_LOGO8_PumpControl-Cistern_en.zip	Requirement: LOGO! Soft Comfort V8.2

3.2 LOGO! TDE

The LOGO! TDE external text display for LOGO! 8 provides you with an inexpensive and central user interface for your applications. You have the possibility to adjust parameters and use the LOGO! TDE for troubleshooting.

The configuration of LOGO! TDE is done using the same function block as for the internal display.

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.

4 Commissioning

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

For further information on mounting and wiring, use the LOGO! 8 manual and follow the connection instructions in the product information supplied with your device.

4.1 Connecting LOGO! 8 to 24V

In the following example LOGO! is operated according to [Figure 4-1](#).

Connect a level sensor of the cistern to the digital input [I1] of the LOGO!.
At [I2], a manual pushbutton for drinking water supply.

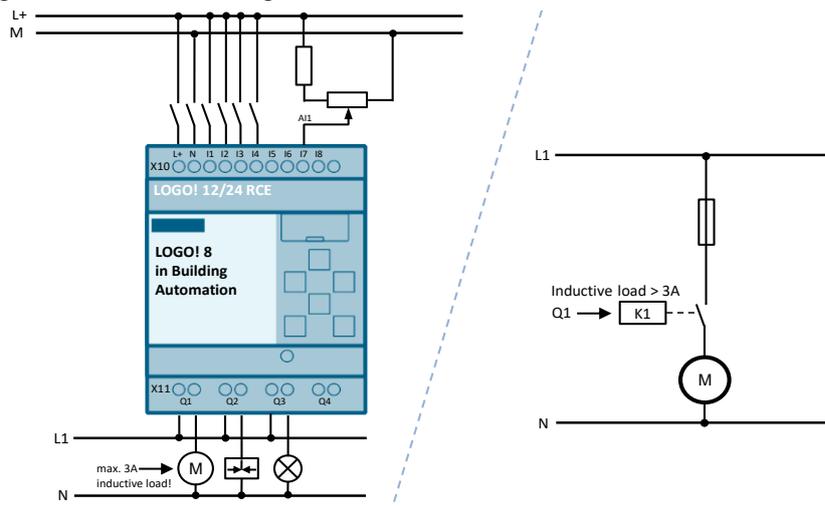
At [I3], send a 24V signal on pump error status and at [I4] a pushbutton (24V) to acknowledge the error messages.

Connect the motor at output [Q1], provided it is driven with less than 3A.

[Q2] is for the control of the fresh water supply valve.

[Q3] is for a 24V lamp for error display.

Figure 4-1: Connection diagram for LOGO! 12/24V RCE



Note

In the case of a LOGO! with relay outputs, coupling relays, e.g. [K1], are always optional and serve to protect the integrated LOGO! relays.

From a specified inductive load of 3A (a resistive load of 10A) it is mandatory to use relays or contactors.

In the case of a LOGO! with transistor outputs, coupling relays or contactors must always be used!

4.2 Connecting LOGO! TDE

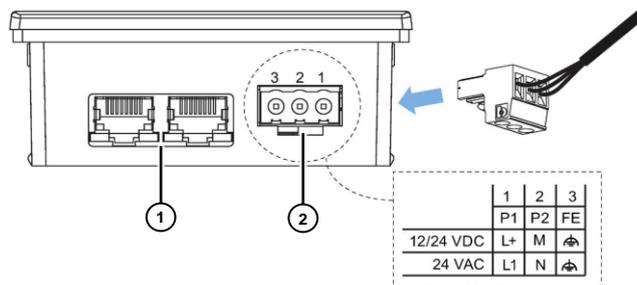
The LOGO! TDE must be operated with a voltage of 12V DC or 24V AC/V DC and is installed separately.

It is recommended that the LOGO! TDE be protected by means of an 0.5 A fuse at the power supply.

The voltage connection is bipolar. 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 4-2](#) (2) either to pin 1 or to pin 2. Pin 3 must be connected to ground.

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

Figure 4-2: Hardware structure for application example



4.3 Starting the application example

Follow these steps:

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 192.168.0.1 has been preset for LOGO!

You will find a description of the general procedure for assigning the IP address of a LOGO! 8 in Chapter: [3.8.1 "Configuring Network settings"](#).

