Logic Unit WCU 501, WCU 650

Manual

Let's connect.

Weidmüller

Content

Manufacturer

Weidmüller Interface GmbH & Co. KG
Klingenbergstraße 16
D-32758 Detmold
T +49 5231 14-0
F +49 5231 14-292083
www.weidmueller.com

Document no.: 2530270000
Revision 01/December 2017

1 About this documentation

1.1 Scope

This manual describes the WCU 501 and WCU 650 logic units and contains an introduction to programming with the miCon-L software. Further information on programming can be found in the online software documentation. All information relates to Version 3.6 of miCon-L.

1.2 Symbols and notes

The safety notices in this documentation are designed according to the severity of the danger.

DANGER

Imminent risk to life!
Notes with the signal word "Danger" warn you of situations which will result in serious injury or death if you do not follow the instructions given in this manual.

WARNING

Possible danger to life!
Notes with the signal word "Warning" warn you of situations which may result in serious injury or death if you do not follow the instructions given in this manual.

CAUTION

Risk of injury!
Notes with the signal word "Caution" warn you of situations which may result in injury if you do not follow the instructions given in this manual.

ATTENTION

Material damage!
Notes with the signal word "Attention" warn you of hazards which may result in material damage.

Text next to this arrow are notes which are not relevant to safety, but provide important information about proper and effective work procedures.

The situation-dependent safety notices may contain the following warning symbols:

Symbol	Meaning
	Warning about dangerous electrical voltage
	All work must be carried out by qualified electricians.
	Observe the documentation

► All instructions can be identified by the black triangle next to the text.
– Lists are marked with a dash.

1.3 Complete documentation

► Please also note the quick start guide provided with the product.

All documents can also be downloaded from the Weidmüller website.

2 Safety

2.1 General safety notice

Always disconnect the power supply to the relevant part of the system and the logic unit before working with the product and secure the system against being switched on again unintentionally.

The device must only be installed by qualified electricians who are familiar with national and international laws, provisions and standards.

Follow these instructions and keep the documentation so it is accessible to all users at all times.

2.2 Intended use

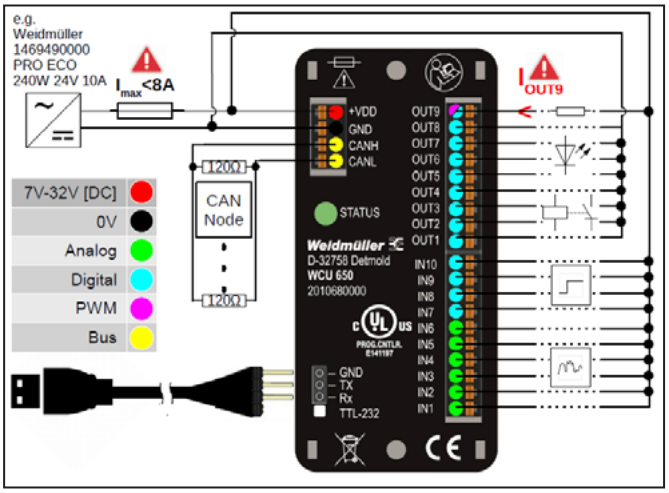
The logic units in the WCU range are compact controllers for use in industrial environments and within the technical data described. They cannot be used in life-preserving, medical or safety-related applications or in explosion-risk environments. Observance of the documentation is also part of the intended use.
If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

3 Device description

The WCU logic unit is a graphically programmable compact controller with digital inputs, analogue inputs, digital outputs and a CAN interface. All plug-in connectors are pluggable spring-type terminals for a wire cross-section of 0.25 to 1.5 mm². The power supply is via the 2-pole plug-in connectors +VDD and GND. An external miniature fuse must be provided (see technical data).
On a logical HIGH, the supply voltage is switched to the output activated. OUT5 for WCU 501 and OUT9 for WCU 650 are ground-switching outputs with PWM functionality. These outputs have no short-circuit protection!
The logic unit is connected to a PC running a Windows® operating system (Windows® 7 or higher) using the corresponding adapter.

