Welcome to LOGO!

Dear customer,
Thank you for purchasing LOGO!, and congratulations on your decision. In LOGO! you have acquired a logic module that meets the stringent quality requirements of ISO 9001.
LOGO! is universal in application. Its comprehensive functionality and great ease of use make it a highly cost-efficient solution for virtually any application.

LOGO! documentation
This LOGO! manual tells you how to install, program and use LOGO!.
In addition, the step-by-step graphical guide shipped with LOGO! and the LOGO!Soft online help system provide you with the essentials.
LOGO!Soft is a programming package that runs on PCs under Windows®. It will help you get to know LOGO! and test, print and archive programs independent of LOGO!.

Guide to the manual
We have subdivided this manual into 8 chapters:
• Getting to know LOGO!
• Installing and wiring LOGO!
• Programming LOGO!
• LOGO! program modules
• Parameterizing LOGO!
• LOGO!Soft
• Applications
• Appendices for technical data, facts specific to the AS interface, determining the amount of memory required and abbreviations

Additional support
If you have any questions concerning LOGO!, the dealer from whom you bought it will be glad to help you.

Safety guidelines
This manual contains notices which you should observe to ensure your own personal safety, as well as to protect the product and connected equipment. These notices are highlighted in the manual by a warning triangle and are marked as follows according to the level of danger:
Welcome to LOGO!

**Danger**
indicates that death, severe personal injury or substantial property damage will result if proper precautions are not taken.

**Warning**
indicates that death, severe personal injury or substantial property damage can result if proper precautions are not taken.

**Caution**
indicates that minor personal injury or property damage can result if proper precautions are not taken.

**Note**
draws your attention to particularly important information on the product, handling the product, or to a particular part of the documentation.

**Warning**
Only qualified personnel should be allowed to install and work on this equipment. Qualified persons are defined as persons who are authorized to commission, to ground, and to tag circuits, equipment, and systems in accordance with established safety practices and standards.

**Warning**
This device and its components may only be used for the applications described in the catalog or the technical description, and only in connection with devices or components from other manufacturers which have been approved or recommended by Siemens. This product can only function correctly and safely if it is transported, stored, set up, and installed correctly, and operated and maintained as recommended.

---

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**Disclaimer of Liability**
We have checked the contents of this manual for agreement with the hardware and software described. Since deviations cannot be precluded entirely, we cannot guarantee full agreement. However, the data in this manual are reviewed regularly and any necessary corrections included in subsequent editions. Suggestions for improvement are welcomed.
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1 Getting to know LOGO!

What is LOGO! ?
LOGO! is the new universal logic module from Siemens.
LOGO! provides
- Control functions
- An operating and display unit
- A power supply
- An interface for program modules and a PC cable
- Ready-to-use basic functions that are often required in practice, such as functions for on and off delays and pulse relays
- A clock/time switch (LOGO! 230RC, LOGO! 230RCL, LOGO! 24RC)
- And inputs and outputs depending on the device type

You can use LOGO! for domestic and installation engineering tasks (e.g. stairway lighting, external lighting, sun blinds, shutters or shop window lighting) and for mechanical and apparatus engineering (e.g. gate control systems, ventilation systems or rainwater pumps).

What devices are available?
LOGO! is available both for 24 V and 230 V power supply as
- a standard version with 6 inputs and 4 outputs, with the dimensions 72 x 90 x 55 mm
- an .L version with 12 inputs and 8 outputs and extended functional scope, with the dimensions 126 x 90 x 55 mm
- an ..LB11 version with 12 inputs and 8 outputs, extended functional scope and additional AS interface bus connection over which 4 further inputs and 4 further outputs are available in the bus system. And all this squeezed into dimensions of 126 x 90 x 55 mm.

It’s your choice
The various versions offer extremely flexible adaptation to your own specific task to be undertaken.

LOGO! offers you solutions ranging from small domestic installation through small automation tasks to extensive tasks integrating the AS interface bus system.
Getting to know LOGO!

How LOGO! is structured

1. Power supply
2. Inputs
3. Outputs
4. Module shaft with cover
5. Control panel (keys)
6. LCD display
7. AS interface connection (optional)
Versions
The following different versions of LOGO! are available:

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Designation</th>
<th>Relay outputs</th>
<th>Transistor outputs</th>
<th>Clock</th>
<th>ASi bus</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>LOGO! 230R</td>
<td>4 * 230 V; 8A</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>LOGO! 230RC</td>
<td>4 * 230 V; 8A</td>
<td>✔</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>LOGO! 24R</td>
<td>4 * 230 V; 8A</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>LOGO! 24RC</td>
<td>4 * 230 V; 8A</td>
<td>✔</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>LOGO! 24</td>
<td></td>
<td>4 * 24 V; 0,3 A</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>LOGO! 230RL</td>
<td>8 * 230 V; 10A</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>LOGO! 230RCL</td>
<td>8 * 230 V; 10A</td>
<td>✔</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>LOGO! 24RL</td>
<td>8 * 230 V; 10A</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>LOGO! 24L</td>
<td></td>
<td>8 * 24 V; 0,3 A</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>LOGO! 230RLB11</td>
<td>8 * 230 V; 10A</td>
<td>✔</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>LOGO! 24RLB11</td>
<td>8 * 230 V; 10A</td>
<td>✔</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>LOGO! 24LB11</td>
<td>8 * 24 V; 0,3 A</td>
<td>✔</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

LOGO! has UL, CSA and FM certification, carries CE marking, complies with the VDE 0631 and IEC1131 standards and has interference suppression in accordance with EN 55011 (limit class B).
Certification Society Approval (ABS, BV, DNV, GL, LRS) has been issued or is pending for LOGO! ...L... versions.
LOGO! can therefore be put to use both in industry and in the domestic scene.
How to recognize which LOGO! version you have

LOGO!’s designation contains information about various characteristics:

- 24: 24 V DC version
- 230: 115/230 V AC version
- R: relay outputs
- C: integrated seven-day time switch (clock)
- L: twice the number of outputs and inputs and extended functional scope
- B11: slave with AS interface bus connection

In this description of LOGO!, we also use small pictographs to identify the different types. They are used wherever information refers to only one part of the LOGO! versions:

- Standard version with 6 inputs and 4 outputs with dimensions of 72 x 90 x 55 mm
- ..L version with 12 inputs and 8 outputs with dimensions of 126 x 90 x 55 mm
- ..LB11 version with 12 inputs and 8 outputs and additional AS interface bus connection with 4 virtual inputs and 4 virtual outputs, with dimensions of 126 x 90 x 55 mm

If details refer to ...C versions or ...R versions only, we will make a specific reference to this fact in the text.
2 Installing and wiring LOGO!

General
We will show you how to install and deinstall LOGO! with the aid of an illustration of the LOGO! 230RC. The measures described also apply to all other LOGO! modules.
You install LOGO! in a distribution box or cabinet, ensuring that the connectors are covered. If they are not, there is a danger of touching live parts.
LOGO! must be installed and wired by a trained technician who knows and complies with both the universally applicable engineering rules and the regulations and standards that apply in specific cases.

Dimensions
The dimensions of LOGO! comply with the DIN 43880 standard for the dimensions of installation equipment.
LOGO! must be snapped onto a DIN rail with a width of 35 mm (DIN EN 50022).
Width of LOGO!:
- LOGO! is 72 mm wide, which corresponds to the size of 4 modules (standard version).
- LOGO!...L is 126 mm wide, which corresponds to the size of 7 modules.
- LOGO!...LB11 is 126 mm wide, which corresponds to the size of 7 modules.
2.1 Installing/deinstalling LOGO!

Installing
You **install** LOGO! on a DIN rail as follows:
1. Place LOGO! on the rail.
2. Swivel it. The snap catch on the back of LOGO! must engage.
Depending on the type of DIN rail used, the snapping mechanism may be a bit stiff. If it is too stiff and LOGO! will not snap on, you can pull the snap catch down a little, as you do when deinstalling LOGO! as described below.

Deinstalling
You **deinstall** LOGO! as follows:
1. Insert a screwdriver in the hole shown in the picture at the lower end of the snap catch, and pull the snap catch downward.
2. Swivel LOGO! away from the DIN rail.
2.2 Wiring LOGO!

Use a screwdriver with a head 3 mm wide to wire LOGO!.

You do not need wire end ferrules for the connectors. You can use wires up to the following sizes:

- 1 x 2.5 mm²
- 2 x 1.5 mm²

2.2.1 Connecting the power supply

LOGO! 230 versions are suitable for line voltages with a rating of 115 V and 230 V; LOGO! 24 versions are suitable for a supply voltage of 24 V DC. Please note the Technical data in appendix A that refer to the permissible voltage tolerances, mains frequencies and current consumptions.

Note

If you are running both LOGO! and its inputs by means of the same power supply, it is possible for an incorrect value to be stored for the remanent functions due to power failure bridging. Under certain circumstances, this can lead to an additional edge after power restoration with edge-triggered special functions.

Make sure that you feed in the power supply for LOGO! and its inputs separately.
Installing and wiring LOGO!

Connecting
You connect the sensors to LOGO! as follows:

LOGO! 24...

LOGO! 230...

Note
LOGO! has protective insulation. A ground terminal is not necessary.
2.2.2 Connecting LOGO!’s inputs

Requirements
You connect sensors to the inputs. The sensors may be switches, photo-electric barriers or daylight control switches, for example.

Sensor attributes for LOGO!

<table>
<thead>
<tr>
<th></th>
<th>LOGO! 230..</th>
<th>LOGO! 230L..</th>
<th>LOGO! 24..</th>
<th>LOGO! 24L..</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Switch state 0</strong></td>
<td>&lt; 40 V AC</td>
<td>&lt; 40 V AC</td>
<td>&lt; 5 V DC</td>
<td>&lt; 5 V DC</td>
</tr>
<tr>
<td>Input current</td>
<td>0.8 ... 1.2 mA</td>
<td>&lt; 5 V DC</td>
<td>&lt; 1.5 mA</td>
<td></td>
</tr>
<tr>
<td><strong>Switch state 1</strong></td>
<td>&gt;79 V AC</td>
<td>&gt;79 V AC</td>
<td>&gt; 15 V DC</td>
<td>&gt; 12 V DC</td>
</tr>
<tr>
<td>Input current</td>
<td>typically 0.24 mA</td>
<td>typically 2.5 mA</td>
<td>typically 3 mA</td>
<td>typically 5 mA</td>
</tr>
<tr>
<td><strong>Proximity switch</strong></td>
<td>3-wire</td>
<td>3-wire</td>
<td>3-wire</td>
<td>2-wire</td>
</tr>
<tr>
<td></td>
<td>4-wire</td>
<td>4-wire</td>
<td>4-wire</td>
<td>4-wire</td>
</tr>
<tr>
<td><strong>Switches with</strong></td>
<td>yes¹ / no²</td>
<td>yes</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td><strong>Glow lamps</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

¹ Glow lamps with a closed-circuit current up to 0.2 mA
² Glow lamps with a closed-circuit current >0.2 mA possible over relay or with additional N for the glow lamp

Switch state change 0 ⇔ 1 / 1 ⇔ 0
When the switch state changes from 0 to 1, switch state 1 must exist for at least 50 ms for LOGO! to recognize it. The same applies to state 0 when the change is in the opposite direction.
Connecting
You connect the sensors to LOGO! as follows:

LOGO! 24 ...

LOGO! 24...
The inputs of LOGO! 24... are non-isolated and must therefore be grounded in the same way as the power supply.

LOGO! 230 ... (standard version)

Warning
Existing safety regulations (VDE 0110, ... IEC 1131, ... and UL and CSA) prohibit the connection of different phases to the inputs of LOGO! 230R/RC.
LOGO! 230 .. L...

The inputs of LOGO! ...L.. are grouped in groups of 4 inputs. The same applies to these groups as for the individual inputs of a standard LOGO!. Different phases are possible only between the blocks.

---

**Warning**

Existing safety regulations (VDE 0110, ... IEC 1131, ..., and UL and CSA) prohibit the connection of different phases to one input block of LOGO! 230R/RCL...
2.2.3 Connecting outputs

LOGO! 230R... and LOGO! 24R...

The outputs of LOGO! 230R... and LOGO! 24R... are relays. The contacts of the relays are isolated from the power supply and the inputs.

Requirements for the relay outputs

You can connect different loads to the outputs, such as lamps, fluorescent tubes, motors, contactors, etc. The loads connected to LOGO! ...R... must have the following properties:

- The maximum switched current depends on the type of load and the number of operations. You will find more information on this in the technical specifications.
- When switched on \((Q = 1)\), the maximum current is 8 amperes (10 A with LOGO!...RL...) for a non-inductive load and 2 amperes (3A with LOGO!...RL...) for an inductive load.

Connecting

You connect the load to LOGO! ...R .... versions as follows:

Protection with automatic circuit breaker (max. 16 A, B16), e.g. power circuit breaker 5SX2 116-6 (if desired)
LOGO! 24... with transistor outputs

LOGO! 24... versions with transistor outputs can be identified by the fact that the letter R is missing from their type designation. The outputs short-circuit proof and overload proof. A separate voltage supply to the load is not necessary; LOGO! 24... supplies the load with voltage.

Requirements for transistor outputs

The load connected to LOGO! 24... must have the following properties:

- The maximum switched current is 0.3 amperes per output.
- When switched on Q = 1), the maximum current is 0.3 amperes.

Connecting

You connect the load to LOGO! 24 as follows:

Load: 24 V DC, 0.3 A max.
2.2.4 Connecting the ASi bus  
(LOGO! ...LB11 only)

This section will be of interest to you if you want to connect LOGO!..LB11 to the ASi bus.

LOGO!...LB11

LOGO!...LB11 can be integrated into a network as an ASi slave. Using a two-wire lead, you can then
- read in and process 4 additional inputs via the ASi bus
- operate 4 additional outputs on one overlaid master of the Asi bus

You configure LOGO!...LB11 in the ASi bus by means of the ASi master you are using.

Requirements for operating LOGO!...LB11 on an ASi master

Please note: LOGO! ...LB11 must be registered in the ASi system, i. e. LOGO! is assigned an address by the bus master. Please read section 2.2.5 to find out how to do this with LOGO!.

Caution

The ASi address can be changed at least 10 times for all LOGO! ...LB11 versions.

We cannot guarantee further changes made.

Bus connector

Always use the standard bus connector enclosed in the packaging to connect LOGO!. 
Connecting

Connect the bus connector cable to an approved connector in the system, making sure that the polarity is correct.

Then push the wired connector into the interface marked AS interface.

2.2.5 LOGO!...LB11 on the ASi bus

LOGO!...LB11 must be known to the bus master if you are to be able to use the ASi functionality. This takes place automatically when you connect LOGO!...LB11 to the bus lead. The master detects the address of the slave.

In the case of LOGO!...LB11, the address preset at the factory = 0. The master assigns a new address that is not equal to 0.

If there are no address conflicts in the system or if only one slave with the address 0 is connected, you do not have to take any further steps.

Note

If you are connecting several slave assemblies (e.g. LOGO!...LB11) to the bus at the same time, please read Appendix B.
2.3 Switching LOGO! on/resumption of power

LOGO! does not have a power switch. How LOGO! responds when switched on depends on:

- Whether a program is stored in LOGO!
- Whether a program module is connected
- The state LOGO! was in before power off

The table indicates LOGO!’s responses to the possible situations:

<table>
<thead>
<tr>
<th>before power off</th>
<th>after power on</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Program</td>
<td>No Program</td>
</tr>
<tr>
<td>no program in memory</td>
<td></td>
</tr>
<tr>
<td>(empty)</td>
<td>&gt;Program..</td>
</tr>
<tr>
<td>(with program)</td>
<td>PC/Card..</td>
</tr>
<tr>
<td></td>
<td>Start</td>
</tr>
<tr>
<td>I:123456</td>
<td>X:123456</td>
</tr>
<tr>
<td>B03:Par = 0300</td>
<td>Mo 09:00</td>
</tr>
<tr>
<td>Cnt = 0028</td>
<td>Q:1234 RUN</td>
</tr>
<tr>
<td>LOGO! in RUN</td>
<td></td>
</tr>
<tr>
<td></td>
<td>with stored program</td>
</tr>
<tr>
<td></td>
<td>from LOGO!</td>
</tr>
<tr>
<td></td>
<td>(empty)</td>
</tr>
<tr>
<td></td>
<td>(with program)</td>
</tr>
<tr>
<td></td>
<td>with program copied</td>
</tr>
<tr>
<td></td>
<td>from module to LOGO!</td>
</tr>
<tr>
<td>I:123456</td>
<td>X:123456</td>
</tr>
<tr>
<td>B01</td>
<td>Mo 09:00</td>
</tr>
<tr>
<td>Q1</td>
<td>Q:1234 RUN</td>
</tr>
<tr>
<td>Program in memory</td>
<td>with stored program</td>
</tr>
<tr>
<td></td>
<td>from LOGO!</td>
</tr>
<tr>
<td></td>
<td>(empty)</td>
</tr>
<tr>
<td></td>
<td>(with program)</td>
</tr>
<tr>
<td></td>
<td>with program copied</td>
</tr>
<tr>
<td></td>
<td>from module to LOGO!</td>
</tr>
</tbody>
</table>
Try to remember the 5 simple rules for starting LOGO!:

1. If there is no program in LOGO! or on the program module connected, LOGO! displays the message: No Program.

2. If there is a program on the program module, it is copied to LOGO! automatically. If there is already a program in LOGO!, it is overwritten.

3. If there is a program in LOGO! or on the program module, LOGO! adopts the operating status it had before power off.

4. If you are using a LOGO!...L version with a red or yellow module and have remanence switched on for at least one function or using a function with remanence permanently switched on, its instantaneous values are retained at power off.

5. With all other versions, the times and count values are reset at power off. The program is stored in such a way that it is secure against power failure.

---

**Note**

If a power failure occurs while you are entering a program, the program in LOGO! is deleted when the power is restored.

You should therefore back up your original program on a program module (card) before changing it.
**LOGO! operating statuses**

LOGO! has 2 operating statuses: STOP and RUN

<table>
<thead>
<tr>
<th>LOGO! is in STOP</th>
<th>LOGO! is in RUN</th>
</tr>
</thead>
<tbody>
<tr>
<td>when ‘No Program’ is displayed or when you switch LOGO! to programming mode</td>
<td>when the mask for monitoring the inputs and outputs is displayed (after START in the main menu) or</td>
</tr>
<tr>
<td></td>
<td>when you switch LOGO! to parameterization mode</td>
</tr>
<tr>
<td>Action by LOGO!:</td>
<td>Action by LOGO!:</td>
</tr>
<tr>
<td>• the inputs are not read.</td>
<td>• LOGO! reads the status of the inputs.</td>
</tr>
<tr>
<td>• the program is not executed.</td>
<td>• LOGO! calculates (with the program) the status of the outputs.</td>
</tr>
<tr>
<td>• the relay contacts are always open or the transistor outputs are switched off.</td>
<td>• LOGO! switches the relays/transistor outputs on or off.</td>
</tr>
</tbody>
</table>
3 Programming LOGO!