5 Mode of operation

According to the tasks description in chapter 2 there are interdependent circuit components in the LOGO! circuit program, which are described individually below.

Note

You will find a function description of the circuit as a comment on the circuit program under LOGO! Soft Comfort:

“File > Properties > Comment”

Hint: Activate “Extras > Options > Print > Comment” to print the function description together with the program.

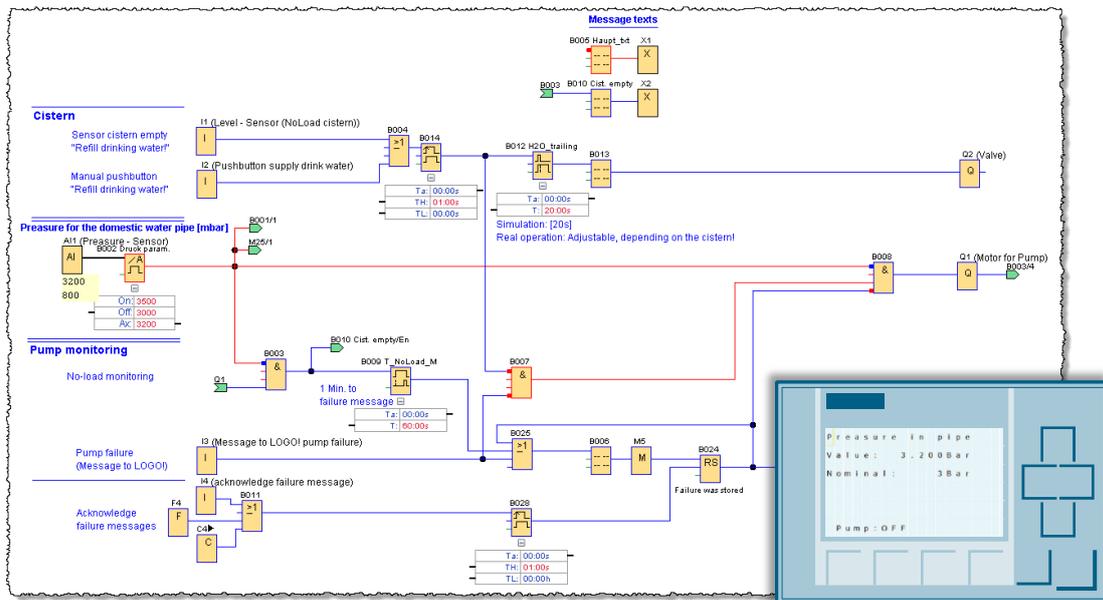
LOGO! switching program

The LOGO! pump control switching program is shown in [Figure 5-1](#).

Use the simulation function of LOGO! Soft Comfort and follow the course of the (=active) switching signals shown in red when pressing the respective buttons in the LOGO! switching program.

In the state shown, the pressure of the service water pipe is in the nominal range of 3.2 bar. In this state, no switching actions take place.

Figure 5-1: Selection of functions via the function keys on the LOGO! TDE

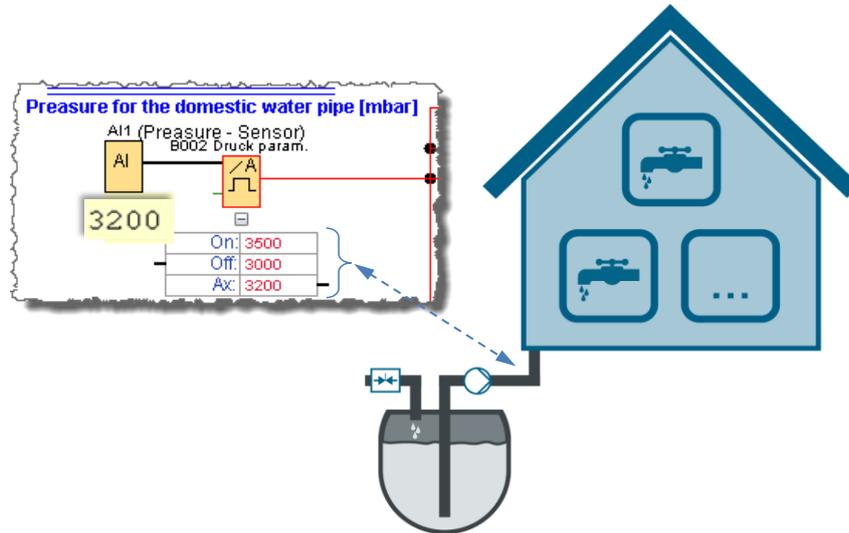


Pressure in the service water pipes

The pressure in the service water pipe should be between 3 and 3.5 [bar], as shown in Figure 5-2 (On: 3500; Off: 3000).

