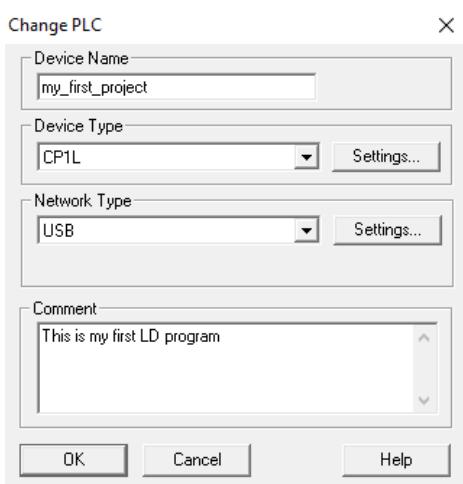
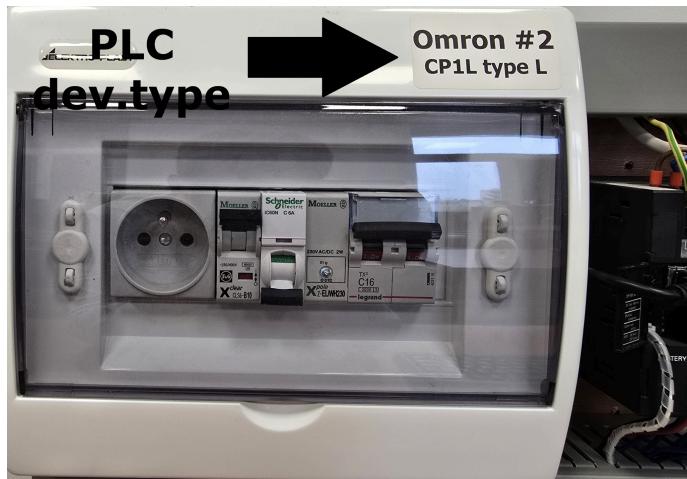


Exercise no 1: Ladder Diagram - Inputs and Outputs

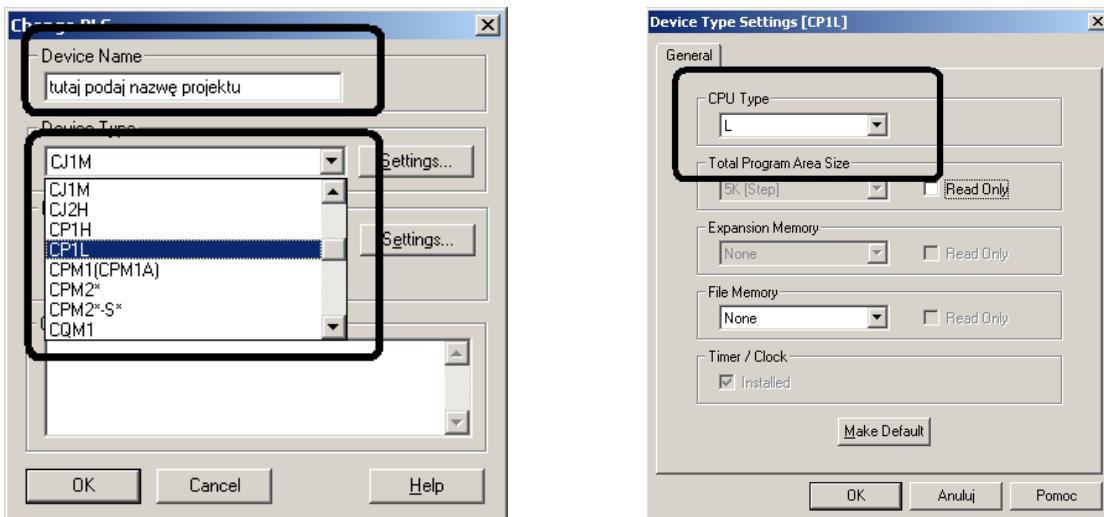
Introduction. Omron *CX-Programmer* is part of *CX-One* which is an integrated package for all of Omron's PLC series. The application includes a wide variety of features to speed up the development of a PLC program.