The first steps with LOGO!

By programming, we mean entering a circuit. A LOGO! program is really no more than a circuit diagram represented in a different way.

We have changed the way it is represented to suit LOGO!’s display panel. In this chapter, we will show you how to use LOGO! to turn your applications into LOGO! programs.

In the first section of the chapter, a brief example will help you get to know how to use LOGO!.

- First of all, we will begin by introducing the two basic terms **connector** and **block**, and show you what is meant by these terms.
- In a second step, we will develop a program from a simple, conventional circuit, and ...
- In the third step, you can then enter this program directly in LOGO!.

After reading through only the first few pages of this manual, you will already have stored your first executable program in LOGO!. Using suitable hardware (switches, etc.), you will then be able to carry out your first tests.

What else can you look forward to?

As you progress further through the chapter, you will expand your first program and learn a number of techniques you can use to make changes to an existing program.

Finally, in the third and last section of the chapter, we will introduce you to LOGO! in its entirety. This covers:

- all the functions of LOGO!
- introduction to the menu structure of LOGO!
3.1 Connectors

LOGO! has inputs and outputs:

![Diagram of LOGO! with inputs and outputs labeled](image)

Each input is identified by the letter I with a number. When you look at LOGO! from the front, you see the connectors for the inputs at the top.

Each output is identified by the letter Q with a number. You will see the connectors of the outputs in the figure below.

**Note**

Inputs and outputs that are made available with LOGO! ...LB11 by means of the AS interface bus connection are not physical inputs on LOGO! itself.

Note that it is the bus master that defines the input and output devices on the ASi bus.
LOGO!’s connectors

Note

The initial letters CO of the term connector will crop up again later on when you are programming circuits in LOGO!.

The term connector refers to all connections and states used in LOGO!.

The inputs and outputs can have the state ’0’ or ’1’. ’0’ means there is no voltage at the input, and ’1’ means that there is. But that is unlikely to be new to you.

We introduced the connector hi, lo and x in order to facilitate program entry for you. ’hi’ (high) has the fixed state ’1’, and ’lo’ (low) has the fixed state ’0’.

If you do not want to wire an input on a block, you use the ’x’ connector. If you want to know what a block is, refer to the next page.

LOGO! recognizes the following connectors:

<table>
<thead>
<tr>
<th>Connectors</th>
<th>I1 to I6</th>
<th>I1 to I12</th>
<th>I1 to I12 and Ia1 to Ia4 (AS interface)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inputs</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Outputs</td>
<td>Q1 to Q4</td>
<td>Q1 to Q8</td>
<td>Q1 to Q8 and Qa1 to Qa4 (AS interface)</td>
</tr>
<tr>
<td>lo</td>
<td>Signal with level ’0’ (OFF)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>hi</td>
<td>Signal with level ’1’ (ON)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>x</td>
<td>an existing connection that is not used</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### 3.2 Blocks and block numbers

A block in LOGO! is a function which converts input information into output information. With earlier versions of LOGO!, you had to wire up the individual elements in the control cabinet or terminal box.

When you program LOGO!, you connect connectors with blocks. To do this, simply select the connection your require from the Co menu (Co stands for connector).

The simplest blocks are logic operations:
- **AND**
- **OR**
- **...**

![Diagram](image)

Inputs I1 and I2 are connected to the OR block. The last input of the block is not used and is therefore marked with an x.

We have made the special functions far more powerful than before:
- pulse relay
- counter
- on-delay
- ....

You can find a complete list of all the functions of LOGO! as of chapter 3.7.

In this chapter, we will introduce you to how you can create extensive circuits with the aid of LOGO!’s elements and how the blocks are linked to each other and to the inputs and outputs.

For this purpose, please turn to the following chapter 3.3. This is where we show you how you turn a conventional circuit into a LOGO! program.

But first of all, you should turn to the information about the block numbers.
Displaying a block in LOGO!’s display

The figure below gives a typical display shown by LOGO!. As you can see, only one block can be depicted at a time. For this reason, we have introduced the use of block numbers, which should help you to keep a check on how the circuit is structured.

Assigning a block number

Whenever you insert a block in a program, LOGO! assigns this block a number, the block number.

LOGO! uses the block number to indicate the connections between blocks. The block numbers are, then, chiefly meant to help you find your way around the program.
The overview display shows you three displays by LOGO!, which together make up the program. As you can see, LOGO! links the blocks with one another by means of the block numbers.

There is, however, one more asset to the block numbers which you can put to good use: you can connect almost any block to an input of the current block by means of its block number. In this way, you can used the interim results of logic or other operations more than once. This saves you the work required to enter things again as well as memory space in LOGO!, and your circuit remains clear and easier to understand. In this case, you have to know how the blocks have been named by LOGO!.

Note

To make working with LOGO! particularly efficient, we recommend that you draw up an overall functional diagram of the program. This will make it a lot easier to generate the program. You can then enter the block number assigned by LOGO! in this diagram.
3.3 From circuit diagram to LOGO!

How a circuit is represented in a circuit diagram
You know, of course, how a circuit is represented in a circuit diagram. Here is an example:

The consumer E1 is switched on and off by means of the switches (S1 OR S2) AND S3.
The relay K1 picks up when S1 or S2 and also S3 are closed.

Implementing a circuit with LOGO!
You create a circuit in LOGO! by connecting blocks and connectors to each other:

To implement a circuit in LOGO!, begin at the output of the circuit. The output is the load or the relay that is supposed to operate.
You convert the circuit to blocks. To do this, you go through the circuit from the output to the input:

Step 1: At output Q1 there is a series connection of the normally open contact S3 with another circuit component. The series connection corresponds to an AND block:

\[ \text{I3} \quad \& \quad \text{Q1} \]

Step 2: S1 and S2 are connected in parallel. The parallel connection corresponds to an OR block:

\[ \text{I1} \quad \geq 1 \quad \text{I2} \quad \& \quad \text{I3} \quad \text{Q1} \]

You have now provided a complete description of the circuit for LOGO!. You now need to connect the inputs and outputs to LOGO!.

**Wiring**

You connect switches S1 to S3 to the screw connectors of LOGO!:

- connect S1 to connector I1 on LOGO!
- connect S2 to connector I2 on LOGO!
- connect S3 to connector I3 on LOGO!

Only 2 inputs of the OR block are used, so the third input must be marked as unused. This is indicated by the \( x \) next to it.

Likewise, only 2 inputs of the AND block are used. The third input is therefore also marked as 'unused' by an \( x \) next to it.

The output of the AND block controls the relay at output Q1. Consumer E1 is connected at output Q1.

The following table shows you the wiring on the basis of a 230 V version of LOGO!.
The remaining steps
Before you enter your first program with us, we would like to introduce you to the 4 most important rules to be followed when working with LOGO!.
3.4 The 4 golden rules for working with LOGO!

**Rule 1 - The 3-finger grip**
You enter the circuit in programming mode. You switch to programming mode by pressing the 3 keys <, ▶ and OK simultaneously.
You change the values of times and parameters in parameterization mode. You switch to parameterization mode by pressing the 2 keys ESC and OK simultaneously.

**Rule 2 - From output to input**
You enter a circuit in the following sequence:
From output to input

**Rule 3 - Cursor and cursor movement**
The following applies when entering a circuit:
- When the cursor appears in the form of an underscore, you can move the cursor
  - Use the keys <, ▶, ▼ and ▲ to move the cursor in the circuit
  - Press OK to select a connector/block
  - Press ESC to exit circuit input
- When the cursor appears in the form of a solid block, you select a connector/block
  - Use the keys ▼ and ▲ to select a connector/block
  - Press OK to accept a selection
  - Press ESC to go back one step

**Rule 4 - Planning**
Before you enter a circuit, always draw up a complete plan of it on paper. LOGO! can only store complete programs. If you enter an incomplete program, LOGO! is not able to exit Programming mode.
3.5 Overview of LOGO!’s menus

Programming mode

Main menu

>Program..  
P/C/Card..  
Start

Programming menu

>edit Prg  
Clear Prg  
Set Clock  
ASi_BUS..

PC/card menu

>PC↔LOGO  
LOGO→Card  
Card→LOGO

Parameterization mode

Parameterization menu

>Set Clock  
Set Param
3.6 Entering and starting a program

You have designed a circuit and now want to enter it in LOGO!. The example below illustrates how to do this.

3.6.1 Switching to programming mode

You have connected LOGO! to the mains and switched on the power. The following message appears on the display:

```
No Program
```

Switch LOGO! to programming mode. To do this, press the keys ◀, ▶ and OK simultaneously.

```
No Program
```

The fact that you have to press the keys simultaneously prevents anyone pressing them and switching to programming mode inadvertently. When you press the keys, LOGO!’s main menu appears:

```
>Program..
PC/Card..
Start
```

LOGO!’s main menu

On the left in the first line you will see a “>”. You press the ▲ and ▼ keys to move the “>” up and down. Move the “>” to "Program..", and press the OK key. LOGO! switches to the programming menu:
LOGO! manual
EWA 4NEB 712 6006-02a

Programming LOGO!

> Edit Prg
  Clear Prg
  Set Clock
  ASi-Bus..

LOGO!’s programming menu

The ASi-Bus.. entry only appears with LOGO!...LB11 versions

Here too, you can move the ”>” by pressing the ▲ and ▼ keys. Position the ”>” on ”Edit Prg” (i.e. to enter the program), and press the OK key. LOGO! then shows you the first output:

LOGO!’s first output

You can use the ▲ and ▼ keys to select the other outputs. At this point, you begin to enter your circuit.

3.6.2 First program

Let’s have a look at the following circuit: a parallel connection of two switches. In the circuit diagram, the circuit looks like this:

The consumer is switched on by switch S1 or switch S2. As far as LOGO! is concerned, the parallel connection of the switches is an OR block, because S1 or S2 switches the output on.

Translated into the LOGO! program, this means: Relay K1 (in LOGO!: Q1) is controlled by an OR block. I1 and I2 are connected to the input of the OR block, S1 to I1 and S2 to I2.

Thus, the program in LOGO! looks like this:
The wiring is as follows:

Switch S1 acts on input I2, and switch S2 acts on input I2. The consumer is connected to relay Q1.

### 3.6.3 Entering the program

Let’s enter the program now (from the output to the input). Initially, LOGO! displays the output:

The Q of Q1 is underlined. This underlining is the **cursor**. The cursor indicates your current position in the program. You can move the cursor by pressing the ▲, ▼, ◀ and ▶ keys. Now press the ◀ key. The cursor moves to the left.
The cursor indicates your position in the program.

At this point, enter only the first block (the OR block). Press the OK key to switch to input mode.

The cursor appears in the form of a solid block: You can select a connector or block.

The cursor no longer appears in the form of an underline; instead, it appears as a solid block that flashes on and off. At the same time, LOGO! offers you the first list for selection. Read chapter 3.7 to find out what a list is.

Select the GF list (by pressing the ▼ key until GF appears), and press the OK key. LOGO! then displays the first block in the list of basic functions:

The first block in the list of basic functions is AND. The cursor appears in the form of a solid block, indicating that you have to select a block.

Press the ▲ or ▼ key until the OR block appears in the display:

The cursor is still in the block and appears in the form of a solid block.

Press the OK key to conclude your selection.
The following appears in the display panel

![Diagram of a block with a block number B01 and a condition \( \geq 1 \) connected to Q1.]

Your entire program looks like this

![Diagram of a block with a condition \( \geq 1 \) connected to Q1 without a block number.]

You have now entered the first block. Every block you enter receives a number, the block number. All you have to do now is wire the inputs of the block. To do this:

Press the **OK** button:

The following appears in the display panel

![Diagram of a block with a condition \( \geq 1 \) connected to Q1 with a Co list indicator.] (Co)

Select the Co list: Press the **OK** key

The following appears in the display panel

![Diagram of a block with a condition \( \geq 1 \) connected to Q1 with an x indicator.] (x)

The first item in the Co list is the character for indicating that an input is not used, an "x". Use the ▲ or ▼ key to select input I1.

Press the **OK** key: I1 is connected to the input of the OR block. The cursor jumps to the next input of the OR block.
The following appears in the display panel

Your entire program so far looks like this in LOGO!

Now connect input I2 to the input of the OR block. You know how to do this already:

1. Switch to input mode: OK
2. Select the Co list: ▲ or ▼
3. Accept the Co list: OK
4. Select I2: ▲ or ▼
5. Accept I2: OK

Thus, I2 is now connected to the input of the OR block:

The following appears in the display panel

Your entire program so far looks like this in LOGO!

We do not need the last input of the OR block in this program. In a LOGO! program, you mark an input that is not used with an ”x”, so enter the ’x’ now (you know the principle already):

1. Switch to input mode: OK
2. Select the Co list: ▲ or ▼
3. Accept the Co list: OK
4. Select x: ▲ or ▼
5. Accept x: OK

Thus, all the block’s inputs are now wired. As far as LOGO! is concerned, the program is now complete. LOGO! returns to output Q1.
The following appears in the display panel

![Diagram of B01 Q1]

Your program looks like this

![Diagram of B01 Q1]

If you want to have another look at your first program, you can use the ▼ or ▲ key or the cursor to move through the program.

But we are going to exit program input now. To do this, proceed as follows:

1. Return to the programming menu: ESC

   If this does not return you to the programming menu, you have not wired a block completely. LOGO! displays the point in the program at which you forgot something (LOGO! only accepts complete programs, which is very much in your interests). Read also page 46 on this.

---

**Note**

LOGO! has now stored your program permanently, so that it will not be lost in the event of a power failure. The program is stored in LOGO! until you expressly delete it by entering the appropriate command.

2. Return to the main menu: ESC
Switching LOGO! to RUN

3. Move ‘>’ to ‘Start’: ▲ or ▼
4. Accept Start: OK

LOGO! switches to RUN. In RUN, LOGO! displays the following:

**LOGO!’s display panel in RUN**

- **State of the inputs**
- **Current time in LOGO!** (versions with a clock only)
- **LOGO! is in RUN**
- **State of the outputs**
- **State of the ASi inputs**
- **State of the ASi outputs**
- **State of the ASi bus**

**What do we mean when we say ”LOGO! is in RUN?”**

In RUN, LOGO! executes the program. It reads the states of the inputs, uses the program you have specified to determine the states of the outputs, and switches the relays at the outputs on or off.

LOGO! represents the state of an input or output as follows:

- **Input/output has the state ‘1’: inverse**
- **Input/output has the state ‘0’: not inverse**
Let’s have a look at that in our example:

When switch S1 is closed, voltage is applied to input I1, which has the state ’1’.

LOGO! uses the program to calculate the states of the outputs.

Output Q1 has the state ’1’ here.

When Q1 has the state ’1’, LOGO! operates relay Q1 and the consumer at Q1 is supplied with voltage.

The next step
You have now successfully entered your first circuit.
In the next chapter, we will show you how to make changes to existing programs and use special functions in them.
3.6.4 Second program

We use the second program to show you:
- How to insert a block in an existing program
- How to select a block for a special function
- How to enter parameters

In order to produce the second program, we modify the first one.
Let’s begin by looking at the circuit diagram for the second program:

**In LOGO!, the program looks like this:**

You will recognize the OR block and the output relay Q1 from the first program. Only the off-delay is new.

You modify your first program as follows:
Switch LOGO! to editing mode.

To do this, proceed as follows:
1. Switch LOGO! to programming mode
   (by pressing the ◀,▶ and OK keys simultaneously)
2. Select ”Program..” from the main menu
   (by moving ’>’ to ”Program..” and pressing the OK key)
3. Select ”Edit Prg” in the programming menu
   (by moving ’>’ to ”Edit Prg” and pressing the OK button)

You can now modify the existing program.
**Inserting an additional block in a program**

Move the cursor to the B of B01 (B01 is the block number of the OR block).

At this point we insert the new block. Press the **OK** button:

LOGO! displays the BN list.

Select the SF list (▼ key).

The SF list contains the blocks for the special functions

Press the **OK** key.

The block of the first special function appears:

When you select a block for a special or basic function, LOGO! displays the block of the function. The cursor is positioned in the block and itself appears in the form of a solid block. Use the ▼ or ▲ key to select the desired block.
Select the desired block (off-delay, see next diagram), and press the **OK** key:

![Diagram of block B01 connected to B02, with T connected to Q1]

The inserted block receives the block number B02. Block B01, which has been connected up to now to Q1, is connected automatically to the uppermost input of the inserted block. The cursor is positioned at the uppermost input of the inserted block.

The off-delay block has 3 inputs. The uppermost input is the trigger input (Trg). You use this input to start the off-delay. In our example, the off-delay is started by the OR block B01. You reset the time and output by means of the reset input, and you set the time for the off-delay at T. You reset the time and output by means of the reset input, and you set the time for the off-delay by means of T parameter.

In our example, we do not use the reset input of the off-delay. We wire it with ‘x’. You learned how to do this in the first program, but just to remind you, here is the procedure again:

1. Position the cursor under the R: ▲ or ▼
2. Switch to input mode: OK
3. Select the Co list: ▲ or ▼
4. Accept the Co list: OK
5. Select ‘x’: ▲ or ▼
6. Accept ‘x’: OK

The display should now look like this:

![Diagram of block B01 connected to B02, with x connected to Q1]

Now enter the time T for the off-delay:

1. If the cursor is not yet under the T, move it there: ▲ or ▼
2. Switch to input mode: OK
LOGO! displays the parameter window for parameters:

**B02:T T=00.00s+**

- **B02**: the parameter of block B02
- **T**: is a time
- + means: the parameter is displayed in parameterization mode and can be modified there

The cursor appears on the first position of the time value.

To change the time value, proceed as follows:

1. Use the keys ▼ and ▲ to move the cursor to the different positions.
2. Use the keys ▼ and ▲ to change the value.
3. If you have entered the time value, press the OK key.

Set the time to 12:00 minutes (T = 12:00):

1. Move the cursor to the first position: ▼ or ▲
2. Select ’1’:
3. Move the cursor to the second position: ▼ or ▲
4. Select ’2’:
5. Move the cursor to the unit:
6. Select the unit m for minutes:

**Displaying/hiding a parameter – Type of protection**

If you do not want the parameter to be displayed in parameterization mode:

1. Move the cursor to the protection mode: ▼ or ▲
2. Select the protection mode ‘–’:

You should now see the following on the display:

**B02:T T=12:00m+** or **B02:T T=12:00m–**

- **Type of protection +**: time T can be changed in parameterization mode
- **Type of protection –**: time T cannot be changed in parameterization mode

9. Conclude your input: OK
This branch of the program for Q1 is now complete. LOGO! displays the Q1 output. You can have another look at the program on the display. Use the keys to move through the program. Use ◀ or ▶ to move from block to block, and use ▲ and ▼ to move between the inputs on a block.