An analog pressure sensor transmits a signal between (0-10V) which is set to a measuring range between 0-4000 [mBar] by the analog threshold switch [B002].

Figure 5-2: Parameters – Pressure of the service water pipe



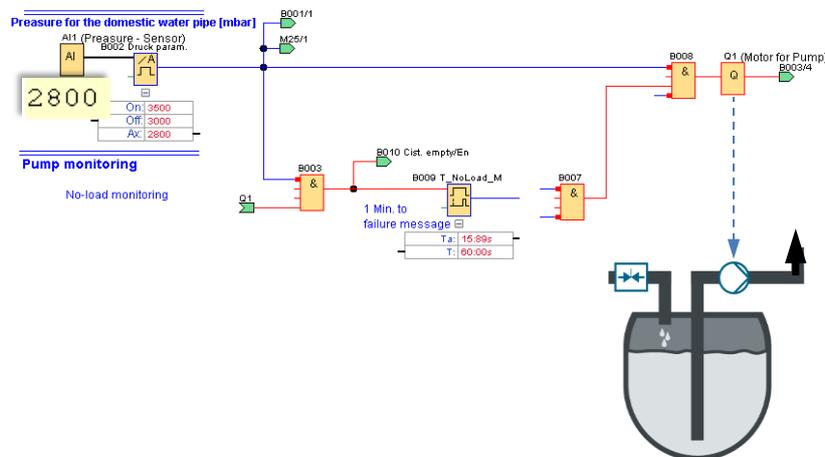
Pressure of the service water pipe drops below threshold → Pump active

The pressure in the service water pipe has fallen to 2.8 [bar] in Figure 5-3. This causes the pump to turn on to increase the pressure to the line nominal value of 3.5 [bar].

The AND block [B008] switches through when the high signal of the analog threshold switch [B002] is no longer present at the inverted input.

Provided no error message from the pump is received via block [B007] and the pressure in the line remains below 3.5 [bar], the motor will remain active. If the cistern is empty or if the service water pipe is defective, this is detected by an idling monitoring of the pump and the motor is switched off.

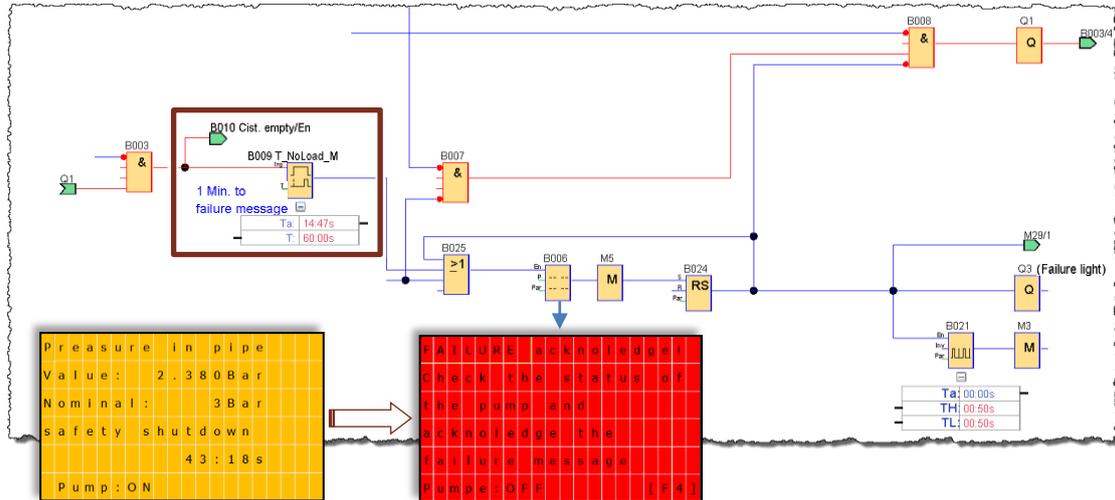
Figure 5-3: Pressure of the service water line



Cistern empty or service water line damaged → pump switched off automatically

If the cistern is empty or the pressure in the service water pipe is not built up, the motor is switched off via [Q1] Figure 5-4 after one minute, due to the switch-on delay [B009] and the error message [B006] appears in the TDE display. You can acknowledge the error by [I4], [F4] on the TDE, or [C4] (right arrow) on the LOGO! provided it has been rectified.