Task 1. Run *CX-Programmer*. From the *File* menu choose *New...* (*File*→*New...*).

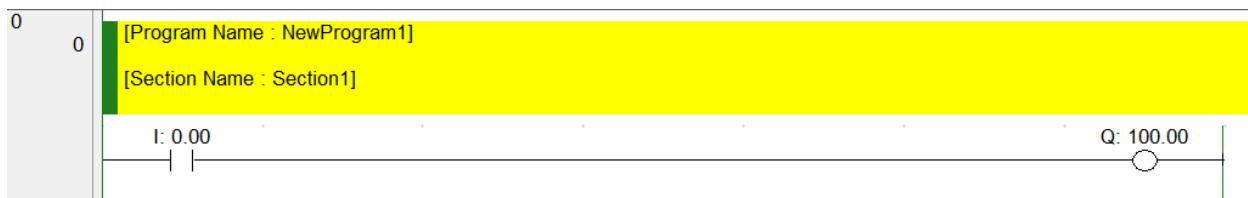


- *Device Name* - the name of the project.
- *Device Type* - PLC type that is used in the project.
- *Network Type* - the interface between PC and PLC.
- *Comment* - designer notes.

Exercise no 1: Ladder Diagram - Inputs and Outputs



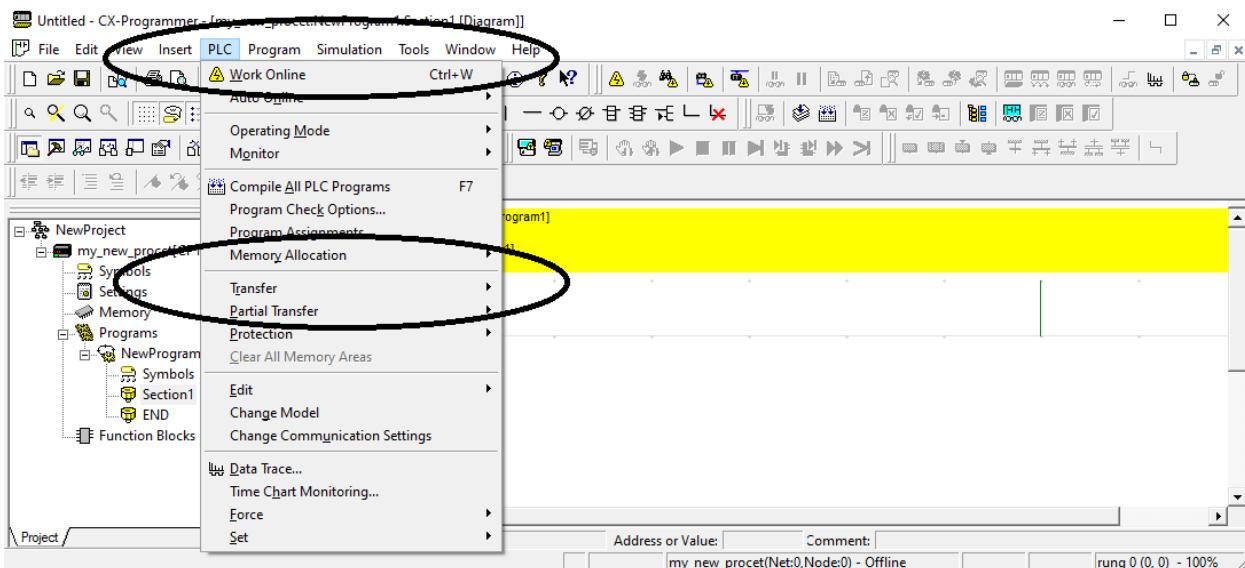
Create the following application:



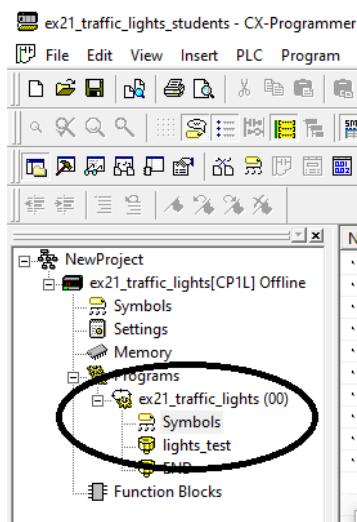
From the *Simulation* menu choose *Work Online Simulator* (*Simulation*→*Work Online Simulator*). Wait for the gray background. Use the simulator to see how the program works.