You exit program input in the same way as you did for the first program, but just to remind you, here is the procedure again:

1. Return to the programming menu: ESC
2. Return to the main menu: ESC
3. Move ‘>’ to ‘Start’: ▲ or ▼
4. Accept ‘Start’: OK

LOGO! is now in RUN again:
3.6.5 Deleting a block

Let’s suppose you want to delete block B02 from the following program and connect B01 directly to Q1.

To do this, proceed as follows:
1. Switch LOGO! to programming mode (3-finger grip).
2. Select ‘Edit Prg’ by pressing OK.
3. Position the cursor at the input of Q1, i.e. under B02, using the ▼ key:

4. Press the OK key.
5. Connect block B01 instead of block B02 directly to output Q01:
   Select the BN list, and then press OK.
   Select B01, and then press OK.

Result: Block B02 is now deleted, because it is no longer used anywhere within the entire circuit. Block B01 is now connected directly to the output instead of block B02.
3.6.6 Deleting a number of interconnected blocks

Let’s suppose you want to delete blocks B01 and B02 from the following program.

To do this, proceed as follows:
1. Switch LOGO! to programming mode (3-finger grip).
2. Select ’Edit Prg’ by pressing OK.
3. Position the cursor at the input of Q1, i.e. under B02:

4. Press the OK key.
5. Set the connector x instead of block B02 at the Q1 output:
   Select the Co list, and then press OK.
   Select x, and then press OK.

Result: Block B02 is now deleted, because it is no longer used anywhere within the entire circuit, and all blocks that are connected to it are deleted with it (i.e. block B01 in the example).
3.6.7 Correcting typing errors

It is easy to correct typing errors in LOGO!:

- If you have not yet concluded input, you can use ESC to go back a step
- If you have already concluded input, simply start again:

   1. Move the cursor to the location of the error
   2. Switch to input mode: OK
   3. Enter the correct wiring for the input.

You can only replace one block with another if the new block has exactly the same number of inputs as the old one. However, you can delete the old block and insert a new one. You can insert whichever block you like.

3.6.8 ”?” on the display

If you have entered a program and want to exit Edit Prg with ESC, LOGO! checks whether you have wired all the inputs of all the blocks correctly. If you have forgotten an input or parameter, LOGO! displays the first place at which you have forgotten something and marks with a question mark all those inputs and parameters that have not been wired.

Wire the input, and enter a value for the parameter. You can then exit Edit Prg by pressing the ESC key.

3.6.9 Deleting a program

To delete a program, proceed as follows:

1. Switch LOGO! to programming mode: ◄, ► and OK simultaneously
2. Move the ‘>’ to ‘Program..’ using the ▲ or ▼ key, and press OK

LOGO! switches to the programming menu:

3. Move the ‘>’ to ‘Clear Prg’:
4. Accept ‘Clear Prg’:

To prevent you from inadvertently deleting your program, we have included an additional query:

If you do not want to delete the program, leave the ‘>’ on ‘No’, and press the OK key.

If you are sure that you want to delete the program stored in LOGO!:
5. Move the ‘>’ to Yes:
6. Press OK

LOGO! deletes the program and then returns to the programming menu:
3.7 Functions

LOGO! offers you a number of elements in programming mode. So that you don’t lose track of things, we have divided these elements into ‘lists’. These lists are:

- **↓Co**: list of connectors for
  - inputs: I1, ...
  - outputs: Q1, ...
  - level: lo, hi
  - not connected: x
- **↓GF**: list of the basic functions AND, OR, ... (see chapter 3.8)
- **↓SF**: list of the special functions (see chapter 3.9)
- **↓BN**: list of the blocks already configured in the circuit and reusable

Contents of the lists

All the lists display elements available in LOGO!. In the normal case, these are all connectors, all basic functions and all special functions that the respective LOGO! version knows. In addition, these elements include all blocks that you have already generated in LOGO! before you call up the ↓BN list.

When LOGO! no longer displays everything

LOGO! no longer displays all elements if

- no further block must be inserted.
  
  In this case, there is either no more memory available or the maximum number of possible blocks has been reached (30).

- a special block would use more memory than is still available in LOGO!

- the resulting number of blocks connected in series would exceed 7.
### 3.8 Basic functions – BF

When you enter a circuit, you will find the blocks for basic functions in the GF list. The following basic functions exist:

<table>
<thead>
<tr>
<th>Circuit diagram representation</th>
<th>Representation in LOGO!</th>
<th>Basic function</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="circuit1.png" alt="Series connection of normally open contacts" /></td>
<td><img src="logo1.png" alt="LOGO diagram" /></td>
<td>AND</td>
</tr>
<tr>
<td><img src="circuit2.png" alt="Parallel connection of normally open contacts" /></td>
<td><img src="logo2.png" alt="LOGO diagram" /></td>
<td>OR</td>
</tr>
<tr>
<td><img src="circuit3.png" alt="Inverter" /></td>
<td><img src="logo3.png" alt="LOGO diagram" /></td>
<td>NOT</td>
</tr>
<tr>
<td><img src="circuit4.png" alt="Double changeover contact" /></td>
<td><img src="logo4.png" alt="LOGO diagram" /></td>
<td>XOR (exclusive or)</td>
</tr>
<tr>
<td><img src="circuit5.png" alt="Parallel connection of normally closed contacts" /></td>
<td><img src="logo5.png" alt="LOGO diagram" /></td>
<td>NAND (and not)</td>
</tr>
<tr>
<td><img src="circuit6.png" alt="Series connection of normally closed contacts" /></td>
<td><img src="logo6.png" alt="LOGO diagram" /></td>
<td>NOR (or not)</td>
</tr>
</tbody>
</table>
3.8.1 AND

The series connection of a number of normally open contacts is represented in a circuit diagram as follows:

```
   ___ / ___ / ___ / ___ / ___

I1       I2       Q
I3
```

The block is called AND because its output (Q) has the state 1 only when I1 and I2 and I3 have the state 1 (i.e. they are closed).

**Logic table for AND:**

<table>
<thead>
<tr>
<th>I1</th>
<th>I2</th>
<th>I3</th>
<th>Q</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>0</td>
<td>1</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>1</td>
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<td>0</td>
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<tr>
<td>1</td>
<td>0</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

The following applies to AND: \( x = 1 \)
(x means the input is not used)

3.8.2 OR

The parallel connection of a number of normally open contacts is represented in a circuit diagram as follows:

```
   ___ / ___ / ___ / ___ / ___

I1       I2       I3       Q
```

The block is called OR because its output (Q) always has the state 1 when I1 or I2 or I3 has the state 1 (i.e. closed). In other words, at least one input must have the state 1.
### Logic table for OR:

<table>
<thead>
<tr>
<th>I1</th>
<th>I2</th>
<th>I3</th>
<th>Q</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>0</td>
<td>1</td>
<td>0</td>
<td>1</td>
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<tr>
<td>0</td>
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<tr>
<td>1</td>
<td>0</td>
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<td>1</td>
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<tr>
<td>1</td>
<td>0</td>
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<tr>
<td>1</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

The following applies to OR: \( x = 0 \)
(x means the input is not used)

### 3.8.3 NOT

An inverter is represented in a circuit diagram as follows:

![Circuit Diagram](image)

In LOGO! the inverter is called NOT: The symbol for this is as follows:

![Symbol Diagram](image)

The block is called NOT because the output (Q) has the state 1 when the input has the state 0, and vice versa. In other words, NOT inverts the state at the input.

The advantage of NOT is, for example, that you no longer require any normally closed contacts for LOGO!. You can use a normally open contact and convert it to a normally closed contact using the NOT block. The symbol for NOT is as follows:

### Logic table for the NOT

<table>
<thead>
<tr>
<th>I1</th>
<th>Q</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>1</td>
<td>0</td>
</tr>
</tbody>
</table>

The following applies to NOT: \( x = 1 \)
(x means the input is not used)
3.8.4 NAND

The parallel connection of a number of normally closed contacts is represented in a circuit diagram as follows:

The block is called NAND because its output (Q) only has the state 0 if I1 and I2 and I3 have the state 1 (i.e. are closed).

Logic table for NAND

<table>
<thead>
<tr>
<th>I1</th>
<th>I2</th>
<th>I3</th>
<th>Q</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>0</td>
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<td>1</td>
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<tr>
<td>0</td>
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<tr>
<td>1</td>
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<tr>
<td>1</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>1</td>
<td>1</td>
<td>1</td>
<td>0</td>
</tr>
</tbody>
</table>

The following applies to NAND: \( x = 1 \)

(x means the input is not used)

3.8.5 NOR

The series connection of a number of normally closed contacts is represented in a circuit diagram as follows:

The output of the NOR block is only switched on (state 1) when all the inputs are switched off (state 0). As soon as any of the inputs is switched on (state 1), the output is switched off.
The block is called NOR because its output (Q) only has the state 1 when all the inputs have the state 0. As soon as any of the inputs takes on the state 1, the output of NOR has the state 0.

**Logic table for NOR**

<table>
<thead>
<tr>
<th>I1</th>
<th>I2</th>
<th>I3</th>
<th>Q</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>0</td>
<td>1</td>
<td>1</td>
<td>0</td>
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<tr>
<td>1</td>
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<tr>
<td>1</td>
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<td>1</td>
<td>0</td>
</tr>
<tr>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>1</td>
<td>1</td>
<td>1</td>
<td>0</td>
</tr>
</tbody>
</table>

The following applies to NOR: x = 0
(x means the input is not used)

### 3.8.6 XOR

An XOR in a circuit diagram is a series connection of two change-over contacts:

\[
\begin{array}{c}
\text{I1} \\
\text{I2} \\
\text{Q}
\end{array}
\]

In LOGO! the symbol for this is as follows:

The output of XOR has the state 1 when the states of the inputs differ.

**Logic table for XOR**

<table>
<thead>
<tr>
<th>I1</th>
<th>I2</th>
<th>Q</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>1</td>
<td>1</td>
<td>0</td>
</tr>
</tbody>
</table>

The following applies to XOR: x = 0
(x means the input is not used)
3.9 Special functions – SF

When you enter a program in LOGO!, you will find the blocks for the special functions in the SF list. The following special functions exist:

<table>
<thead>
<tr>
<th>Function</th>
<th>Circuit diagram representation</th>
<th>Representation in LOGO!...</th>
<th>Representation in LOGO!...L...</th>
<th>Re</th>
</tr>
</thead>
<tbody>
<tr>
<td>On-delay</td>
<td><img src="image" alt="On-delay Circuit" /></td>
<td><img src="image" alt="On-delay Logo" /></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Off-delay</td>
<td><img src="image" alt="Off-delay Circuit" /></td>
<td><img src="image" alt="Off-delay Logo" /></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pulse relay</td>
<td><img src="image" alt="Pulse Relay Circuit" /></td>
<td><img src="image" alt="Pulse Relay Logo" /></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clock (time switch)</td>
<td><img src="image" alt="Clock Circuit" /></td>
<td><img src="image" alt="Clock Logo" /></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Latching relay</td>
<td><img src="image" alt="Latching Relay Circuit" /></td>
<td><img src="image" alt="Latching Relay Logo" /></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clock pulse generator</td>
<td><img src="image" alt="Clock Pulse Generator Circuit" /></td>
<td><img src="image" alt="Clock Pulse Generator Logo" /></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Re If there is a power failure, the state is stored as remanent if a module is inserted for remanence (with LOGO!...-L... only) and the function has been defined as remanent.
### Function Representation in LOGO!...  
### Circuit diagram representation  
### Representation in LOGO!...L...  
### Re

<table>
<thead>
<tr>
<th>Function</th>
<th>Circuit diagram representation</th>
<th>Representation in LOGO!...</th>
<th>Representation in LOGO!...L...</th>
<th>Re</th>
</tr>
</thead>
<tbody>
<tr>
<td>Retentive on-delay</td>
<td><img src="circuit-diagram.png" alt="Circuit Diagram" /></td>
<td><img src="logo-symbol.png" alt="LOGO! Symbol" /></td>
<td><img src="logo-symbol.png" alt="LOGO! Symbol" /></td>
<td></td>
</tr>
<tr>
<td>Up and down counter</td>
<td><img src="circuit-diagram.png" alt="Circuit Diagram" /></td>
<td><img src="logo-symbol.png" alt="LOGO! Symbol" /></td>
<td><img src="logo-symbol.png" alt="LOGO! Symbol" /></td>
<td></td>
</tr>
<tr>
<td>Operating hours counter</td>
<td><img src="circuit-diagram.png" alt="Circuit Diagram" /></td>
<td><img src="logo-symbol.png" alt="LOGO! Symbol" /></td>
<td><img src="logo-symbol.png" alt="LOGO! Symbol" /></td>
<td></td>
</tr>
<tr>
<td>Wiping relay / pulse output</td>
<td><img src="circuit-diagram.png" alt="Circuit Diagram" /></td>
<td><img src="logo-symbol.png" alt="LOGO! Symbol" /></td>
<td><img src="logo-symbol.png" alt="LOGO! Symbol" /></td>
<td></td>
</tr>
<tr>
<td>Threshold switch</td>
<td><img src="circuit-diagram.png" alt="Circuit Diagram" /></td>
<td><img src="logo-symbol.png" alt="LOGO! Symbol" /></td>
<td><img src="logo-symbol.png" alt="LOGO! Symbol" /></td>
<td></td>
</tr>
</tbody>
</table>

**Re** If there is a power failure, the state is stored as remanent if a module is inserted for remanence (with LOGO!...-L... only) and the function has been defined as remanent.

**Note**
In all functions, input R has priority over all other inputs.
Remanence
The following applies for the standard version of LOGO!:

Note
After a power failure/power restoration, in the case of time functions the time that has elapsed is reset, and in the case of the counter the counted value is reset.

In LOGO!-L..., it is possible with a number of functions to store switch statuses, times and count values as remanent values. For this to be possible,

- the values in question must be defined as remanent
- a yellow or red module must be inserted that permits remanent data storage.

After a power failure, the program continues with those values that were current before the interruption.

Note
If you are running both LOGO! and its inputs by means of the same power supply, it is possible for incorrect values to be stored for the remanent functions due to power failure bridging. Under certain circumstances, this can lead to an additional edge after power restoration with edge-triggered special functions.

Make sure that you feed in the power supply for LOGO! and its inputs separately.

Connector X on the inputs of the special functions

Note
If you wire inputs of special functions to the ’x’ connector, these inputs will be assigned the value 0, i.e. a low signal is applied to the inputs.
3.9.1 Accuracy of the time (all variants) and of the clock (LOGO!...C... versions)

Accuracy of T
All electronic components have minute differences. For this reason, small deviations from the time set (T) can occur. In LOGO!, the maximum deviation is 1 %.

Example:
In 1 hour (3600 seconds), the deviation is 1 %, i.e. ± 36 seconds.
In 1 minute, the deviation is therefore only ± 0.6 seconds.

Accuracy of the clock
To ensure that this deviation does not lead to the clock in C versions running inaccurately, the clock (time switch) is regularly compared with a high-precision time base and adjusted accordingly.
This means that the clock has a maximum deviation of + 5 s per day.

3.9.2 T parameter

With a number of the special functions described below, you have the option of parameterizing a time value T. Please note the following when setting the time:

Note
Always specify a time for T ≥ 0.10 s. For T = 0.05 s and T = 0.00 s, the time T is not defined.
3.9.3 On-delay

<table>
<thead>
<tr>
<th>Circuit diagram / Symbol in LOGO!</th>
<th>Wiring</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="Circuit diagram" /></td>
<td>Trg input</td>
<td>You start the time for the on-delay by means of the Trg input (TRG stands for trigger)</td>
</tr>
<tr>
<td><img src="image" alt="Circuit diagram" /></td>
<td>T parameter</td>
<td>T is the time after which the output is switched on (output signal changes from 0 to 1).</td>
</tr>
<tr>
<td><img src="image" alt="Circuit diagram" /></td>
<td>Q output</td>
<td>Q switches on once the parameterized time T has expired, if Trg is still set.</td>
</tr>
</tbody>
</table>

**T parameter**

Please pay attention to the note in chapter 3.9.2 when specifying the values.

**Timing diagram**

![Timing diagram](image)

The bold part of the timing diagram appears in the on-delay symbol.

When the state at the Trg input changes from 0 to 1, the time $T_a$ begins to elapse ($T_a$ is the current time in LOGO!). If the state at the Trg input remains 1 at least for the duration of the parameterized time $T$, the output is set to 1 after the time $T$ has elapsed (there is a delay between the input being switched on and the output coming on).

If the state at the Trg input changes back to 0 before the time $T$ elapses, the time is reset.

The output is reset to 0 when the Trg input has the state 0.

**Applications**

Switch debouncing
### 3.9.4 Off-delay

<table>
<thead>
<tr>
<th>Circuit diagram / Symbol in LOGO!</th>
<th>Wiring</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="Circuit diagram" /></td>
<td>Trg input</td>
<td>You start the time for the off-delay by means of the Trg input (Trg stands for trigger)</td>
</tr>
<tr>
<td></td>
<td>R input</td>
<td>You reset the time for the off-delay and set the output to 0 via the R (reset) input (R has priority over Trg)</td>
</tr>
<tr>
<td><img src="image" alt="Circuit diagram" /></td>
<td>T parameter</td>
<td>T is the time after which the output is switched off (the output signal changes from 1 to 0).</td>
</tr>
<tr>
<td></td>
<td>Q output</td>
<td>Q switches on when Trg is sent and remains switched on until T expires.</td>
</tr>
</tbody>
</table>

**T parameter**

Please pay attention to the note in chapter 3.9.2 for parameter T.

**Timing diagram**

![Timing diagram](image)

The bold part of the timing diagram appears in the off-delay symbol.

When the Trg input takes on the state 1, the output (Q) switches to 1 immediately. If the state of Trg changes from 1 to 0, LOGO!’s current time \( T_a \) is started and the output remains set. If \( T_a \) reaches the values set via T \( (T_a=T) \), the output (Q) is reset to 0 (off-delay).

If the Trg input is switched on and off again, the time \( T_a \) starts again.

You reset the time \( T_a \) and the output via the R (reset) input before the time \( T_a \) has elapsed.

**Applications**

Automatic stairway lighting system
### 3.9.5 Pulse relay

<table>
<thead>
<tr>
<th>Circuit diagram / Symbol in LOGO!</th>
<th>Wiring</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="Circuit diagram" /></td>
<td>Trg input</td>
<td>You use the Trg input (Trg stands for trigger) to switch the output on and off.</td>
</tr>
<tr>
<td></td>
<td>R input</td>
<td>You use the R input (reset) to reset the pulse relay and set the output to 0 (R has priority over Trg)</td>
</tr>
<tr>
<td><img src="image" alt="Parameter symbol" /></td>
<td>Par parameter</td>
<td>Par is only available in LOGO!... L... versions. You can use this parameter to switch remanence on and off.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Rem:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>off = no remanence</td>
</tr>
<tr>
<td></td>
<td></td>
<td>on = the state can be stored as a remanent one</td>
</tr>
<tr>
<td></td>
<td>Q output</td>
<td>Q switches on when Trg is sent and remains switched on until T expires.</td>
</tr>
</tbody>
</table>

**Timing diagram**

- Trg
- R
- Q

The bold part of the timing diagram appears in the pulse relay symbol.