WCU 501 logic unit

WCU 650 logic unit



Overview of WCU 650 connections

Colour	Connection	Function
Red	+VDD	Power supply
Black	GND	
Yellow	CANH & CANL	CAN bus
Green	IN1 to IN6	Analogue inputs
Blue	IN7 to IN10	Digital inputs
	OUT1 to OUT8	Digital outputs
Magenta	OUT9	PWM output
	TTL-232	PC connection

Programming software

The logic function block is programmed via the miCon-L software, which is provided by Weidmüller without the need for a licence. You can also work with the software when the logic unit is not connected to your PC. The following options are available online and offline:

- Create programs
- Run program simulations

The software provides the following features:

- Extensive function component library
- Data visualisation option
- Program simulation and debugging
- Communication via RS-232/TTL232 or USB

4 Mounting and installation

WARNING

Possible danger to life!
Always disconnect the power supply to the relevant part of the system and the logic unit before working with the product and secure the system against being switched on again unintentionally.

4.1 Mounting the device

WCU 501

► Clip the device on to a standard TS35 terminal rail using the clip-in foot on the back.

WCU 650

There are three ways of fitting the WCU 650.

► Clip the device on to a standard TS35 terminal rail using the clip-in foot on the back.

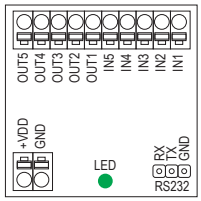
Or

► Dismount the clip-in foot on the back and attach the device using 2 M4 screws through the drill holes on the side.

Or

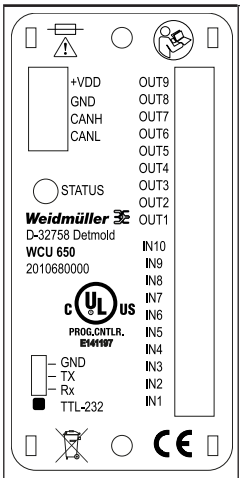
► Secure the device with 4 3.6 mm cable ties through the slots in the corners.

WCU 501 pin assignment



IN3 ... IN5 IN1 ... IN2	Analogue inputs 0 ... 30 V Digital inputs up to 1 kHz
OUT1 ... OUT4 OUT5	Digital outputs, plus-switching PWM output, minus-switching
+VDD ... GND	Power supply
RS-232	PC connection via USB/RS-232 adapter

WCU 650 pin assignment



IN1 ... IN6 IN7 ... IN10	Analogue inputs 0 ... 30 V Digital inputs up to 1 kHz
OUT1 ... OUT8 OUT9	Digital outputs, plus-switching PWM output, minus-switching
+VDD, GND CANH, CANL	Power supply CAN 2.0A/B interface
TTL-232	PC connection

4.2 Installing the connections

The wires to be connected can have a cross section of 0.25 to 1.5 mm². We recommend using wire-end ferrules in order to make secure connections.

► Make the connections as shown in the pin assignment (see printing on the logic unit).
► Connect the power supply via the +VDD and GND 2-pole plug-in connectors.

Make sure the polarity of the power supply is correct.

► Make sure that an external fuse is provided (max. 5 A for WCU 501 and 8 A for WCU 650).

5 Commissioning

5.1 Installing the software

System requirements

- Processor with at least 500 MHz
- At least 256 MB RAM
- Hard drive: approx. 200 MB free space
- Monitor resolution 1024 x 576 or higher
- Windows® operating system (Windows®7 or higher)

You need administrator permissions to install the USB driver.

In order to program the logic unit, you need the miCon-L software. This is available to download free-of-charge, including documentation and sample programs, from the Weidmüller website (product catalogue).

► Enter the order number for your logic module in the product catalogue.
► Click on "Downloads" and download the programming software.

This downloads the file "WM_miConL.zip".

► Open the folder in which you have saved the zip file and extract the file.

An extracted folder "WM_miConL" appears.

► Install the miCon-L software from the "WM_miCon-L" folder by running "miCon-L_WM_DE_V3.6.exe".

IMPORTANT: select C:\miCon-L\... as the target directory and follow the instructions in the software.

► Install the USB driver from the "...miCon-L/SETUP/USBdriver" folder by running the file "CDM20828_Setup.exe".
► Switch on the supply voltage to the logic unit.

5.2 Connecting the PC

The logic unit is connected to the USB port of the PC.