Close the simulator (*Simulation*→*Work Online Simulator*). Send this program to the PLC using the combination: *PLC* → *Work Online*; *PLC* → *Transfer* → *To PLC...*

Exercise no 1: Ladder Diagram - Inputs and Outputs



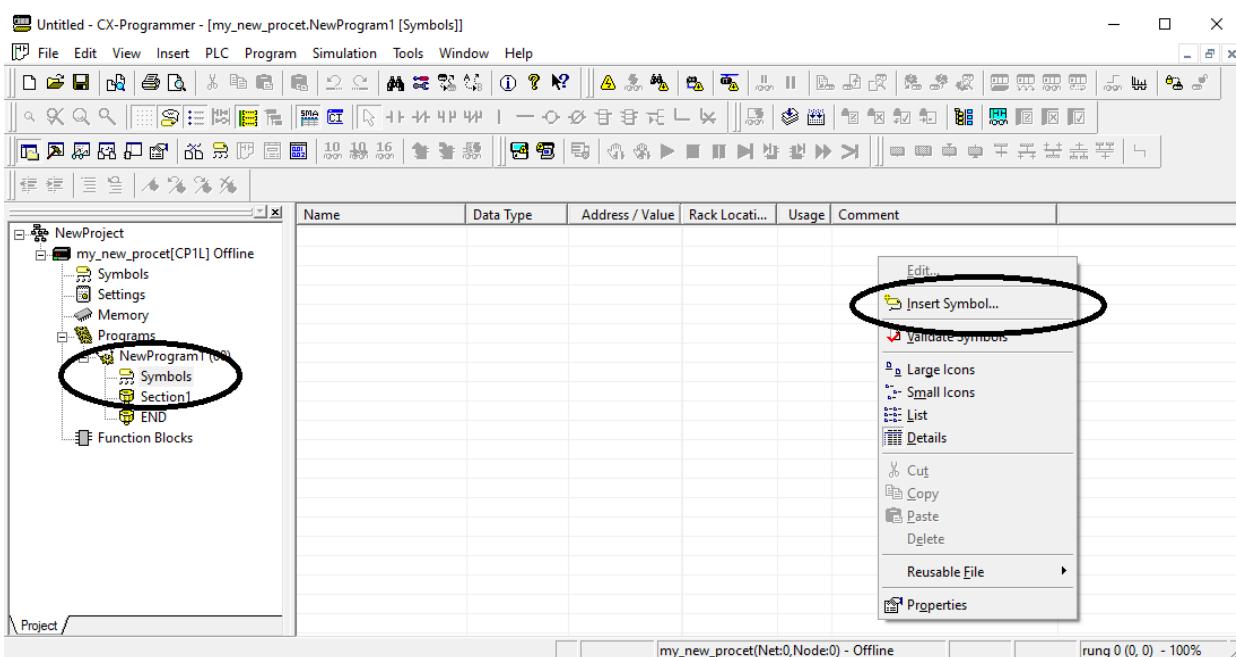
Task 2. Run *CX-Programmer*. From the *File* menu choose *New...* (*File*→*New...*).