Every time the state of the Trg input changes from 0 to 1, the state of the output (Q) changes (i.e. it is switched on or off). You reset the pulse relay to its initial state via the R input. After power on or reset, the pulse relay is reset and the output (Q) changes to 0.
Behavior after power on

Behavior after the power supply is switched on depends on the LOGO! version you are using:

<table>
<thead>
<tr>
<th>After power on the pulse relay is always reset and the Q output always set to 0.</th>
<th>If remanence has not been parameterized, the pulse relay is reset and the Q output set to 0 after power on.</th>
</tr>
</thead>
<tbody>
<tr>
<td>If remanence has been parameterized, the state that was current before LOGO! was switched off is set after power on.</td>
<td></td>
</tr>
</tbody>
</table>

Applications

Hall/corridor lighting

3.9.6 Clock (time switch)

A time switch is only available in LOGO! versions that have the letter C (for clock) in their name (e.g. LOGO! 230 RC).

Each clock has 3 cams.

<table>
<thead>
<tr>
<th>Symbol in LOGO!</th>
<th>Wiring</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>No 1, No 2, No 3</td>
<td>Parameter Q</td>
<td>You use the “No” parameters to set the switch-on and switch-off times for the three cams of the clock (see also &quot;Setting the clock (time switch)&quot;).</td>
</tr>
<tr>
<td>Q output</td>
<td>Q switches on if one of the cams parameterized is switched on.</td>
<td></td>
</tr>
</tbody>
</table>
Parameter No1, No2, No3
The parameter window for cam No1 is as follows, for example:

```
Block B01
Cam No 1
B01:No1
Day=Mo +
On =06:00
Off=19:00
```

Day of the week (Mo for Monday);
See the parameter for displaying/hiding – type of protection on page 42
Switch-on time (6.00 hours)
Switch-off time (19.00 hours)

Day of the week
The following options are available to you for setting the days of the week:
- Su Sunday
- Mo Monday
- Tu Tuesday
- We Wednesday
- Th Thursday
- Fr Friday
- Sa Saturday
- Mo..Fr Every day from Monday to Friday
- Mo..Sa Every day from Monday to Saturday
- Mo..Su Every day from Monday to Sunday (i.e. every day)
- Sa..Su Saturday and Sunday

Switch-on time
Any time between 00:00 and 23:59 hours
—:—:— means there is no switch-on time

Switch-off time
Any time between 00:00 and 23:59 hours
—:—:— means there is no switch-off time
Clock buffer

In LOGO! ...C, the internal clock continues to run when there is a power failure. In other words, the clock has reserve power. How much reserve power LOGO! ...C has depends on the ambient temperature. At a temperature of 25 °C, it has reserve power for a typical duration of 80 hours.

Cam overlap

You use the cams to set switch-on and switch-off times. At a switch-on time, the clock switches the output on unless it was already on; at a switch-off time, it switches the output off unless it was already off.

Priorities when setting identical switch-on and switch-off times

If you specify a switch-on time and a switch-off time at the same time for different cams, the switch-on/switch-off times contradict each other. In this case, cam No3 has priority over cam No2, and cam No2 has priority over cam No1.
3.9.7 Setting the clock (time switch)

To enter switching times, proceed as follows:

1. Position the cursor on one of the clock’s No parameters (e.g. No1).
2. Press the OK key. LOGO! opens the parameter window for the cam.
   The cursor is positioned on the day of the week.
3. Use the ▲ and ▼ keys to select one or more days of the week.
4. Use the ► key to move the cursor to the first position for the switch-on time.
5. Set the switch-on time.
   You use the ▲ and ▼ keys to change the value. To move the cursor from one position to another, you use the ◀ and ► keys.
   You can only select the value —:— at the first position (—:— means no switching operation).
6. Use the ► key to move the cursor to the first position for the switch-off time.
7. Set the switch-off time (same procedure as for step 5).
8. Conclude your input by pressing the OK key.
   The cursor is positioned at parameter No 2 (cam 2). You can now parameterize another cam (as described under points 2. to 8.).

Note

Please refer to the Technical data in appendix A and chapter 3.9.1 for information regarding the accuracy of the clock (time switch).
3.9.8 Clock: examples

You can use the clock to combine switch-on and switch-off times however you like. Here are some examples:

Example 1
The clock’s output is to be switched on every day (i.e. from Monday to Sunday) from 08:00 hours to 13:00 hours:

<table>
<thead>
<tr>
<th>B01:No1</th>
<th>Day= Mo..Su</th>
<th>On =08:00</th>
<th>Off=13:00</th>
</tr>
</thead>
</table>

Example 2
The clock’s output is to be switched on every day from 08:00 hours to 13:00 hours and from 15:00 hours to 18:30 hours. You need 2 cams for this:

<table>
<thead>
<tr>
<th>B01:No1</th>
<th>B01:No2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Day= Mo..Su</td>
<td>Day= Mo..Su</td>
</tr>
<tr>
<td>On =08:00</td>
<td>On =15:00</td>
</tr>
<tr>
<td>Off=13:00</td>
<td>Off=18:30</td>
</tr>
</tbody>
</table>

On=’1’=voltage connected
Off=’0’=no voltage
Example 3
The clock’s output is to be switched on every day from Monday to Saturday from 08:00 hours to 13:00 hours and from 15:00 hours to 18:30 hours. In addition, it is also to be switched on on Sunday between 11:00 hours and 15:00 hours. You need 3 cams for this:

<table>
<thead>
<tr>
<th>Cam</th>
<th>Description</th>
<th>Day</th>
<th>On</th>
<th>Off</th>
</tr>
</thead>
<tbody>
<tr>
<td>B01:No1</td>
<td>Day= Mo..Sa</td>
<td>On =08:00</td>
<td>Off=13:00</td>
<td></td>
</tr>
<tr>
<td>B01:No2</td>
<td>Day= Mo..Sa</td>
<td>On =15:00</td>
<td>Off=18:30</td>
<td></td>
</tr>
<tr>
<td>B01:No3</td>
<td>Day= Su</td>
<td>On =11:00</td>
<td>Off=15:00</td>
<td></td>
</tr>
</tbody>
</table>

Example 4
The clock’s output is to be switched on on Monday at 22:00 hours and off on Tuesday at 6:00 hours.

<table>
<thead>
<tr>
<th>Cam</th>
<th>Description</th>
<th>Day</th>
<th>On</th>
<th>Off</th>
</tr>
</thead>
<tbody>
<tr>
<td>B01:No1</td>
<td>Day= Mo</td>
<td>On =22:00</td>
<td>Off=6:00</td>
<td></td>
</tr>
<tr>
<td>B01:No2</td>
<td>Day= Tu</td>
<td>On =—:—</td>
<td>Off=6:00</td>
<td></td>
</tr>
</tbody>
</table>
3.9.9 Latching relay

Very often, a circuit is required that retains a switched-on state. This is referred to as latching. Latching is represented in a circuit diagram as follows:

<table>
<thead>
<tr>
<th>Circuit diagram / Symbol in LOGO!</th>
<th>Wiring</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="Circuit Diagram" /></td>
<td></td>
<td></td>
</tr>
<tr>
<td><img src="image" alt="Symbol in LOGO!" /></td>
<td></td>
<td></td>
</tr>
<tr>
<td><img src="image" alt="Wiring" /></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Switching behavior

A latching relay is a simple binary flip-flop. The value of the output depends on the states of the inputs and the previous state of the output. The following table illustrates the logic once more:

<table>
<thead>
<tr>
<th>$S_n$</th>
<th>$R_n$</th>
<th>$Q$</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
<td>State remains the same</td>
</tr>
<tr>
<td>0</td>
<td>1</td>
<td>0</td>
<td>Reset</td>
</tr>
<tr>
<td>1</td>
<td>0</td>
<td>1</td>
<td>Set</td>
</tr>
<tr>
<td>1</td>
<td>1</td>
<td>0</td>
<td>Reset (resetting has priority over setting)</td>
</tr>
</tbody>
</table>
3.9.10 Symmetrical clock pulse generator

<table>
<thead>
<tr>
<th>Circuit diagram / Symbol in LOGO!</th>
<th>Wiring</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="Circuit Diagram" /></td>
<td>En input</td>
<td>You switch the clock pulse generator on and off via the En input (enable).</td>
</tr>
<tr>
<td><img src="image" alt="Circuit Diagram" /></td>
<td>T parameter</td>
<td>T is the time for which the output is switched on or off.</td>
</tr>
<tr>
<td><img src="image" alt="Circuit Diagram" /></td>
<td>Q output</td>
<td>Q switches on and off cyclically with the clock time T.</td>
</tr>
</tbody>
</table>

**T parameter**

Please pay attention to the note in chapter 3.9.2 when specifying the values.

**Timing diagram**

![Timing Diagram](image)  

The bold part of the timing diagram appears in the symmetrical clock pulse generator symbol.

You use the T parameter to specify how long the on and off times are to last. You use the En (enable) input to switch the clock pulse generator on. The clock pulse generator sets the output to 1 for the time T, then to 0 for the time T, and so on until the En input is at 0.

**Note on the relay outputs Qn:**

Relay outputs that switch under load get worn a little with each switching operation. To find out how many switching operations a LOGO! output can execute, refer to the chapter entitled “Technical data” (see chapter A).
3.9.11 Retentive on-delay

<table>
<thead>
<tr>
<th>Circuit diagram / Symbol in LOGO!</th>
<th>Wiring</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>![K1](Trg input) R K1 Q</td>
<td>Trg input</td>
<td>You start the time for the on-delay via the Trg (trigger) input</td>
</tr>
<tr>
<td><img src="K1" alt="R" /> Trg Q</td>
<td>R input</td>
<td>You reset the time for the on-delay and set the output to 0 via the R (reset) input (R has priority over Trg)</td>
</tr>
<tr>
<td><img src="Q" alt="T" /></td>
<td>T parameter</td>
<td>T is the time after which the output is switched on (the output changes from 0 to 1).</td>
</tr>
<tr>
<td><img src="T" alt="R" /></td>
<td>Q output</td>
<td>Q switches on after the time T expires.</td>
</tr>
</tbody>
</table>

**T parameter**

Please pay attention to the note in chapter 3.9.2 when specifying the values.

**Timing diagram**

The bold part of the timing diagram appears in the retentive on-relay symbol.

If the state of the Trg input changes from 0 to 1, the current time $T_a$ starts. When $T_a$ reaches the time $T$, the output (Q) is set to 1. Another switching operation at the Trg input has no effect on $T_a$.

The output and the time $T_a$ are not reset to 0 until the state of the R input changes to 1 again.
3.9.12 Up and down counter

<table>
<thead>
<tr>
<th>Symbol in LOGO!</th>
<th>Wiring</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>R</td>
<td>R input</td>
<td>You reset the internal count value and the output to zero via the R (Reset) input (R has priority over Cnt).</td>
</tr>
<tr>
<td>Cnt</td>
<td>Cnt input</td>
<td>The counter counts the changes from state 0 to state 1 at the Cnt (Count) input. Changes from state 1 to state 0 are not counted. Maximum count frequency at the input connectors: 5 Hz</td>
</tr>
<tr>
<td>Dir</td>
<td>Dir input</td>
<td>You specify the count direction via the Dir (Direction) input: Dir = 0: The counter counts up Dir = 1: The counter counts down</td>
</tr>
<tr>
<td>Par</td>
<td>Par parameter</td>
<td>Please read the comments about Par parameter setting that follow this table.</td>
</tr>
<tr>
<td>Q</td>
<td>Q output</td>
<td>Q switches on when the count value (Par parameter or Lim - see below) is reached.</td>
</tr>
</tbody>
</table>

Par parameter setting

If the internal count value is greater than or equal to Par (Parameter) or Lim, the output is set. In the event of overrunning or underrunning, the counter stops.

Par can be anything between 0 and 9999.
**Lim** can be anything between 0 and 999999.

**Rem:** This parameter can be used in LOGO!...L... to switch remanence on and off for the internal count value Cnt.

off = no remanence

on = the count value Cnt can be stored as a remanent value

**Type of protection:**

+: The Par or Lim parameter can be changed during operation.

−: The Par or Lim parameter can only be changed at this point during programming. The parameter(s) cannot be changed during operation.

**Timing diagram**

At each positive edge at the Cnt input, the internal counter is incremented by one (Dir = 0) or decremented by one (Dir = 1). If the internal count value is greater than or equal to the value specified by Par, the output (Q) is set to 1. You can use the reset input to reset the internal count value to ‘0000’ or ‘000000’. As long as R=1, the output is 0.

**Remanence**

**Note**

If you switch off the power supply of the standard version of LOGO!, the internal count value is deleted. After power on, the internal count value is always zero (Cnt=0000).
In LOGO!...L..., it is possible with a number of functions to store switch statuses, times and count values as remanent values. For this to be possible,

- the values in question must be defined as remanent
- a yellow or red module must be inserted, that permits remanent data storage.

After a power failure, the program recontinues with those values that were current before the interruption.

**Example**

![Diagram](image)

Whenever I1 takes on the state 1, the internal count value is incremented by 1. As soon as the internal count value (Cnt) reaches the value 10 set by means of Par, the output of the counter is set to 1.
### 3.9.13 Operating hours counter

This function is only available in LOGO!...L... versions.

<table>
<thead>
<tr>
<th>Symbol in LOGO!</th>
<th>Wiring</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>R</td>
<td>R input</td>
<td>R = 0: Counting is possible if Ral is not = 1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>R = 1: The counter is stopped</td>
</tr>
<tr>
<td></td>
<td></td>
<td>You reset the output via the R (Reset) input.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>The remaining time of the maintenance interval MN is set to MN = MI.</td>
</tr>
<tr>
<td>En</td>
<td>En input</td>
<td>En is the monitoring input. LOGO! measures the time in which this input is set.</td>
</tr>
<tr>
<td>Ral</td>
<td>Ral input</td>
<td>Ral = 0: Counting is possible if R is not = 1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ral = 1: The counter is stopped</td>
</tr>
<tr>
<td></td>
<td></td>
<td>You reset the counter and the output via the Ral (Reset all) input.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>I. e.:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• the Q output is set to 0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• the operating hours measured (OT) = 0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• the remaining time of the maintenance interval (MN) = MI.</td>
</tr>
<tr>
<td>Par parameter: MI</td>
<td>Par parameter: MI</td>
<td>MI: preventive maintenance interval specified in hours.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>MI can be anything between 0 and 9999 hours.</td>
</tr>
<tr>
<td>Q output</td>
<td>Q output</td>
<td>If the remaining time MN = 0 (see timing diagram), the output is set.</td>
</tr>
</tbody>
</table>

MI = parameterized count value
MN = remaining time
OT = overall time expired since the last 1 signal at the Ral input
**Par parameter setting**

**B03:Par**

- **MI** = 0000h+

**Monitoring interval in seconds**

**Type of protection**

**MI** is the parameterizable time interval. It can be anything between 0 and 9999.

**Type of protection:**

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>+:</td>
<td>The specified monitoring time can be changed during operation.</td>
</tr>
<tr>
<td>-:</td>
<td>The specified monitoring time can only be changed at this point during programming. The time cannot be changed during operation.</td>
</tr>
</tbody>
</table>

**Timing diagram**

- **MN** = remaining time
- **MI** = parameterizable time interval
- **MN** = remaining time
- **OT** = overall time expired since the last 1 signal at the Ral input

The counter stops counting as long as **R** or **Ral** is set.

**MI** = parameterizable time interval

**MN** = remaining time

**OT** = overall time expired since the last 1 signal at the Ral input
Behavior after canceling R

The operating hours counter monitors the En input. As long as this input is 1, LOGO! measures the time expired and the remaining time. LOGO! displays the times in Parameterization mode. If the remaining time is 0, the Q output is set to 1.

<table>
<thead>
<tr>
<th>You use reset input R to:</th>
<th>You use reset input Ral to:</th>
</tr>
</thead>
<tbody>
<tr>
<td>reset the Q output</td>
<td>reset the Q output</td>
</tr>
<tr>
<td>set the counter for the remaining time to the specified value MI</td>
<td>set the counter for the remaining time to the specified value MI</td>
</tr>
<tr>
<td></td>
<td>reset the internal counter OT to 0</td>
</tr>
</tbody>
</table>

The internal counter OT remains unchanged

Limit value for OT

If you reset the operating hours counter by means of the R signal, the operating hours counted in the OT counter are retained. The limit value of the OT counter is 99999 h.

When the operating hours counter reaches this value, no further hours are counted.
Remanence
In LOGO!...L..., the internal count value is always set to remanent. If you want to use this remanence, a yellow or red module must be inserted.

Note
The remanence of the operating hours counter cannot be switched off. As soon as a yellow or red module is inserted, the count values for OT and MN are stored if a power failure occurs.

After a power failure, the program continues with those values that were current before the interruption.

Application
Monitoring maintenance intervals

3.9.14 Wiping relay – pulse output

<table>
<thead>
<tr>
<th>Symbol in LOGO!</th>
<th>Wiring</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trg T</td>
<td>Trg input</td>
<td>You start the time for the wiping relay via the Trg (Trg stands for trigger) input</td>
</tr>
<tr>
<td>Q</td>
<td>T parameter</td>
<td>T is the time after which the output is switched off (output signal changes from 1 to 0).</td>
</tr>
<tr>
<td></td>
<td>Q output</td>
<td>Q switches on when Trg is sent and remains switched on until T expires.</td>
</tr>
</tbody>
</table>

T parameter
Please refer to the note in chapter 3.9.2 for the T parameter.
Timing diagram

When the Trg input takes on the state 1, the Q output switches immediately to state 1. At the same time, the current time $T_a$ starts in LOGO!, and the output remains set. When $T_a$ reaches the value set by means of $T$ ($T_a=T$), the Q output is reset to state 0 (pulse output).

If the Trg input changes from 1 to 0 before the time expires, the output also changes immediately from 1 to 0.
3.9.15 Threshold switch for frequencies

This function is only available in LOGO!...-L... versions.