Figure 5-4: Idle state monitoring with motor shutdown after one minute



Note

Set the switch-on delay to an individual value. For example, if you fill a tank, the idling shutdown may be activated after one minute.

Error messages and acknowledgment

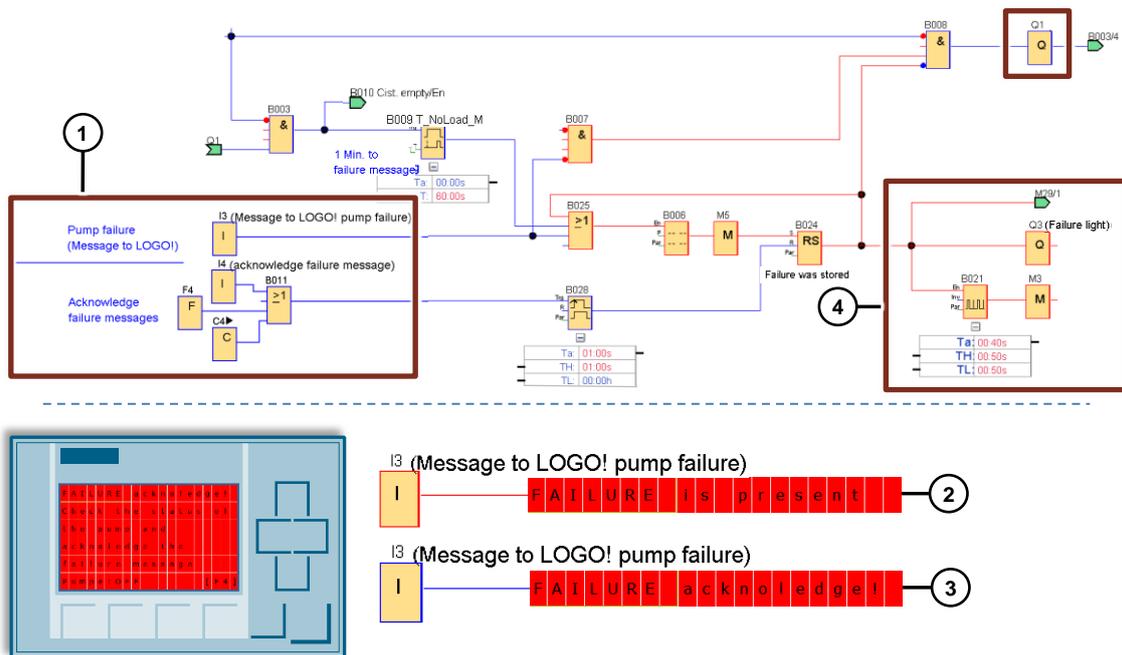
If the pump has an error message signal output, you can connect it to the LOGO! input [I3], see Item (1) in [Figure 5-5](#).

As long as this signal is present, an error message "ERROR is present" (2) appears, whereby an error acknowledgment is not possible and the motor remains switched off.

If [I4], [F4] or [C4] is nevertheless pressed, only a brief color change (1s) is shown on the display by the wiping relay [B028].

Only when the error signal at [I3] goes out can an acknowledgment (3) take place and enable the pump again. During a present error, the fault light at [Q3] is active. A flashing "ERROR" display for the message text is implemented with flag [M3] (4).

Figure 5-5: Error messages and acknowledgment



6 Appendix

6.1 Service and Support

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6.2 Links and Literature

Table 6-1: Links and Literature

No.	Topic
\1\	Siemens Industry Online Support https://support.industry.siemens.com
\2\	This entry https://support.industry.siemens.com/cs/ww/en/view/109755866
\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

6.3 Change documentation

Table 6-2: Change documentation

Version	Date	Change
V1.0	03/2018	First edition
V1.1	03/2019	Textual changes