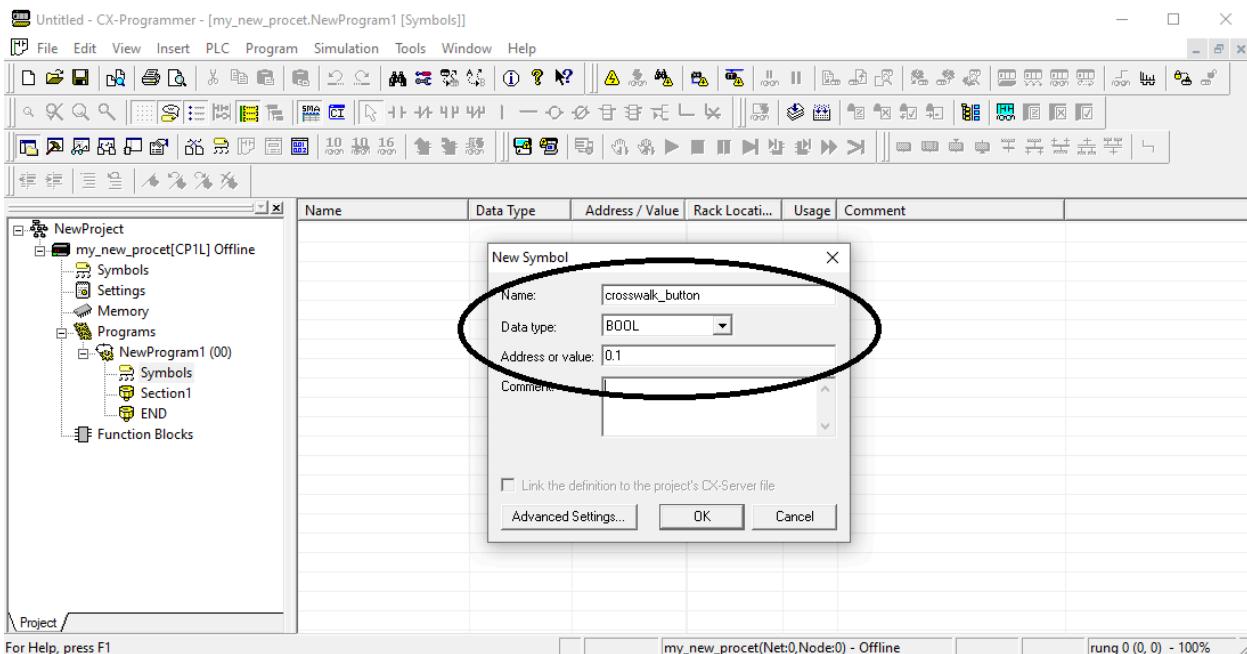
In the project tree, open the *Programs* tab. Select *Symbols*.

Press the right mouse button while keeping the mouse pointer inside the *Symbols* window. Select *Insert Symbol*.

Exercise no 1: Ladder Diagram - Inputs and Outputs



Enter the *Name* and address in the PLC memory (*Address or value*).



Exercise no 1: Ladder Diagram - Inputs and Outputs

Create symbols according to the following table:

Hardware	Input symbol	Input	Output symbol	Output
Omron #1	button_1		out_1	
	button_2		out_2	
	button_3		out_3	
Omron #2	button_1	0.0	out_1	100.0
	button_2	0.2	out_2	100.1
	button_3	0.3	out_3	100.2
Omron #3	button_1	0.0	out_1	100.0
	button_2	0.2	out_2	100.1
	button_3	0.4	out_3	100.2
Omron #4	button_1	0.0	out_1	100.0
	button_2	0.1	out_2	100.2
	button_3	0.3	out_3	100.3
Omron #5	button_1	0.0	out_1	100.0
	button_2	0.1	out_2	100.2
	button_3	0.3	out_3	100.3
Omron #6	button_1		out_1	
	button_2		out_2	
	button_3		out_3	

Exercise no 1: Ladder Diagram - Inputs and Outputs

Task 3. Using symbols from Task 2 build the following LD diagram in the CX-Programmer. Send this program to the PLC. Check if it works.



Task 4. Using symbols from Task 2 build the following LD diagram in the CX-Programmer. Send this program to the PLC. Check if it works.



Task 5. Using symbols from Task 2 build the following LD diagram in the CX-Programmer. Send this program to the PLC. Check if it works.