<table>
<thead>
<tr>
<th>Symbol in LOGO!</th>
<th>Wiring</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fre input</td>
<td>You apply the input that supplies the pulses to be counted to the Fre input. Use</td>
<td></td>
</tr>
<tr>
<td>Par</td>
<td>• input I12 for rapid counts (24 V inputs): max. 150 Hz</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• any other input or circuit section for low counting frequencies.</td>
<td></td>
</tr>
<tr>
<td>Q</td>
<td>Par parameter:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>SW↑: Switch-on threshold</td>
<td></td>
</tr>
<tr>
<td></td>
<td>SW↓: Switch-off threshold</td>
<td></td>
</tr>
<tr>
<td></td>
<td>G_T: Time interval in which the pulses applied are measured</td>
<td></td>
</tr>
<tr>
<td>Q output</td>
<td>Q switches on or off depending on SW↑ and SW↓ (see description below).</td>
<td></td>
</tr>
</tbody>
</table>

Par parameter setting

<table>
<thead>
<tr>
<th>B03:Par</th>
<th>Type of protection</th>
</tr>
</thead>
<tbody>
<tr>
<td>SW↑=0050+</td>
<td>Switch-on threshold</td>
</tr>
<tr>
<td>SW↓=0048</td>
<td>Switch-off threshold</td>
</tr>
<tr>
<td>G_T=01.00s</td>
<td>Time interval for pulses</td>
</tr>
</tbody>
</table>

SW↑ is the switch-on threshold. It can be anything between 0000 and 9999.

SW↓ is the switch-off threshold. It can be anything between 0000 and 9999.

G_T is the time interval in which the pulses applied to Fre are measured. G_T can be anything between 00.05s and 99.95s.
**Type of protection:**

| |  
|---|---|---|---|---|---|---|---|
| +: | The definable switching thresholds can be changed during operation. |  
| --: | The definable switching thresholds can only be changed at this point during programming. The thresholds cannot be changed during operation. |  

**Timing diagram**

Q

G_T

\[ \text{fa} = 6 \] \[ \text{fa} = 10 \] \[ \text{fa} = 8 \] \[ \text{fa} = 5 \]

Switch-on threshold: \( \text{SW}^+ = 9 \)  
Switch-off threshold: \( \text{SW}^- = 5 \)

The threshold switch measures the signals at the Fre input. The pulses are measures during a parameterizable period \( G_T \). If the values measured within the time \( G_T \) are **greater** than the switch-on and switch-off thresholds, the Q output switches on.

Q switches off again when the number of pulses measured has **reached or fallen below** the value of the switch-off threshold.

**Note**

If you specify the time \( G_T \) as 1 s, LOGO! returns the current frequency (in Hz) in the \( \text{fa} \) parameter.

\( \text{fa} \) is always the sum of the pulses measured per time unit \( G_T \).
3.10 Memory required and size of a circuit

A program (or circuit diagram, if you prefer) is subject to limitations with regard to:
- The number of blocks connected in series
- The memory available

**Number of blocks connected in series**

You can insert a series of up to 7 blocks between an input and an output.

**Memory**

LOGO! monitors memory utilization and offers in the function lists only those functions for which there actually still is enough memory space available.

At this point, we will mention just a few basic conditions that you should take into consideration:
- a program can contain a maximum of 30 blocks.
  Just to refresh your memory: a block can be a simple AND function or even a complex special function (e.g. operating hours counter).
- if you use a number of special functions, this reduces the number of blocks possible.

Please read appendix C to find out how to determine the amount of memory that is in use.
4 LOGO!’s program modules

You can copy the program stored in LOGO! to a program module/card. You can insert the program module/card in a different LOGO! and copy the program to it. You can use the program module/card to:

- archive programs
- duplicate programs
- send programs per post
- write and test programs in the office and then transfer them to a different LOGO! in the cabinet.

LOGO! is supplied with cover. You receive the program module/card separately.

Note

You do not require a module for permanently storing the program in your LOGO!.

The LOGO! program is already stored permanently when the Programming mode is ended.

We will now introduce you to the three modules that you can buy for LOGO!. All three can accommodate the entire program memory of a LOGO!.

<table>
<thead>
<tr>
<th>Module</th>
<th>Order number</th>
<th>Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard module</td>
<td>6ED1 056–1AA00–0AA0</td>
<td>All LOGO! versions</td>
</tr>
<tr>
<td>Program modules with know-how protection and remanence</td>
<td>6ED1 056–4BA00–0AA0</td>
<td></td>
</tr>
<tr>
<td>Program modules with remanence</td>
<td>6ED1 056–1BA00–0AA0</td>
<td></td>
</tr>
</tbody>
</table>
4.1 Overview of the modules

We will now introduce you to the characteristics of the different modules in the various LOGO! versions.

The overview table shows you the application options for the modules. Look the symbol of your LOGO! and find out which modules you can use:

<table>
<thead>
<tr>
<th>LOGO!...</th>
<th>Standard module (cyan)</th>
<th>Module for remanent data (yellow)</th>
<th>Module for protected programs and remanent data (red)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Reading and writing programs</td>
<td>Cannot be used</td>
<td>Cannot be used</td>
</tr>
<tr>
<td></td>
<td>Interchangeable between all versions</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Reading and writing programs</td>
<td>Reading and writing programs and remanent data</td>
<td>Writing programs</td>
</tr>
<tr>
<td></td>
<td>Interchangeable between all LOGO! ...L versions</td>
<td>Interchangeable between all LOGO!...L versions</td>
<td>Reading and writing remanent data</td>
</tr>
<tr>
<td></td>
<td>Reading and writing programs</td>
<td>Reading and writing programs and remanent data</td>
<td>Writing programs</td>
</tr>
<tr>
<td></td>
<td>Interchangeable between all LOGO! LB11 versions</td>
<td>Interchangeable between all LOGO!..L versions</td>
<td>Reading and writing remanent data</td>
</tr>
</tbody>
</table>

Note

To enable remanent data to be stored in a red or yellow module, your program must contain functions whose current data can be stored as remanent data. What’s more, remanence must be switched on for the parameterizable functions.
Upward compatibility

The following rule applies: the modules are only upward compatible, i.e. a module

- that has been written in a standard version can be read into all other versions.
- that has been written in a LOGO! ...L version can be read into all other LOGO! ...L versions, but not into a standard version.
- that has been written in a LOGO! ...LB11 version can be read into all other LOGO! ...LB11 versions, but not into a standard version or a LOGO! ...L version.

Standard module

Color: cyan (blue)

The module can be used in all LOGO! versions. The programs stored can be interchanged in accordance with the rules described above in the Upward compatibility section.

Program module with remanence

Color: yellow

This module can only be used in the LOGO! ...L... versions. The programs stored can be interchanged freely between these models.

The module must always be inserted so that remanent data can be stored. In the event of a power failure and on power OFF, LOGO! saves the remanent data to the module inserted.
Functions whose data can be stored as remanent data:

<table>
<thead>
<tr>
<th>Function</th>
<th>Remanent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pulse relay</td>
<td>The switch state is stored</td>
</tr>
<tr>
<td>Latching relay</td>
<td>The switch state is stored</td>
</tr>
<tr>
<td>Up and down counter</td>
<td>The internal counter reading is stored</td>
</tr>
<tr>
<td>Operating hours counter</td>
<td>The time elapsed is stored</td>
</tr>
</tbody>
</table>

**Program module with know-how protection and remanence**

[Image of module]

Color: red

This module can only be used in the LOGO! ...L... versions. Once a program has been stored in this module, it can neither be looked at, copied nor changed. I.e. your data is protected.

The module must remain inserted in LOGO! the whole time the system is operating for the program stored in this way to run.

---

**Warning**

Make sure that you do not save your program to a module with program protection if you want to edit the program further.

The program of a module with know-how protection can only be started, but not read for the purpose of editing.

---

In the event of a power failure and on power OFF, LOGO! saves the remanent data to the module inserted.
4.2 Removing and inserting the program module/card

Whenever you remove a program module, always observe the following points:

<table>
<thead>
<tr>
<th>Module</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard</td>
<td>You can change the program module/card when the power is on and LOGO! is in RUN or the programming mode.</td>
</tr>
<tr>
<td>Remanence</td>
<td>The module must be inserted so that the remanent data can be saved in the event of a power failure. The module is not required for the program to be able to run.</td>
</tr>
<tr>
<td>Know-how protection and remanence</td>
<td>The program stored on the module can only run if the module is inserted and remains inserted for the entire run time of the program. If the module is removed, LOGO! reports ‘no program’.</td>
</tr>
</tbody>
</table>

In any case, however, please heed the following warning:

⚠️ **Warning**

Only use LOGO! 230 with the cover or the program module/card inserted.

Do not put your finger or an object made of metal or any other conductive material in the open shaft of the program module/card.

The socket for the program module/card may be live if mistakes have been made with the wiring (L1 and N mixed up).

The program module/card should only be changed by a trained technician.
Removing the module

Remove the program module/card as follows:

Carefully insert a screwdriver into the slot at the upper end of the program module/card, and ease the program module/card out of the shaft a little. You can now remove the program module/card.

Inserting the program module/card

The shaft for the program module/card is chamfered at the bottom on the right. The program module/card also has a chamfered edge. This prevents you from inserting the program module/card the wrong way around. Insert the program module/card into the shaft until it engages.
4.3 Copying a program from LOGO! to the program module/card

To copy a program to the program module/card, proceed as follows:
1. Insert the program module/card
2. Switch LOGO! to programming mode: ▶, ◀ and OK simultaneously

3. Move the '>' to ”PC/Card”:

4. Press OK. The transfer menu appears

5. Move the '>' to 'LOGO → Card': ▼

6. Press OK.
LOGO!’s program modules

LOGO! copies the program to the program module/card. While it is doing this, a ’#’ flashes on the display:

<table>
<thead>
<tr>
<th>PC&lt;-&gt;LOGO</th>
<th>Card&lt;-&gt;LOGO</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt;LOGO→Card</td>
<td>#</td>
</tr>
<tr>
<td>Card→LOGO</td>
<td></td>
</tr>
</tbody>
</table>

Flashes

When LOGO! has finished copying, it returns to the main menu:

<table>
<thead>
<tr>
<th>Program..</th>
<th>Start</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt;PC/Card..</td>
<td></td>
</tr>
</tbody>
</table>

The program is now also on the program module/card. You can remove the program module/card. **Do not forget** to replace the cover.

If there is a power failure while LOGO! is copying, you have to copy the program again once the power has been restored.
4.4 Copying a program from the program module/card to LOGO!

You have a program module/card containing your program. There are 2 ways to copy the program to LOGO!:
- Automatically when LOGO! starts up (power on)
- Via LOGO!’s PC/Card menu

Note

Please note that not all modules can be read in all LOGO! versions. If necessary, read chapter 4.1 once again.

Automatic copying at LOGO! startup

Proceed as follows:
1. Switch LOGO! into programming mode.
2. Switch the power off.
3. Remove the cover from the shaft.
4. Insert the program module/card in the shaft.
5. Switch the power on again.

Result: LOGO! copies the program from the program module/card to LOGO!. While LOGO! is copying, a ’#’ flashes on the display. As soon as LOGO! has finished copying, LOGO! displays the main menu:

>Program.. 
  PC/Card..
  Start
Now you can switch LOGO! to RUN:

**Note**

Before you switch LOGO! to RUN, you must ensure that the system you are controlling with LOGO! does not represent a source of danger.

1. Move the ‘>’ to Start: 2 × ▼
2. Press OK

**Using the PC/Card menu to copy**

Read the note about changing the program module/card.

To copy a program from the program module/card to LOGO!, proceed as follows:

1. Insert the program module/card
2. Switch LOGO! to programming mode: ◀, ▶ and OK simultaneously

   >Program..
   PC/Card..
   Start

3. Move the ‘>’ to ”PC/Card”: ▼
4. Press OK. The transfer menu appears:

   PC⇔LOGO
   LOGO→Card
   >Card→LOGO

5. Move the ‘>’ to ‘Card → LOGO’: ▲ or ▼
6. Press OK.

LOGO! copies the program from the program module/card to LOGO!.
When LOGO! has finished copying, it returns to the main menu:
5 Parameterizing LOGO!

By parameterization we mean setting the parameters of blocks. You can set delay times for time functions, switching times for clocks (time switches), the threshold value of a counter, the monitoring interval of an operating hours counter and the switch-on and switch-off thresholds of the threshold switch.

You can set the parameters:

- In programming mode
- In parameterization mode

In parameterization mode, the programmer sets a value for a parameter. We introduced parameterization mode so that parameters can be changed without having to change the program. In this way, a caretaker can change times, for example, without having to change into programming mode. The advantage of this is that the program (and thus the circuit) is protected but can still be modified by the user of the circuit to suit requirements.

---

Note

LOGO! continues to execute the program in parameterization mode.
5.1 Switching to parameterization mode

To switch to parameterization mode, press ESC and OK simultaneously:

```
I:123456
Mo 09:00
Q:1234 RUN
```

LOGO! switches to parameterization mode and displays the parameterization menu:

```
>Set Clock
Set Param
```

The ’Set Clock’ menu item is executed only if your version of LOGO! has a clock/time switch (those versions of LOGO! that have a clock have the letter C in their name, e.g. LOGO 230 RC). ’Set Clock’ allows you to set LOGO!’s clock.
5.1.1 Parameters

Parameters can be:

- The delay times of a time relay
- The switching times (cams) of a clock
- The threshold value of a counter
- The monitoring time of an operating hours counter
- The switching thresholds of a threshold switch

Every parameter is identified by the block number and the parameter abbreviation. Examples:

```
B01:T
```

Block number  Parameter abbreviation

B01:T       A delay time can be set at block B01
B02:No1     Block B02 is a clock block. No1 is the first cam of this clock
B03:Par     Block B03 is a counter. Par is the threshold value of the counter
B04:Par     Block B04 is a counter in LOGO!... L... Par stands for a number of parameters that can be monitored.
B05:Par     Block B05 is an operating hours counter. Par stands for a number of parameters that can be monitored.
B06:Par     Block B06 is threshold switch. Par stands for a number of parameters that can be monitored.
5.1.2 Selecting a parameter

To select a parameter, proceed as follows:

1. Select the ‘Set Param’ option from the parameterization menu

   Set Clock
   >Set Param

2. Press OK

   LOGO! displays the first parameter:

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value set for the parameter</th>
<th>Current time in LOGO!</th>
</tr>
</thead>
<tbody>
<tr>
<td>B01:T</td>
<td>T = 12:00m</td>
<td>Ta = 00:00m</td>
</tr>
</tbody>
</table>

   If no parameter can be set, LOGO! displays the following:

<table>
<thead>
<tr>
<th>No Param</th>
<th>Press ESC</th>
</tr>
</thead>
<tbody>
<tr>
<td>No parameter can be changed: ESC returns you to the parametrization menu</td>
<td></td>
</tr>
</tbody>
</table>

3. Select the desired parameter: ▲ or ▼

   LOGO! displays a parameter in a separate window.

4. To change a parameter, select it and press the OK key.
5.1.3 Changing a parameter

To change a parameter, you first have to select it (see "Selecting a parameter").

You change the value of the parameter in the same way as you entered it in programming mode:

1. Move the cursor to the point at which you want to make the change: 
   \[ \text{Move: } \downarrow \text{ or } \uparrow \]
2. Change the value: 
   \[ \text{Change the value: } \uparrow \text{ or } \downarrow \]
3. Accept the value: 
   \[ \text{OK} \]

You cannot change the unit of the delay time for the parameter T in parameterization mode. This is only possible in programming mode.

Current value of a time T

If you view a time T in parameterization mode, it looks like this:

\[
\begin{align*}
\text{B01:T} \\
\text{T} &= \text{01:00m} \\
\text{T_a} &= \text{00:00m}
\end{align*}
\]

You can change the set time T (see "Changing a parameter").
Current value of the clock

If you view a cam of a clock in parameterization mode, it looks like this, for example:

<table>
<thead>
<tr>
<th>B02:No1</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Day = Su</td>
<td></td>
</tr>
<tr>
<td>On = 09:00</td>
<td></td>
</tr>
<tr>
<td>Off = 10:00</td>
<td></td>
</tr>
</tbody>
</table>

The switching state of the clock is displayed:
- 0 The clock is off (state ’0’ at the output)
- 1 The clock is on (state ’1’ at the output)

LOGO! displays the switching state of the clock rather than the switching state of a cam. The switching state of the clock depends on all three cams (No1, No2 and No3).

Current value of a counter (Par)

If you view the parameter of a counter in parameterization mode, it looks like this:

<table>
<thead>
<tr>
<th>B03:Par</th>
</tr>
</thead>
<tbody>
<tr>
<td>Par = 0300</td>
</tr>
<tr>
<td>Cnt = 0028</td>
</tr>
</tbody>
</table>

Switching threshold

Current count value

Current value of a counter in LOGO!...L...

If you view the parameter of a counter in parameterization mode, it looks like this:

<table>
<thead>
<tr>
<th>B04:Par</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lim = 000100</td>
</tr>
<tr>
<td>Cnt = 000011</td>
</tr>
</tbody>
</table>

Switching threshold

Current count value
Current value of an operating hours counter
If you view the parameter of an operating hours counter in parameterization mode, it looks like this:

<table>
<thead>
<tr>
<th>B05:Par</th>
<th>Monitoring time</th>
<th>Remaining time</th>
<th>Operating hours elapsed</th>
</tr>
</thead>
<tbody>
<tr>
<td>MI = 0050h</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MN = 0017h</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>OT = 00083h</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Current value of a threshold switch
If you view the parameter of a threshold switch in parameterization mode, it looks like this:

<table>
<thead>
<tr>
<th>B06:Par</th>
<th>Switch-on threshold</th>
<th>Switch-off threshold</th>
<th>Measured value</th>
</tr>
</thead>
<tbody>
<tr>
<td>SW↑ = 0050</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SW↓ = 0048</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>fa = 0012</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

5.2 Setting the time (LOGO! ... C)
You can set the time:
- In parameterization mode
- In programming mode

Setting the time in parameterization mode:
1. Switch to parameterization mode:
   - ESC and OK simultaneously
2. Select 'Set Clock', and press OK
3. Select the day of the week: ▲ or ▼
4. Move the cursor to the next position: ◀ or ▶
5. Change the value at this position: ▲ or ▼
6. Set the clock to the correct time. Repeat steps 4 and 5
7. Conclude your input: OK

**Setting the time in programming mode:**

1. Switch to programming mode:
   ◀, ▶ and OK
2. Select ‘Program..’, and press OK
3. Select (using ▼ or ▲) ‘Set Clock’, and press OK

Now you can set the day of the week and the time, as described above (as of step 3).
Switching between summer and winter time:

LOGO!...L... must be in RUN if you want to switch over the time.

1. If necessary, exit programming or parameterization mode and switch your LOGO!...L... to RUN.

2. Press **OK** and ▲

   The current time is put forward by one hour.

3. Press **OK** and ▼.

   The current time is put back by one hour.
LOGO!Soft V 2.0 is a programming package for use on PCs. The software contains the following functions:

- Offline program generation of your application
- Simulation of your circuit (or your program) on the computer
- Generation and printing of a block diagram of the circuit
- Saving of the program to hard disk or another storage medium
- Program transfer
  - from LOGO! to the PC
  - from the PC to LOGO!

