

Programming of GE-Fanuc PLC devices – simple commands

Task 1

You should to design a logical circuit in the form of program of ladder diagram type. This program should change the count of activated inputs into the number of activated output (e.g. if we activate any two inputs, then the second output should be activated – %Q0002, if we activate any three inputs – the third output %Q0003 should be activated.

You should prepare a solution only for three inputs.

The suggested table of variables:

<i>address</i>	<i>description</i>
%I0001	input 1
%I0002	input 2
%I0003	input 3
%Q0001	output 1
%Q0002	output 2
%Q0003	output 3

Task 2

Prepare and run the program.

a) The counter of impulses incoming to input %I0004.

The counter should count to three and the fourth impulse should reset it. Additionally input %I0006 should reset the counter.

b) The second counter of impulses incoming to input %I0005.

The counter should count to three and the fourth impulse should reset it. Next, the values of counters should be added or multiplied together depending on input %I0001 state (0 - addition, 1 - multiplication). The result should be placed in the %R10 register.

c) Add the logical circuit of relation detection between counters.

If the number in the first counter is greater then the number in the second counter you should activate the output %Q0004 with frequency 1Hz.

Notes:

You can use special system bit variables:

- #ALW_ON – always on (1),
- #ALW_OFF – always off (0),
- #T_SEC – activated every 1 second,
- #FST_SCN – the first cycle of automaton,

The input signals %I you should deal either from debugger or from a switch box.

Each counter use three register in memory. The value of counter is in the first of them.

Task 3

Prepare and run the program that:

- a) Waits for „1” on input %I7, and after 15 seconds activate (sets “1”) the output %Q7. Whenever %I7 is switched off („0”), the output %Q7 should be set to „0” 10 seconds later. If state “1” on %I7 is shorter than 15 seconds, the output %Q7 should not be activated.
- b) Periodically activate output %Q6, with the following pattern: 2 seconds of activation (%Q6 set to “1”) and 3 seconds of deactivation (%Q6 set to “0”)

Programming of GE-Fanuc PLC devices – tank control

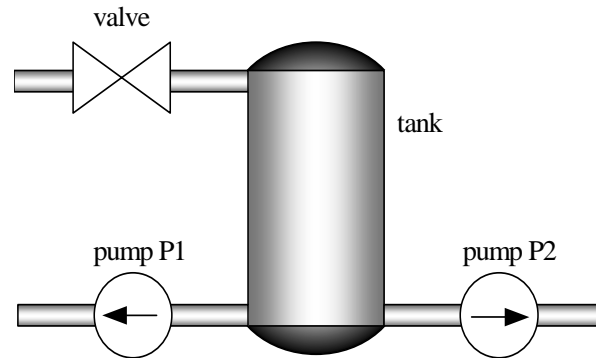
Task 4

Write PLC program to simulate tank loading and unloading.
The tank is equipped with a loading valve and two unloading pumps.

Guidelines:

We have two monostable buttons ZAW_OTW and ZAW_ZAM. These buttons activate open and close valve (activate binary output)

Monostable buttons: P1_ZAL, P1_WYL, P2_ZAL and P2_WYL activate correct outputs for pumps.



Liquid level should be calculated 10 times per second. Liquid level should increase slowly when valve is open and P1 working and should decrease slowly when valve is open and P2 is working. Other states are obvious.

The level less than 10% should activate ALARM_MIN and stop the pumps.
The level greater than 90% should activate ALARM_MAX and close the valve.

Variables:

Name	Description	Reference		
Binary input variables				
P1_ZAL	Start pump P1 command button	%I0001		
P1_WYL	Stop pump P1 command button	%I0002		
P2_ZAL	Start pump P2 command button	%I0003		
P2_WYL	Stop pump P2 command button	%I0004		
ZAW_OTW	Open valve command button	%I0005		
ZAW_ZAM	Close valve command button	%I0006		
Binary output variables				
P1_STAN	Pump P1 is working	%Q0001		
P2_STAN	Pump P2 is working	%Q0002		
ZAW_STAN	Valve is open	%Q0003		
ALARM_MAX	Liquid level above 90%	%Q0004		
ALARM_MIN	Liquid level less than 10%	%Q0005		
Name	Description	Reference	Range	Default value
Analog variables				
Poziom	Liquid level	%R0100	0 – 32000	16000
P1_wydajn	Pump P2 efficiency	%R0010	To be found during exercise to achieve specified requirements	
P2_wydajn	Pump P2 efficiency	%R0020		
Zaw_przepl	Valve efficiency	%R0015		

Report, in electronic form only, should contain:

1. Text document with:

- a list of participants with numbers of group and laboratory section,
- summary and conclusion of the exercise,

and

2. The project created during the lab should be saved with “Create backup...” command of Cimplicity Machine Edition, after it is closed. Created programs should be commented.

Complete report should be packed into a single *.zip file with name following the convention: g1s2c3.zip, for 1st group, 2nd section and 3rd exercise.

The report should be uploaded on the ftp server no longer than 2 weeks after the classes.

FTP connection details:

Server: 157.158.57.50

User: labplc

Password: plclab

Directory where to place reports: /dcs/[exercise_number], i.e. /dcs/3

Students are responsible for maintain of a copy of the report, in case of server malfunction or other unpredictable contitions.

Some essential ladder logic commands:

- | |— normal input – relay (Normally Open Contact)
- |/|— negative input (Normally Close Contact)
- ()— normal output – coil (Normally Open Coil)