Exercise no 1: Ladder Diagram - Inputs and Outputs

Task 6. Using symbols from Task 2 build the following LD diagram in the CX-Programmer. Send this program to the PLC. Check if it works.



Task 7. Using symbols from Task 2 build the following LD diagram in the CX-Programmer. Send this program to the PLC. Check if it works.

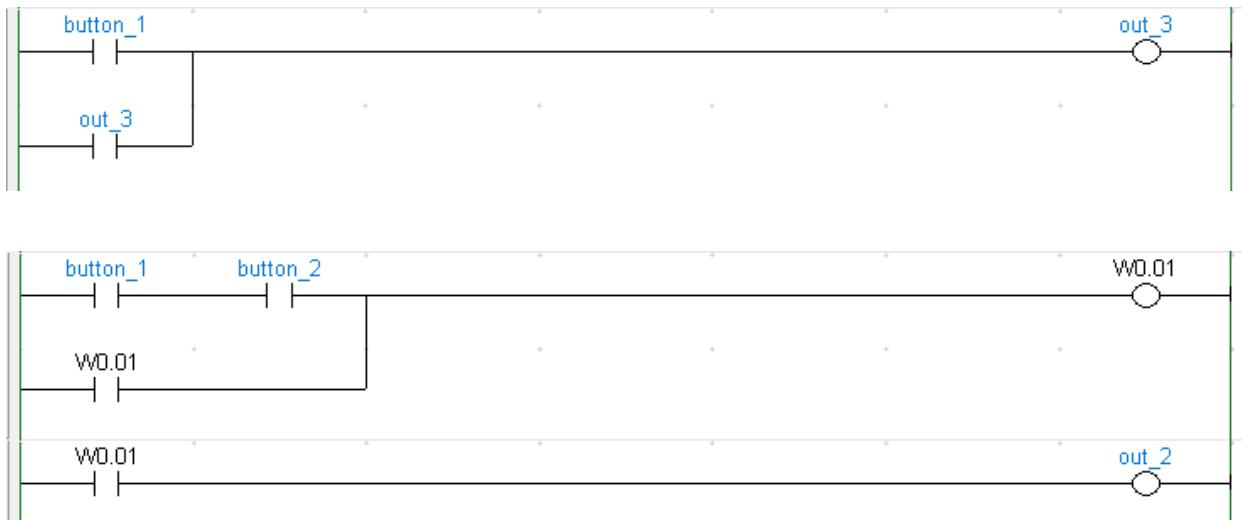


Task 8. Using symbols from Task 2 build the following LD diagram in the CX-Programmer. Send this program to the PLC. Check if it works.



Exercise no 1: Ladder Diagram - Inputs and Outputs

Task 9. Using symbols from Task 2 build the following LD diagram in the CX-Programmer. Send this program to the PLC. Check if it works.



Task 10. Using symbols from Task 2 prepare a solution that meets the following parameters:

1. $out_1 = button_1 \mid button_2;$
2. $out_2 = out_1 \& button_3;$
3. *out_2 should be energized, even when the input ceases.*

The prepared program should be sent to the PLC and its operation should be presented to the teacher. After completing the task, the cxp file should be sent to the e-mail address shown in the footer, along with the authors of the solution.

Task 11. Using defined symbols prepare a solution that meets the following parameters:

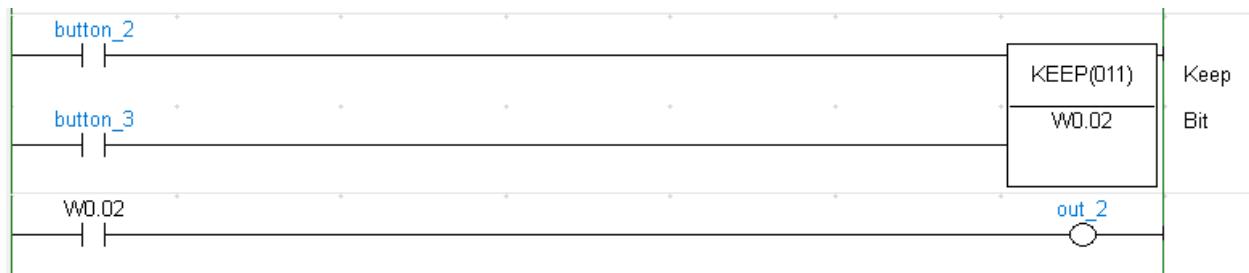
1. turn on and hold (latch) `out_3` if `button_3` and `button_1` were pressed;
2. turn on `out_3` if `button_2` and `button_3` were pressed.

Exercise no 1: Ladder Diagram - Inputs and Outputs

Task 12. KEEP function. Add a new symbol.

Hardware	Input symbol	Input
Omron #1	button_4	
Omron #2		0.1
Omron #3		0.1
Omron #4		0.2
Omron #5		
Omron #6		

Build the following LD diagrams. Check the results.

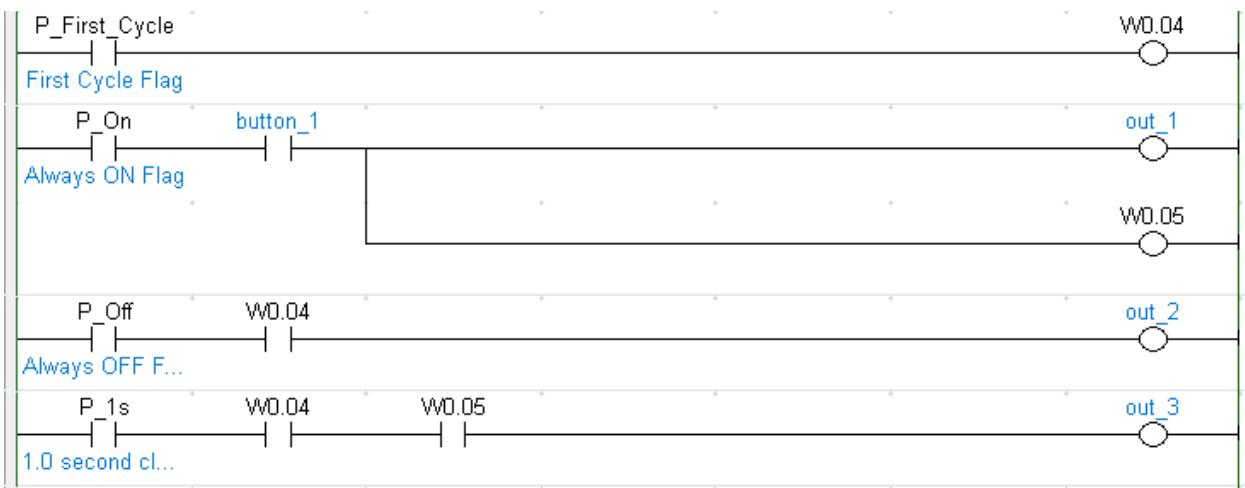


Exercise no 1: Ladder Diagram - Inputs and Outputs

Task 13. SET/RSET function. Build the following LD diagrams. Check the results.



Task 14. P flags. Build the following LD diagrams. Check the results.



Task 15. Prepare a solution that meets the following parameters:

1. turn on and hold (latch) *out_1* if *button_1* and *button_2* were pressed;
2. *button_3* resets the latch;
3. after reset *out_2* should blink.

Task 16. Ask the teacher for Your final task.

For those interested:

1. CX-Programmer Introduction Guide:

[www.fa.omron.com.cn/data_pdf/mnu/r132-e1-05_cx-programmer.pdf?
_id=1605](http://www.fa.omron.com.cn/data_pdf/mnu/r132-e1-05_cx-programmer.pdf?_id=1605)

2. CP1L Programming Manual:

assets.omron.eu/downloads/manual/en/v1/w451_cp1_cpu_unit_programming_manual_en.pdf