The alternative

LOGO!Soft therefore offers you an alternative to conventional planning:

1. i.e., you develop your applications first at your desk.
2. i.e., you simulate the application in your computer and test whether or not it functions properly before the circuit is actually put to use.
3. i.e., you print out the entire circuit in a block diagram or in a number of block diagrams sorted according to outputs.
4. i.e., you archive your circuits in your PC file system. In this way, you can retrieve a circuit directly if you want to make changes some time in the future.
5. i.e., you transfer the program to LOGO! by pressing just a few buttons. Your LOGO! is ”retooled” within a very short space of time.
6.1 Possible applications for LOGO!Soft

You can run LOGO!Soft both in conjunction with LOGO! (online) and as a standalone solution (offline).

The following requirements must be fulfilled:

<table>
<thead>
<tr>
<th>LOGO!Soft without connection to LOGO! (offline)</th>
<th>LOGO!Soft with connection to LOGO! (online)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compatible PC with Windows Version 3.1 or higher, Windows 95 or Windows NT</td>
<td>LOGO! Soft Version 2.0 or higher</td>
</tr>
<tr>
<td>· LOGO!Soft Version 2.0 or higher</td>
<td>· LOGO!Soft Version 2.0 or higher</td>
</tr>
<tr>
<td>· Free space on the hard disk for full installation: 7 Mbytes</td>
<td>· Free space on the hard disk for full installation: 7 Mbytes</td>
</tr>
<tr>
<td></td>
<td>· LOGO! ....</td>
</tr>
<tr>
<td></td>
<td>· PC cable for connecting the PC to LOGO!.... .</td>
</tr>
</tbody>
</table>

Installating and using

Before installing LOGO!Soft, read the file Readme.txt on the Installation disk.

To install the software, simply follow the instructions given by the Installation program. This is how you start the Installation program:

1. Select the application SETUP.EXE and start it:
   – in Windows 3.1, e.g. via the File Manager
   – in Windows 95 and Windows NT 4.0 via Start Run and entering A:\Setup in the command line

2. Following the instructions given by the Installation program.

The best way to find out how to use the software is by working with it on your computer. If you get stuck, simply call up the online Help of the software.

The remaining steps

In the next step, we will show you how to connect LOGO! to a PC. Skip this step if at present you only have the software available.

The second step of the chapter describes in note form the special menu items that are not available in Windows software.
6.2 Connecting LOGO! to a PC

Connecting a PC cable

To connect LOGO! to a PC, you need the LOGO! PC cable. Remove the cover or the program module/card, and connect the cable there.

Switch LOGO! to PC↔LOGO mode

So that the PC can access LOGO!, LOGO! must be in PC ↔ LOGO mode. To switch LOGO! to PC ↔ LOGO mode:

1. Switch LOGO! to programming mode: ▼, ▲ and OK simultaneously
2. Select ’PC/Card’:
   ▼ or ▲
3. Press OK
4. Select PC ↔ LOGO:
   ▼ or ▲
5. Press OK

LOGO! is now in PC ↔ LOGO mode, and the following appears on the display:

PC ↔ LOGO
STOP:
Press ESC

The PC can now access LOGO!. The best way to find out how this is done is to go directly into the online Help of LOGO!Soft.

To break the link to the PC, you press ESC.

Switching LOGO! to PC↔LOGO mode at startup

1. Switch the power off
2. Remove the cover or the program module/card, and connect the cable there.
3. Switch the power on

LOGO! goes into PC ↔ LOGO mode automatically
6.3 Using LOGO!Soft with LOGO!

You use LOGO!Soft with LOGO! by means of the menu entries in the LOGO! menu item. This menu item offers you the following entries:

- **Select LOGO!**: you use this entry to set LOGO!Soft to your particular version of LOGO!. This is necessary to ensure that all functions of LOGO! are supported.

- **PC→LOGO!**: you use this entry to transfer a program you have generated in LOGO!Soft to LOGO!.

- **LOGO!→PC!**: you use this entry to transfer a program you have generated in LOGO! to LOGO!Soft.

- **Set up link**: you use this entry to define the serial interface of the PC via which data is be exchanged with LOGO!.
7 Applications

To give you a feeling for the kind of situations in which you can use LOGO!, we have compiled a number of application examples. We have included the circuit diagram of the original solution for each example. For the solutions using LOGO!, we have included the wiring and a diagram.

Solutions for the following tasks are included:

- Stairway, hall or corridor lighting ............................................. 105
- An automatic door ................................................................. 110
- A ventilation system ............................................................. 117
- An industrial gate ................................................................. 121
- Centralized activation and surveillance/monitoring of several industrial gates ......................................................... 125
- Fluorescent lamps ................................................................. 129
- A rainwater pump ................................................................. 133
- Centralized activation and monitoring of pumps ....................... 137
- Dereeler ............................................................................ 141
- Other possibilities ................................................................. 144

Note

The LOGO! applications are available to our customers free of charge. The examples they contain are not binding and are included to provide general information on how LOGO! can be used. Customer-specific solutions may be different.

The user is responsible for ensuring that the system is run properly. We refer you to the relevant national standards and system-related installation requirements.

Errors are excepted the right to make changes reserved.

These applications – and tips for further applications – can be found in the Internet under the address http://www.AUT.Siemens.DE. Search for LOGO!..
7.1 Stairway, hall or corridor lighting

7.1.1 Demands on stairway lighting

The lighting system of a stairway should fulfill the following requirements:
- The light should be on when someone is on the stairway.
- If there is nobody on the stairway, the light should be off to save energy.

7.1.2 Previous solution

Previously there were 2 ways of switching the lighting:
- By means of an impulse relay
- By means of automatic stairway lighting

The wiring for these two lighting systems is the same.

Components used
- Switches
- Automatic lighting device or pulse relay

Lighting system with a pulse relay

When a pulse relay is used, the lighting system behaves as follows:
- When any switch is pressed: The lighting is switched on
- When any switch is pressed again: The lighting is switched off.

Disadvantage: People often forget to switch the light off again.
Lighting system with an automatic lighting device

When an automatic device is used, the lighting system behaves as follows:

- When any switch is pressed: The lighting is switched on.
- After a preset time has elapsed, the lighting is switched off automatically.

**Disadvantage:** The lighting cannot be switched on for an extended period of time (e.g. for cleaning purposes). The switch for permanent lighting is usually on the automatic device, which is either impossible or difficult to access.

### 7.1.3 Lighting system with LOGO!

If you use LOGO!, you can replace the automatic lighting device or the pulse relay. You can implement both functions (time-dependent switching-off and pulse relay) using a single device. You can also include additional functions without changing the wiring. Here are some examples:

- Impulse relay with LOGO!
- Automatic stairway lighting system with LOGO!
- LOGO! as a multi-function switching system with the following functions:
  - Light on: Press switch
    (Light switches off after the set time elapses)
  - Permanent light on: Press switch twice
  - Light off: Press switch for 2 seconds
Wiring of the lighting system with LOGO! 230RC

The external wiring of the lighting system with LOGO! is the same as for a conventional hall, corridor or stairway lighting system. The difference is that the automatic lighting device or the pulse relay is replaced. Additional functions are entered directly in LOGO!.

**Pulse relay with LOGO!**

In the event of a gate pulse at input I1, output Q1 switches over.

**Automatic stairway lighting system with LOGO!**

In the event of a gate pulse at input I1, output Q1 switches on and remains on for 6 minutes.
Multi-functional switch with LOGO!

The diagram shows the circuit for an input with an associated output.

This switch offers the following:

- **When the switch is pressed**: The light is switched on and goes off again after the set time of 6 minutes (T=06:00m) has elapsed (off-delay)

- **When the switch is pressed twice**: The light is switched on permanently (the latching relay is set via the impulse relay).

- **When the switch is pressed for 2 seconds**: The light is switched off (on-delay switches the light off; both the permanent light and the normal light; this branch of the circuit is therefore used twice)

You can enter these circuits several times for the remaining inputs and outputs. Instead of using 4 automatic stairway lighting systems or 4 impulse relays, you thus use only a single LOGO! module. However, you can also use the free inputs and outputs for completely different functions.
7.1.4 Special features and enhancement options

Features such as the following are available for adding functions or saving energy:

- You can have the light flash before it goes off automatically.
- You can integrate various central functions:
  - Central off
  - Central on (panic button)
  - Control of all lights or individual circuits by a daylight control switch
  - Control by the integrated time switch (clock)
    (e.g. permanent light only until 24.00 hours; no enabling at certain times)
  - Automatic switching off of permanent light after a preset time has elapsed (e.g. 3 hours)
7.2 Automatic door

You often find automatic door control systems at the entrances to supermarkets, public buildings, banks, hospitals, etc.

7.2.1 Demands on an automatic door

- When somebody approaches, the door must open automatically.
- The door must remain open until there is nobody in the doorway any more.
- If there is nobody in the doorway anymore, it must close automatically after a short time.

The door is generally driven by a motor with a safety clutch. This prevents people from being caught or injured in the door. The control system is connected to the mains via a main switch.
7.2.2 Previous solution

As soon as one of the motion detectors B1 or B2 registers somebody’s presence, the door is opened by K3.

If the two motion detectors detect nothing for a minimum period, K4 enables the close operation.

7.2.3 Door control system with LOGO!

LOGO! allows you to considerably simplify the circuit. You need only connect the motion detectors, the limit switches and the master contactors to LOGO!.
Wiring of the door control system with LOGO! 230RC

Components used

- K1  Master contactor Open
- K2  Master contactor Close
- S1 (NC contact) Limit switch Closed
- S2 (NC contact) Limit switch Open
- B1 (NO contact) Infrared motion detector Outside
- B2 (NO contact) Infrared motion detector Inside
Diagram of the door control system with LOGO!

This is what the functional block diagram that corresponds to the circuit diagram of the conventional solution looks like.

You can simplify this circuit if you make use of LOGO!'s functions. You can use the off-delay to replace the latching relay and on-delay. The following function block diagram illustrates this simplification:
7.2.4 Special features and enhancement options

The functionality and user friendliness can be improved in the following ways, for example:

- You can connect an additional control switch: Open – Automatic – Closed (O-A-C)
- You can connect a buzzer to one of LOGO!’s outputs to indicate when the door is about to close.
- You can include time- and direction-dependent enabling of door opening (so that it only opens during shop opening hours and only from the inside to the outside after closing time, for example).

7.2.5 Enhanced LOGO! 230 RC solution

Wiring of the enhanced LOGO! solution
Applications

Functional block diagram of the enhanced LOGO! solution

**No1:**
Day: Mo..Fr
On = 09:00
Off = 18:00

**No2:**
Day: Sa
On = 08:00
Off = 13:00

**No1:**
Day: Mo..Fr
On = 09:00
Off = 19:00

**No2:**
Day: Sa
On = 08:00
Off = 14:00

**Detecting motion**

During business hours, motion detector B1 opens the door as soon as somebody wants to enter the shop from outside. Motion detector B2 opens the door if somebody wants to leave the shop.

**Motor for opening**

**Motor for closing**
After closing time, motion detector B2 continues to open the door for 1 hour so that customers can leave the shop.

**Motor for opening**
Output Q1 is switched on and opens the door when
- the control switch at I5 is operated (the door is to be constantly open), or
- the motion detectors indicate that somebody is approaching the door, and
- the door is not yet completely open (limit switch at I4).

**Motor for closing**
Output Q2 is switched on and closes the door when
- the control switch at I6 is operated (the door is to be constantly closed),
  or
- the motion detectors indicate that there is nobody near the door, and
- the door is not yet fully closed (limit switch at I3).

**Buzzer**
You connect the buzzer to output Q3. The buzzer sounds for a short time (in this case 1 second) when the door is closed. In the block diagram, you enter the following circuit at Q3:
7.3 Ventilation system

7.3.1 Demands on a ventilation system

A ventilation system is used either to feed fresh air into a room or to remove used air from it. Consider the following example:

- The room contains an exhaust ventilator and a fresh air ventilator.
- Both ventilators are controlled by a control monitor.
- At no time must excess pressure develop in the room.
- The fresh air ventilator cannot be switched on unless the flow monitor indicates that the exhaust ventilator is functioning properly.
- A warning light comes on in the event of a ventilator failing.

The circuit diagram for the previous solution is as follows:
Applications

The ventilators are controlled by flow monitors. If no air flow is detected after a short waiting time has elapsed, the system is switched off and a fault is reported. You acknowledge this by pressing the stop switch.

In addition to the flow monitors, the ventilation monitoring system requires an evaluation circuit with a number of switching devices. The evaluation circuit can be replaced by a single LOGO! module.

Wiring of the ventilation system with LOGO! 230RC

Components used

- **K1** Master contactor
- **K2** Master contactor
- **S0** (NC contact) Stop switch
- **S1** (NO contact) Start switch
- **S2** (NO contact) Flow monitor
- **S3** (NO contact) Flow monitor
- **H1** Warning light
- **H2** Warning light
Block diagram of the LOGO! solution
The block diagram of the ventilation control system with LOGO! is as follows:

7.3.2 Advantages of using LOGO!
When you use LOGO!, you do not need as many switching devices. Thus, you save on installation time and space in the switch box. You may even be able to use a smaller switch box.

Additional options when using LOGO!
- The free output (Q4) can be used as a potential-free signalling contact in the event of a fault or a power failure.
- It is possible to stagger the switching-off of the ventilators.
These functions can be implemented without additional switching devices.
Functional diagram of the enhanced LOGO! solution

The ventilators at Q1 and Q2 are switched off as shown in the following circuit:

You can also generate a message via output Q4:

The contacts of output Q4 are always closed when the system is running. Relay Q4 does not release unless there is a power failure or a fault in the system. This contact can be used for teleindication, for example.
There is often a gate at the entrance to a company’s premises. This is only opened to let vehicles in and out.

The gate is controlled by the gateman.

### 7.4.1 Demands on the door control system

- The gate is opened, closed and monitored by the gateman, who operates it by means of a switch in the gatehouse.
- The gate is normally completely open or completely closed, but its movement can be interrupted at any time.
- A warning light starts flashing on and off 5 seconds before the gate begins to move and continues for as long as the gate is still moving.
- A safety pressure bar ensures that nobody gets injured and nothing gets caught or damaged when the gate closes.
7.4.2 Previous solution

Various kinds of control system are used to drive automatic gates. The circuit diagram shows one possible gate control circuit.

Wiring of the gate control system with LOGO! 230RC
Components used

- K1  Master contactor
- K2  Master contactor
- S0 (NC contact) Stop switch
- S1 (NO contact) Open switch
- S2 (NO contact) Close switch
- S3 (NC contact) Open position switch
- S4 (NC contact) Closed position switch
- S5 (NC contact) Safety pressure bar

Functional diagram of the LOGO! solution

The open and close start switches start the movement of the gate, provided the gate is not currently moving in the opposite direction. The gate stops moving when the stop switch is pressed or when it reaches a limit switch. The gate is also prevented from closing by the safety bar.
7.4.3 Enhanced LOGO! solution

In our enhanced solution, the gate will automatically open again when the safety bar operates.
7.5 Centralized activation and surveillance/monitoring of several industrial gates

There are often a number of different entrances to a company’s premises. Not all gates can always be surveilled and monitored directly by a member of staff. They must therefore be able to surveilled, monitored and operated by a gateman who sits in the a central control room.

In addition, it is obvious that each gate must also be able to be opened and closed immediately at the gate by personnel.

A LOGO!230RLB11 is used for each gate. The modules are linked to each other and an ASi master by means of the ASi bus.

In this chapter, we will describe the gate control system used for a gate. All the other gate control systems are identical.
7.5.1 Demands on the gate control system

- Each gate is opened and closed by means of a pull-cord switch. The gate is always opened and closed completely.
- In addition, each gate can be opened and closed by means of switches at the gate.
- The ASi bus connection enables the gateman to open and close the gate from the gatehouse. The state GATE OPEN or GATE CLOSED is indicated in the gatehouse.
- A flashing warning light starts flashing on and off 5 seconds before the gate begins to move and continues for as long as the gate is still moving.
- A safety pressure bar ensures that nobody gets injured and nothing gets caught or damaged when the gate closes.

Wiring of the gate control system with LOGO! 230RLB11
Components used

- K1  Master contactor, opening
- K2  Master contactor, closing
- S0 \((NO \ contact)\)  OPEN pull-cord switch
- S1 \((NO \ contact)\)  CLOSE pull-cord switch
- S2 \((NO \ contact)\)  OPEN switch
- S3 \((NO \ contact)\)  CLOSE switch
- S4 \((NC \ contact)\)  OPEN GATE position switch
- S5 \((NC \ contact)\)  CLOSE GATE position switch
- S6 \((NC \ contact)\)  Safety pressure bar

Higher-level control system

- Qa1  GATE OPEN position switch
- Qa2  GATE CLOSED position switch
- Ia1  External OPEN GATE switch
- Ia2  External CLOSE GATE switch
Applications

Functional diagram of the LOGO! solution

The OPEN GATE and CLOSE GATE start switches start movement of the gate provided the gate is not currently moving in the opposite direction. The gate stops moving when it reaches a limit switch. The gate is also prevented from closing by the safety bar.
7.6 Fluorescent lamps

When lighting systems are planned in companies, the type and number of lamps used depends on the level of lighting required. For reasons of cost efficiency, fluorescent lamps arranged in rows of tubes are often used. They are subdivided into switching groups according to how the room is used.

7.6.1 Demands on the lighting system

- The lamps are switched on and off locally.
- If there is sufficient natural light, the lamps on the window side of the room are automatically switched off by means of a brightness-sensitive switch.
- The lights are switched off automatically at 8 o’clock in the evening.
- It must be possible at all times to switch the lights on and off locally.
The lights are operated by means of a pulse relay controlled by the switches at the door. Independently of this, they are reset by the time switch (clock) or by the brightness-sensitive switch via the central off input. The switching-off commands must be cut by impulse relays so that it is still possible to switch the lights on and off locally after they have been switched off centrally.

Components required:

- Switches S1 to S4
- Daylight control switch B1
- Time switch (clock) E1
- Impulse relays K1 and K2
- Remote-control switches with central off K3 to K6

**Disadvantages of the previous solution**

- To implement the required functions, a large amount of circuitry is required.
- The large number of mechanical components means that considerable wear and high maintenance costs can be expected.
- Functional changes are costly to implement.
7.6.3 Fluorescent lamp control with LOGO! 230RC

Components used
- S1 to S4 (NO contact) Switches
- B1 (NO contact) Daylight control switch
Advantages of the LOGO! solution

- You can connect the lamps to LOGO! directly provided the switching capacity of the outputs is not exceeded. In the case of greater capacities, you should use a power contactor.
- You connect the brightness-sensitive switch to one of LOGO!’s inputs directly.
- You do not need a time switch; this function is integrated in LOGO!.
- The fact that fewer switching devices are required means you can install a smaller sub-distribution unit and thus save space.
- Fewer devices are required.
- The lighting system can be easily modified.
- Additional switching times can be set as required (staggered switch-off pulses at the end of the day).
- The effect of the brightness-sensitive switch can easily be applied to all lamps or a changed group of lamps.
7.7 Rainwater pump

Rainwater is being used increasingly in homes in addition to drinking water. This saves money and is environment-friendly. You can use rainwater, for example, for:

- Washing clothes
- Watering the garden
- Watering house plants
- Washing the car
- Flushing the toilet

The following drawing illustrates how a system for using rainwater works:

The rainwater is caught in a collecting tank, from which it is pumped into a pipe system. The rainwater can then be taken from this in the same way that drinking water can. If the tank should ever run dry, it can be supplied with drinking water.
### 7.7.1 Demands on the control system for a rainwater pump

- The water must be available at all times. Whenever necessary, the controller must switch automatically to drinking water.
- When the switch to drinking water takes place, no rainwater must get into the drinking water system.
- If there is not enough water in the rainwater tank, the pump cannot be switched on (run-dry protection).

### 7.7.2 Previous solution

The pump and a solenoid valve are controlled by a pressure switch and 3 float switches in the rainwater tank. The pump must be switched on when the pressure goes below the minimum permitted. Once the operating pressure is reached, the pump is switched off again after an after-run time of a few seconds. The after-run time prevents the water pump from constantly being switched on and off if the water is drawn for any length of time.
Apart from LOGO!, you need only the pressure switch and the float switches to control the pump. If you are using a three-phase motor, you need a master contactor. If the system has a single-phase motor, you need a contactor if the motor requires more current than output relay Q1 can switch. The consumption of a solenoid valve is so low that you can normally control it directly.

- **K1** Master contactor
- **Y1** Solenoid valve
- **S1 (NO contact)** Pressure switch
- **S2 (NO contact)** Float switch
- **S3 (NC contact)** Float switch
- **S4 (NC contact)** Float switch
7.7.4 Special features and enhancement options

In the functional diagram you can see how to wire the control system for the pump and the solenoid valve. Its structure corresponds to that of the circuit diagram. However, you can also integrate additional functions for specific applications that, with conventional technology, would require additional equipment:

- Enabling of the pump at specific times
- Indication of an imminent or existing water shortage
- Indication of malfunctioning
7.8 Centralized activation and monitoring of pumps

Areas in buildings that are endangered by being flooded by groundwater must be monitored constantly. In most cases, it is enough just to pump away the groundwater as of a certain level.

Each area endangered is equipped with 2 pumps which are controlled by a LOGO! 230RLB11. LOGO! receives all the information is requires from various sensors.

All logic modules are linked with each other and an ASi master by means of the ASi bus. All the areas are monitored in a central control room. Each individual pump can be operated separately via the ASi bus by means of switches.

The following operating sequence must be programmed in each LOGO!:
When the maximum permitted water level is reached, pump 1 is switched on. If pump 1 fails, pump 2 is switched on automatically.
If both pumps fail, this "emergency" state is signaled by a horn.
The program and the wiring of a LOGO! 230RLB11 can be found on the following pages.
You coordinate the individual slave assemblies (LOGO! 230RLB11) in your ASi master assembly.
Applications

Note

This manual does not contain a description of how you can configure your ASi master and write the interconnecting framework program.

This information is contained in the description of your ASi master assembly.

Area monitoring (principle)

7.8.1 Demands on the control system of a tank pump system

- When water level S2 is reached, pump 1 is switched on and continues pumping until the defined switch-off point S1 is reached.
- If pump 1 fails due to a fault while pumping, pump 2 is switched on automatically. The fault is signaled by an indicator light.
- If pump 2 also fails, total failure of the two pumps is signaled by a horn. The fault is also signaled by an indicator light.
7.8.2 Pump control with LOGO! 230RLB11

In addition to LOGO!, you also require the following components to control the pumps:

- **K1, K2** one master contactor for switching each of the two three-phase motors of pumps 1 and 2
- **H1, H2** one fault indicator light for each pump (pumps 1 and 2)
- **H3** horn for signaling failure of both pumps
- **S0 (NO contact)** level sensor for switching on the pump
- **S1 (NO contact)** level sensor for switching off the pump
- **S2, S3 (NO contact)** one sensor for each pump for signaling that pump 1 or pump 2 is operating
- **S4, S5 (NC contact)** one sensor for each pump for monitoring pump 1 or pump 2 and signaling a fault
- **S6, S7 (NO contact)** switches for operating the pumps manually
A single LOGO! assembly only enables you to perform a limited range of control tasks. If, however, you connect a number of LOGO!..LB11 in an ASi system by means of the AS interface, you have an extensive range of control options open to you.
7.9 Dereeler

A metal strip (coil) is fed to a punching device over a dereeler.

7.9.1 Demands on a dereeler

The following demands are placed on a dereeler:
- The metal strip must not sag.
- The metal fed to the punching device must not exceed a defined maximum tension.
- If the metal strip becomes too taut, the punching device must be switched off.

![Diagram of dereeler and punching device](image)

Switch S3 - Strip too taut, Punching device off
Switch S4 - Strip taut, Dereeler on
Switch S5 - Strip loose, Dereeler off

7.9.2 Previous solution

The key-operated switch S1 is the operating mode switch (manual/automatic) for the dereeler. You can use switch S2 to control the motor of the dereeler manually. Switches S4 and S5 monitor the tension of the strip and switch the motor of the dereeler on and off. Switch S3 switches the punching device off when the strip is too taut.
7.9.3 Dereeler with LOGO! 24R

If you use LOGO!, you can make the circuit much simpler. You only have to connect the switches, the indicator light and the main contactor to LOGO!.

Wiring the dereeler with LOGO! 24R

Components used

- **S1** Operating mode switch: manual/automatic
- **S2 (NO contact)** Switch for manual dereeler control
- **S3 (NC contact)** Switch for switching the punching device off
- **S4 (NO contact)** Strip taut switch
- **S5 (NO contact)** Strip loose switch
- **K1** Motor contactor
- **H1** Indicator light for automatic mode
Functional diagram of the LOGO! solution

The block diagram for controlling the dereeler with LOGO! is as follows:

7.9.4 Advantages of the LOGO! solution

If you use LOGO!, you need fewer switching devices less wiring is involved. You also save on assembly time and space in the switch box. You may even be able to use a smaller switch box.
7.10 Additional application options

It is worth using LOGO! particularly when you:

- Can replace a number of auxiliary switching devices with the integrated functions of LOGO!.
- Want to save yourself wiring and installation work (because the wiring is done in LOGO!).
- Want to reduce the space required by the components in the control cabinet/distribution box. You may be able to use a smaller control cabinet/distribution box.
- Can add or change functions subsequently without having to install an additional switching device or change the wiring.
- Have to provide your customers with additional functions for their domestic or building installation. Here are some examples:
  - Home security: You can program LOGO! to switch a lamp on regularly or open and close your shutters while you are on holiday.
  - Heating system: You can program LOGO! to run the circulation pump only when water or heat is really required.
  - Cooling systems: You can program LOGO! to thaw your cooling systems automatically on a regular basis to save energy costs.
  - You can illuminate aquaria and terraria automatically on a time-dependent basis.

You can also:

- Use commercially available switches and buttons, which makes it easy to integrate in the installation.
- Connect LOGO! directly to your domestic installation due to its integrated power supply.

Do you have any suggestions?

There are many more potential applications for LOGO!. If you know of one, why not write to us? We will collect all the suggestions we receive, and we intend to pass on as many as we can. So drop us a line – no matter how unusual or simple your LOGO! circuit is! We will be delighted to receive all your suggestions.

Write to:
Siemens AG
AUT 1MVM – LOGO!
Postfach 48 48
D-90327 Nuremberg
## A Technical data

### A.1 General technical data

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<thead>
<tr>
<th>Criterion</th>
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<th>Values</th>
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#### Ambient climatic conditions

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<td>0 to 55 °C</td>
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<td>Vertical installation</td>
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<td>Storage/transport</td>
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<td>Relative humidity</td>
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<td>Atmospheric pressure</td>
<td>From 795 to 1080 hPa</td>
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<td>Pollutants</td>
<td>IEC 68-2-42</td>
<td>SO₂ 10 cm³/m³, 4 days</td>
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<td>Vibrations</td>
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<td></td>
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<td>57 to 150 Hz (constant acceleration 2 g)</td>
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*IEC 68 includes VDE 0631
## Technical data

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<td>Limit class A for ASi operation</td>
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<td>EMC emitted interference</td>
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<td>Immunity to interference</td>
<td>EN 50082-2</td>
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<td>Burst pulses</td>
<td>IEC 801-4</td>
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<td>single pulse (surge)</td>
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<td>Measurement of clearance and creepage distance</td>
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## A.2 Technical data: LOGO! 230....

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<td>• 115 V AC</td>
<td>Typically 2.5 W</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• 120 V AC</td>
<td>Typically 2.5 W</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• 230 V AC</td>
<td>Typically 3 W</td>
<td></td>
<td>Typically 4.5 W</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• 240 V AC</td>
<td>Typically 3 W</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Clock buffering at 25 °C</strong></td>
<td>Typically 80 h</td>
<td></td>
<td>Typically 80 h</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Accuracy of the real-time clock</strong></td>
<td>Maximum ± 5 s/day</td>
<td></td>
<td>Maximum ± 5 s/day</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(LOGO! 230RC; LOGO! 230RCL; LOGO! 230RCLB11)</td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>
## Technical data

<table>
<thead>
<tr>
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<th></th>
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</thead>
<tbody>
<tr>
<td><strong>Digital inputs</strong></td>
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<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Number</td>
<td>6</td>
<td>12</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electrical isolation</td>
<td>No</td>
<td>No</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>In groups of</td>
<td>4</td>
<td></td>
<td></td>
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<tr>
<td>Input voltage L1 at rated value of 115 V/230 V AC</td>
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<td></td>
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<tr>
<td>• Signal 0</td>
<td>0 V to 40 V AC</td>
<td>0 V to 40 V AC</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>• Signal 1</td>
<td>79 V to 265 V AC</td>
<td>79 V to 265 V AC</td>
<td></td>
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</tr>
<tr>
<td>Input current at Signal 1</td>
<td>Typically 2.5 mA at 230 V AC</td>
<td>Typically 2.5 mA at 230 V AC</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Input current at Signal 0</td>
<td>Typically 0.8 mA at 1.2 mA</td>
<td>Typically 0.8 mA at 1.2 mA</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Delay time at</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• 0 after 1</td>
<td>Typically 50 ms</td>
<td>Typically 50 ms</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• 1 after 0</td>
<td>Typically 50 ms</td>
<td>Typically 50 ms</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Line length (unshielded)</td>
<td>100 m</td>
<td>100 m</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sensors: connection of</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• 2-wire Beros</td>
<td>No</td>
<td>No</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• incandescent lamps</td>
<td>No</td>
<td>Yes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Digital outputs</strong></td>
<td></td>
<td></td>
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<tr>
<td>Number</td>
<td>4</td>
<td>8</td>
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</tr>
<tr>
<td>Output type</td>
<td>Relay outputs</td>
<td>Relay outputs</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electrical isolation</td>
<td>Yes</td>
<td>Yes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>In groups of</td>
<td>1</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Activation of digital input</td>
<td>Yes</td>
<td>Yes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Continuous current $I_{th}$ (per connector)</td>
<td>Maximum 8 A</td>
<td>Maximum 10 A</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Technical data

<table>
<thead>
<tr>
<th>Incandescent lamp load (25,000 switching cycles) at 230/240 V AC</th>
<th>LOGO! 230R LOGO! 230RC</th>
<th>LOGO! 230RL LOGO! 230RCL LOGO! 230RLB11</th>
</tr>
</thead>
<tbody>
<tr>
<td>115/120 V AC</td>
<td>1000 W</td>
<td>1000 W</td>
</tr>
<tr>
<td></td>
<td>500 W</td>
<td>500 W</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Fluorescent tubes with electr. control gear (25,000 switching cycles)</th>
<th>LOGO! 230R LOGO! 230RC</th>
<th>LOGO! 230RL LOGO! 230RCL LOGO! 230RLB11</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 × 58 W (at 230/240 V AC)</td>
<td>10 × 58 W (at 230/240 V AC)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Fluorescent tubes, conventionally compensated (25,000 switching cycles)</th>
<th>LOGO! 230R LOGO! 230RC</th>
<th>LOGO! 230RL LOGO! 230RCL LOGO! 230RLB11</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 × 58 W (at 230/240 V AC)</td>
<td>1 × 58 W (at 230/240 V AC)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Fluorescent tubes, uncompensated (25,000 switching cycles)</th>
<th>LOGO! 230R LOGO! 230RC</th>
<th>LOGO! 230RL LOGO! 230RCL LOGO! 230RLB11</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 × 58 W (at 230/240 V AC)</td>
<td>10 × 58 W (at 230/240 V AC)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Short-circuit proof cos 1</th>
<th>Power protection B16 600A</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Short-circuit proof cos 0.5 to 0.7</th>
<th>Power protection B16 900A</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Parallel switching of outputs to increase power</th>
<th>Not permitted</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Protection of output relay (if desired)</th>
<th>Maximum 16 A, characteristic B16</th>
</tr>
</thead>
</table>

### Switching rate

<table>
<thead>
<tr>
<th>Mechanical</th>
<th>10 Hz</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ohmic load/lamp load</td>
<td>2 Hz</td>
</tr>
<tr>
<td>Inductive load</td>
<td>0.5 Hz</td>
</tr>
</tbody>
</table>

| ASi slave Interfacing (LOGO! 230RLB11 only) |
|---------------------------------------------|------------------|
| ASi profile                                 | 7.F              |
|     • I/O config                            | 7h               |
|     • ID code                               | Fh               |
| Number of virtual digital inputs            | –                |
| Number of virtual digital outputs           | 4                |
### A.3 Technical data: LOGO! 24, LOGO! 24R, LOGO! 24RC

<table>
<thead>
<tr>
<th></th>
<th>LOGO! 24</th>
<th>LOGO! 24R; LOGO! 24RC</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Power supply</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Input voltage: rated value</td>
<td>24 V DC</td>
<td>24 V DC</td>
</tr>
<tr>
<td>Permissible range</td>
<td>20.4 V to 28.8 V DC</td>
<td>20.4 V to 28.8 V DC</td>
</tr>
<tr>
<td>Power consumption from 24 V DC and per output max. 300 mA (4 * 0.3 A)</td>
<td>Typically 30 mA 1.2 A</td>
<td>Typically 62 mA</td>
</tr>
<tr>
<td>Voltage failure bridging</td>
<td></td>
<td>Typically 5 ms</td>
</tr>
<tr>
<td>Power loss at 24 V DC</td>
<td>Typically 0.8 W</td>
<td>Typically 1.5 W</td>
</tr>
<tr>
<td>Clock buffering at 25 °C (LOGO! 24RC)</td>
<td></td>
<td>Typically 80 h</td>
</tr>
<tr>
<td>Accuracy of the real-time clock (LOGO! 24RC)</td>
<td></td>
<td>Maximum ± 5 s/day</td>
</tr>
<tr>
<td><strong>Digital inputs</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>Electrical isolation</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Technical data</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>LOGO! 24</th>
<th>LOGO! 24R; LOGO! 24RC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input voltage L+</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rated value</td>
<td>24 V DC</td>
<td>24 V DC</td>
</tr>
<tr>
<td>• Signal 0</td>
<td>&lt;5.0 V DC</td>
<td>&lt;5.0 V DC</td>
</tr>
<tr>
<td>• Signal 1</td>
<td>&gt;15.0 V DC</td>
<td>&gt;15.0 V DC</td>
</tr>
<tr>
<td>Input current at</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• signal 1</td>
<td>Typically 3 mA</td>
<td>Typically 3 mA</td>
</tr>
<tr>
<td>• signal 0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Delay time at</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• 0 after 1</td>
<td>Typically 50 ms</td>
<td>Typically 50 ms</td>
</tr>
<tr>
<td>• 1 after 0</td>
<td>Typically 50 ms</td>
<td>Typically 50 ms</td>
</tr>
<tr>
<td>Line length (unshielded)</td>
<td>100 m</td>
<td>100 m</td>
</tr>
</tbody>
</table>

**Digital outputs**

<p>| | | |</p>
<table>
<thead>
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<th></th>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Number</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Output type</td>
<td>Transistor, current-sourcing</td>
<td>Relay outputs</td>
</tr>
<tr>
<td>Electrical isolation</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>In groups of</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>Activation of digital input</td>
<td>Yes</td>
<td>/–</td>
</tr>
<tr>
<td>Output voltage</td>
<td>△ Supply voltage</td>
<td></td>
</tr>
<tr>
<td>Output current</td>
<td>Maximum 0.3 A</td>
<td>Maximum 8 A</td>
</tr>
<tr>
<td>Continuous current $I_{th}$</td>
<td></td>
<td>Maximum 8 A</td>
</tr>
<tr>
<td>Incandescent lamp load (25,000 switching cycles)</td>
<td></td>
<td>1000 W</td>
</tr>
<tr>
<td>Fluorescent tubes with electr. control gear (25,000 switching cycles)</td>
<td>–</td>
<td>10 × 58 W</td>
</tr>
<tr>
<td>Fluorescent tubes, conventionally compensated (25,000 switching cycles)</td>
<td>–</td>
<td>1 × 58 W</td>
</tr>
</tbody>
</table>
## Technical data

<table>
<thead>
<tr>
<th>Feature</th>
<th>LOGO! 24</th>
<th>LOGO! 24R; LOGO! 24RC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fluorescent tubes, uncompensated (25,000 switching cycles)</td>
<td>–</td>
<td>10 × 58 W</td>
</tr>
<tr>
<td>Short-circuit proof and overload proof</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Short circuit current limiting</td>
<td>Approx. 1 A</td>
<td></td>
</tr>
<tr>
<td>Derating</td>
<td>None throughout the entire temperature range</td>
<td></td>
</tr>
<tr>
<td>Short-circuit proof cos 1</td>
<td>–</td>
<td>Power protection B16 600A</td>
</tr>
<tr>
<td>Short-circuit proof cos 0.5 to 0.7</td>
<td>–</td>
<td>Power protection B16 900A</td>
</tr>
<tr>
<td>Parallel switching of outputs to increase power</td>
<td>Not permissible</td>
<td>Not permissible</td>
</tr>
<tr>
<td>Protection of output relay (if desired)</td>
<td>–</td>
<td>Maximum 16 A, characteristic B16</td>
</tr>
</tbody>
</table>

### Switching rate

<table>
<thead>
<tr>
<th>Type</th>
<th>LOGO! 24L, LOGO! 24LB11</th>
<th>LOGO! 24RL, LOGO! 24RLB11</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mechanical</td>
<td>–</td>
<td>10 Hz</td>
</tr>
<tr>
<td>Electrical</td>
<td>10 Hz</td>
<td>–</td>
</tr>
<tr>
<td>Ohmic load/lamp load</td>
<td>10 Hz / 10 Hz</td>
<td>2 Hz</td>
</tr>
<tr>
<td>Inductive load</td>
<td>0.5 Hz</td>
<td>0.5 Hz</td>
</tr>
</tbody>
</table>

### A.4 Technical data: LOGO! 24L, LOGO! 24RL, LOGO! 24LB11, LOGO! 24RLB11

<table>
<thead>
<tr>
<th>Power supply</th>
<th>LOGO! 24L, LOGO! 24LB11</th>
<th>LOGO! 24RL, LOGO! 24RLB11</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input voltage: rated value</td>
<td>24 V DC</td>
<td>24 V DC</td>
</tr>
</tbody>
</table>
### Technical data

<table>
<thead>
<tr>
<th></th>
<th>LOGO! 24L, LOGO! 24LB11</th>
<th>LOGO! 24RL, LOGO! 24RLB11</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Permissible range</strong></td>
<td>20.4 V to 28.2 V DC</td>
<td>20.4 V to 28.2 V DC</td>
</tr>
<tr>
<td><strong>Power consumption from 24 V DC at full load of outputs</strong></td>
<td>Typically 2.44 A</td>
<td>Typically 120 mA</td>
</tr>
<tr>
<td><strong>Voltage failure bridging</strong></td>
<td></td>
<td>Typically 5 ms</td>
</tr>
<tr>
<td><strong>Power loss at 24 V DC</strong></td>
<td>Typically 1 W</td>
<td>Typically 2.9 W</td>
</tr>
<tr>
<td><strong>Electrical isolation</strong></td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td><strong>Polarity reversal protection</strong></td>
<td>Yes</td>
<td>Yes</td>
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</tbody>
</table>

#### Digital inputs

<table>
<thead>
<tr>
<th></th>
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<th>12</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Number</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Electrical isolation</strong></td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td><strong>In groups of</strong></td>
<td>12</td>
<td>12</td>
</tr>
<tr>
<td><strong>Input voltage L+</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Rated value</strong></td>
<td>24 V DC</td>
<td>24 V DC</td>
</tr>
<tr>
<td>• Signal 0</td>
<td>&lt;5.0 V DC</td>
<td>&lt;5.0 V DC</td>
</tr>
<tr>
<td>• Signal 1</td>
<td>&gt;12.0 V DC</td>
<td>&gt;12.0 V DC</td>
</tr>
<tr>
<td><strong>Input current at</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• signal 1</td>
<td>Typically 5 mA</td>
<td>Typically 5 mA</td>
</tr>
<tr>
<td>• signal 0</td>
<td>&lt; 1.5 mA</td>
<td>&lt; 1.5 mA</td>
</tr>
<tr>
<td><strong>Delay time at</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• 0 after 1</td>
<td>Typically 50 ms</td>
<td>Typically 50 ms</td>
</tr>
<tr>
<td>• 1 after 0</td>
<td>Typically 50 ms</td>
<td>Typically 50 ms</td>
</tr>
<tr>
<td><strong>Line length (unshielded)</strong></td>
<td>100 m</td>
<td>100 m</td>
</tr>
</tbody>
</table>
### Technical data

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>2-wire Beros</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>incandescent lamps</td>
<td>–</td>
<td>–</td>
</tr>
</tbody>
</table>

#### Digital outputs

<table>
<thead>
<tr>
<th>Number</th>
<th>8</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Output type</td>
<td>Transistor, current-sourcing</td>
<td>Relay outputs</td>
</tr>
<tr>
<td>Electrical isolation</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>In groups of</td>
<td>8</td>
<td>2</td>
</tr>
<tr>
<td>Activation of digital input</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Output voltage</td>
<td>△ Supply voltage</td>
<td></td>
</tr>
<tr>
<td>Output current</td>
<td>Maximum 0.3 A</td>
<td></td>
</tr>
<tr>
<td>Continuous current $I_{th}$ (per connector)</td>
<td></td>
<td>Maximum 10 A</td>
</tr>
<tr>
<td>Incandescent lamp load (25,000 switching cycles)</td>
<td></td>
<td>1000 W</td>
</tr>
<tr>
<td>Fluorescent tubes with electr. control gear (25,000 switching cycles)</td>
<td>–</td>
<td>$10 \times 58W$</td>
</tr>
<tr>
<td>Fluorescent tubes, conventionally compensated (25,000 switching cycles)</td>
<td>–</td>
<td>$1 \times 58W$</td>
</tr>
<tr>
<td>Fluorescent tubes, uncompensated (25,000 switching cycles)</td>
<td>–</td>
<td>$10 \times 58W$</td>
</tr>
<tr>
<td>Short-circuit proof and overload proof</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Short circuit current limiting</td>
<td>Approx. 1 A</td>
<td></td>
</tr>
<tr>
<td>Derating</td>
<td>None throughout the entire temperature range</td>
<td>None throughout the entire temperature range</td>
</tr>
</tbody>
</table>
## Technical data

<table>
<thead>
<tr>
<th>Feature</th>
<th>LOGO! 24L, LOGO! 24LB11</th>
<th>LOGO! 24RL, LOGO! 24RLB11</th>
</tr>
</thead>
<tbody>
<tr>
<td>Short-circuit proof cos 1</td>
<td>–</td>
<td>Power protection B16 600A</td>
</tr>
<tr>
<td>Short-circuit proof cos 0.5 to 0.7</td>
<td>–</td>
<td>Power protection B16 900A</td>
</tr>
<tr>
<td>Parallel switching of outputs to increase power</td>
<td>Not permissible</td>
<td>Not permissible</td>
</tr>
<tr>
<td>Protection of output relay (if desired)</td>
<td>–</td>
<td>Maximum 16 A, characteristic B16</td>
</tr>
</tbody>
</table>

### Switching rate

<table>
<thead>
<tr>
<th>Type</th>
<th>Mechanical</th>
<th>Electrical</th>
<th>Ohmic load/lamp load</th>
<th>Inductive load</th>
<th>ASi slave Interfacing (LOGO! 24RLB11 only)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>–</td>
<td>10 Hz</td>
<td>10 Hz / 10 Hz</td>
<td>0.5 Hz</td>
<td>ASi profile</td>
</tr>
<tr>
<td></td>
<td></td>
<td>–</td>
<td>–</td>
<td>0.5 Hz</td>
<td>7.F</td>
</tr>
<tr>
<td>ASi slave Interfacing</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>7h</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Fh</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>ID code</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>7.F</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>7h</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Fh</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Number of virtual digital inputs</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>4</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Number of virtual digital outputs</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>4</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Input voltage: rated value</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>24 V DC</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Power supply</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>ASi power supply unit</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Power consumption</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Typically 30 mA</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Electrical isolation</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Polarity reversal protection</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Yes</td>
</tr>
</tbody>
</table>
Technical data

Switching capacity and service life of the relay outputs

Ohmic load

![Graph showing switching capacity and service life of ohmic load contacts.](image)

**Figure A** Switching capacity and service life of the contact at ohmic load (heating)

Inductive load

![Graph showing switching capacity and service life of inductive load contacts.](image)

**Figure B** Switching capacity and service life of the contacts at highly inductive load in accordance with IEC 947-5-1 DC13/AC15 (contactors, solenoid coils, motors)
A.5 LOGO! Power 1.3 and LOGO! Power 2.5

LOGO! Power 1.3 and LOGO! Power 2.5 are switched-mode primary power supply units for the LOGO! ...L... versions.

<table>
<thead>
<tr>
<th>Input data</th>
<th>LOGO! Power 1.3</th>
<th>LOGO! Power 2.5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input voltage: rated value</td>
<td>120/230 V</td>
<td></td>
</tr>
<tr>
<td>Permissible range</td>
<td>85 V ... 264 V (Derating at &lt;93 V)</td>
<td></td>
</tr>
<tr>
<td>Input voltage frequency</td>
<td>47 .. 63 Hz</td>
<td></td>
</tr>
<tr>
<td>Voltage failure bridging</td>
<td>20 (10) ms at 187 (110) V AC</td>
<td></td>
</tr>
<tr>
<td>Making current (25°C)</td>
<td>&lt; 15 A</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Output data</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Output voltage: rated value</td>
<td>24 V DC</td>
<td></td>
</tr>
<tr>
<td>Output voltage: overall tolerance</td>
<td>+/- 8%</td>
<td></td>
</tr>
<tr>
<td>Output voltage: residual ripple</td>
<td>&lt; 250 mVss</td>
<td></td>
</tr>
<tr>
<td>Output current: rated value</td>
<td>1.3 A</td>
<td>2.5 A</td>
</tr>
<tr>
<td>Overcurrent limiting</td>
<td>1.35 A</td>
<td>2.8 A</td>
</tr>
<tr>
<td>Outputs idling- and short-circuit proof</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Efficiency</td>
<td>&gt; 80 %</td>
<td></td>
</tr>
</tbody>
</table>

**Electromagnetic compatibility**

<table>
<thead>
<tr>
<th></th>
<th>EN 50081-1, EN 55022 Class B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interference suppression (emitted)</td>
<td>EN 50082-2</td>
</tr>
<tr>
<td>Immunity to interference</td>
<td>EN 50082-2</td>
</tr>
</tbody>
</table>

**Safety**

<table>
<thead>
<tr>
<th></th>
<th>Yes, SELV (in acc. w. EN 60950 / VDE 0805)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electrical isolation, primary/secondary</td>
<td>II (in acc. w. IEC 536 / VDE 0106 T1)</td>
</tr>
<tr>
<td>Safety class</td>
<td>IP 20 (in acc. w. EN 60529 / VDE 470 T1)</td>
</tr>
<tr>
<td>Protection type</td>
<td>CE, UL/cUL, FM</td>
</tr>
<tr>
<td>Planned certification</td>
<td></td>
</tr>
</tbody>
</table>
Technical data

<table>
<thead>
<tr>
<th>General details</th>
<th>LOGO! Power 1.3</th>
<th>LOGO! Power 2.5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ambient temperature range</td>
<td>0 ... +55°C, natural convection</td>
<td></td>
</tr>
<tr>
<td>Storage and transport temperature</td>
<td>-40°C ... +70°C</td>
<td></td>
</tr>
<tr>
<td>Connections on input</td>
<td>one connector (1x 2.5 mm² or 2x 1.5 mm²) each for L1 and N</td>
<td></td>
</tr>
<tr>
<td>Connections on output</td>
<td>two connectors (1x 2.5 mm² or 2x 1.5 mm²) each for L+ and M</td>
<td></td>
</tr>
<tr>
<td>Installation</td>
<td>on 35 mm DIN rail, snap-on</td>
<td></td>
</tr>
<tr>
<td>Dimensions in mm (WxHxD)</td>
<td>72x80x55</td>
<td>126x90x55</td>
</tr>
<tr>
<td>Weight</td>
<td>Approx. 0.3 kg</td>
<td>Approx. 0.6 kg</td>
</tr>
</tbody>
</table>

A.6 LOGO! Contact 24 and LOGO! Contact 230

LOGO! Contact 24 and LOGO! Contact 230 are switching modules for direct switching of ohmic loads of up to 20 A and motors of up to 4 kW (without noise emission, hum-free).

<table>
<thead>
<tr>
<th>Operating voltage</th>
<th>LOGO! Contact 24</th>
<th>LOGO! Contact 230</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>24 V DC</td>
<td>230 V AC; 50/60 Hz</td>
</tr>
</tbody>
</table>

Switching capacity

| Utilization category AC-1                           | 85 V ... 264 V (derating at <93 V) |
| Switching of ohmic load at 55°C                    |                                |
| Operating current                                  |                                |
| Operating current at 400 V                         | 20 A                           |
| Output of three-phase loads at 400 V                | 13 kW                          |
| Utilization category AC-2, AC-3                    | 85 V ... 264 V (derating at <93 V) |
| Motors with slipring or squirrel-cage rotor         |                                |
| Operating current at 400 V                         | 8.4 A                          |
## Technical data

<table>
<thead>
<tr>
<th></th>
<th>LOGO! Contact 24</th>
<th>LOGO! Contact 230</th>
</tr>
</thead>
<tbody>
<tr>
<td>Output of three-phase loads at 400 V</td>
<td>4 kW</td>
<td></td>
</tr>
<tr>
<td>Short-circuit protection: assignment type Type 1</td>
<td>25 A</td>
<td></td>
</tr>
<tr>
<td>Short-circuit protection: assignment type Type 1</td>
<td>10 A</td>
<td></td>
</tr>
<tr>
<td>Connecting leads</td>
<td>finely stranded with connector sleeves single-core</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2x(0.75 to 2.5) mm²</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2x(1 to 2.5) mm²</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1x4 mm²</td>
<td></td>
</tr>
<tr>
<td>Dimensions (WxHxD)</td>
<td>36x72x55</td>
<td></td>
</tr>
<tr>
<td>Ambient temperature</td>
<td>-25°C to +55°C</td>
<td></td>
</tr>
<tr>
<td>Storage temperature</td>
<td>-50°C to +80°C</td>
<td></td>
</tr>
</tbody>
</table>
B LOGO! ...LB11:
Active-passive switchover

All LOGO! ...LB11 versions are factory-set to address 0.

When the master is assigning addresses, only one active slave may be set
to address 0 on the ASi bus at any one time. All other slaves with the ad-
dress 0 must be passive, that is, unknown on the bus.

---

**Caution**

The ASi address can be changed 10 times for all
LOGO! ...LB11 versions.

There is no guarantee for more changes than this.

---

To switch LOGO! ...LB11 to passive, we have built a specific menu item
into the programming menu.

**Switching LOGO! ...LB11 between active and passive**

1. Switch LOGO! ...LB11 to programming mode (using the 3-finger grip)
   and press **OK** to go directly into the programming menu.

2. Press the ▼ key 3 times.
   The cursor (>) is now positioned at the start of the ASi_Bus.. line.

   - **Edit Prg**
   - **Clear Prg**
   - **Set Clock**
   - **>ASi_BUS..**

---
3. Press **OK**. The following display appears:

```
> Active
  Passive
LOGO:
  Active
```

4. Switch LOGO! ...LB11 to passive by pressing the ▼ key and then **OK**. The new state is then displayed:

```
LOGO:
  Passive
```

5. As soon as the master has detected an active slave and assigned it an address, you can switch another slave back from **passive** to **active**.

---

**Note**

You can exit the menu for switching back and forth between active and passive only if LOGO! is switched **active**.
C Determining the amount of memory required

The maximum number of function blocks in a program is 30. This applies to the basic functions. If you use special functions in your applications, the maximum number of function blocks possible may under certain circumstances be reduced. Please pay attention to the examples given in this chapter.

The function blocks of the special functions in your program require special memory in LOGO!. There are four different memory areas for this in LOGO!. The amount of memory required in the different memory areas varies depending on which function is used.

<table>
<thead>
<tr>
<th>Memory area</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>△</td>
<td>Area in which your target values are stored (e.g. limit values of the counter)</td>
</tr>
<tr>
<td></td>
<td>LOGO! has space for 27 units in this memory area.</td>
</tr>
<tr>
<td>□</td>
<td>Area in which the current actual values are stored (e.g. current count)</td>
</tr>
<tr>
<td></td>
<td>LOGO! has space for 24 units in this memory area.</td>
</tr>
<tr>
<td>○</td>
<td>Area used by the time functions (e.g. off-delay)</td>
</tr>
<tr>
<td></td>
<td>LOGO! has space for 10 units in this memory area.</td>
</tr>
<tr>
<td>RE</td>
<td>Area in which current actual values to be stored as remanent values are stored (e.g. the count of an operating hours counter).</td>
</tr>
<tr>
<td></td>
<td>Remanent data storage is only possible in LOGO!...L.. versions</td>
</tr>
<tr>
<td></td>
<td>LOGO! has space for 7 units in this memory area.</td>
</tr>
</tbody>
</table>
Memory required for the functions

The following table provides you with an overview of how much memory each block occupies in each memory area:

<table>
<thead>
<tr>
<th>Function</th>
<th>Memory area</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>△</td>
<td>□</td>
<td>○</td>
<td>RE</td>
</tr>
<tr>
<td>Basic functions</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>On-delay</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Off-delay</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Wiping relay</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Pulse relay 1</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Pulse relay 2</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Clock (time switch)</td>
<td>6</td>
<td>2</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Latching relay 1</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Latching relay 2</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Clock pulse generator</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Retentive on-delay</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Counter 1</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Counter 2</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Operating hours counter</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>Threshold switch</td>
<td>3</td>
<td>3</td>
<td>1</td>
<td>0</td>
</tr>
</tbody>
</table>

1 Memory occupancy in LOGO!...L... versions without parameterized remanence
2 Memory occupancy in LOGO!...L... versions with parameterized remanence

The marked functions offer additional functionality which is only available in LOGO!...L... versions.

Always take into account all individual areas of the memory when determining the amount of memory required by a circuit.
Determining the amount

Example:

The example program contains:

<table>
<thead>
<tr>
<th>Block No.</th>
<th>Function</th>
<th>Memory area</th>
<th>△</th>
<th>□</th>
<th>○</th>
<th>RE</th>
</tr>
</thead>
<tbody>
<tr>
<td>B01</td>
<td>OR</td>
<td></td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>B02</td>
<td>AND</td>
<td></td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>B03</td>
<td>Clock</td>
<td>6</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>B04</td>
<td>On-delay</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>B05</td>
<td>Clock pulse generator</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>B06</td>
<td>AND</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Memory occupied by the program</td>
<td>8</td>
<td>4</td>
<td>2</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Memory limits in LOGO!</td>
<td>27</td>
<td>24</td>
<td>10</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Memory still free in LOGO!</td>
<td>19</td>
<td>20</td>
<td>8</td>
<td>7</td>
<td></td>
</tr>
</tbody>
</table>

Of the maximum of 30 blocks available in LOGO!, you have used 6 blocks for your program. The program therefore fits in LOGO!.
If you cannot enter any more blocks when entering a program, this means that a memory area is full. LOGO! offers you only those blocks for which it still has enough space. If there is not enough space in LOGO! for any of the blocks in the list, you can no longer select the list.

When a memory area is full, optimize your circuit or use a second LOGO! module.
Abbreviations

B01  Block number B01
BN  Block number
Cnt  Count (input for counter)
Co  Connector
Dir  Direction (for counter: up or down)
En  Enable (switching on the clock pulse generator)
BF  Basic function
No  Nocke (cam for clock)
Par  Parameter for counter
Par  Parameter list for various functions
R  Reset
S  Set (setting the latching relay)
SF  Special function
T  Time (parameter)
T\textsubscript{a}  Current value of a time (the current value of a time is displayed in the parameterization mode)
Trg  Trigger (parameter)