WCU 501

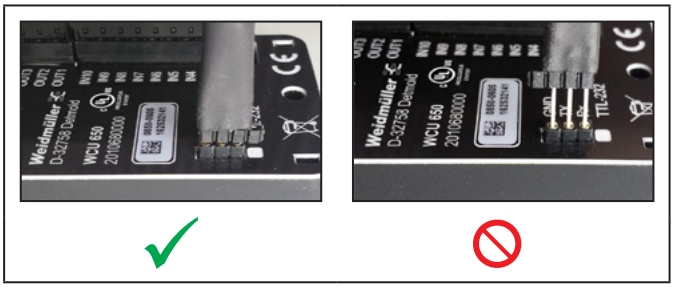
Connecting the WCU 501 requires the RS232 cable (order no. 2515030000) and a standard RS232 USB converter. Both are supplied with the WCU 510 starter kit.

WCU 650

To connect the WCU 650, you need the USB programming adapter USB/TTL-232 (order no. 2515020000). The adapter is provided in the WCU 650 starter kit.

► Plug the adapter into the connection on the logic unit.

With the WCU 650, make sure the connecting plugs are plugged in in the right direction.



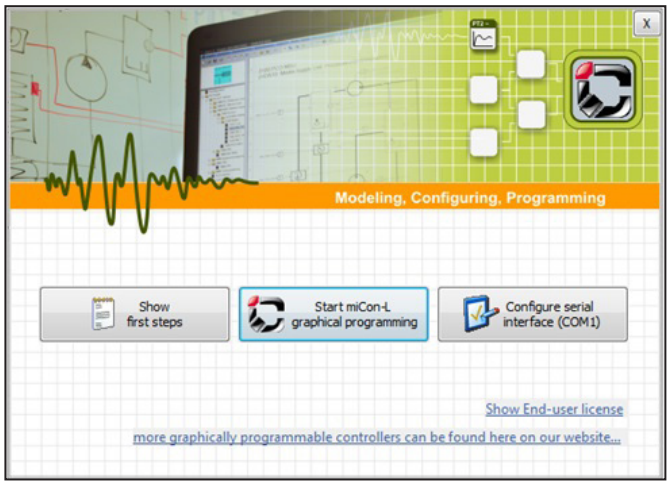
Plug-in direction of PC connection on WCU 650

► Connect the adapter cable to the USB port on the PC.

5.3 Starting the program

► Double-click on the program icon to start the program.

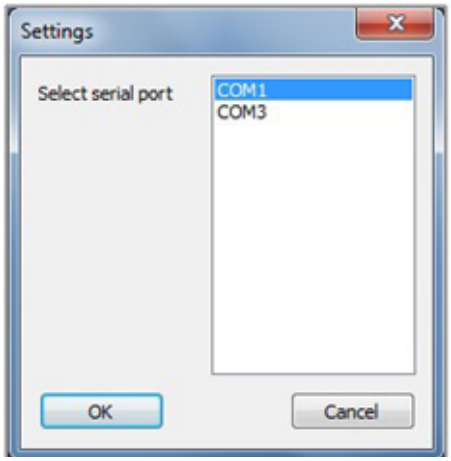
This opens the start window.



Start window

► To configure the serial interface, click on the "Configure serial interface" button.

This opens the "Settings" window. The serial interfaces available are displayed.



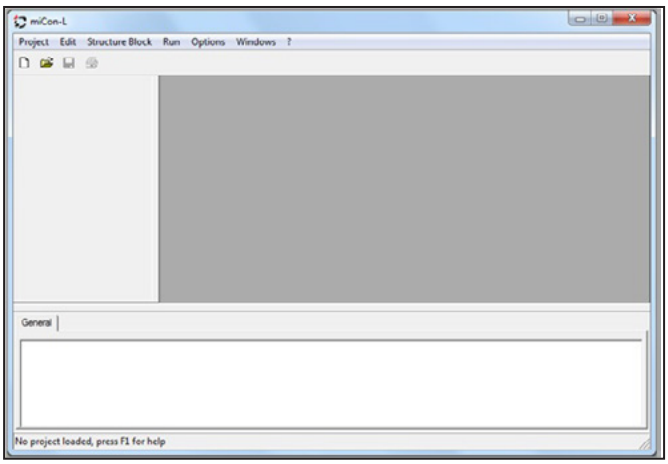
"Settings" window

► Select your interface and confirm by pressing "OK".

You can work out which is the interface to the logic unit by disconnecting the USB cable briefly and reconnecting it. The interface that disappears from the list and then reappears is the interface to the logic unit.

► In order to open the programming interface, click on the "Start miCon-L graphical programming" button.

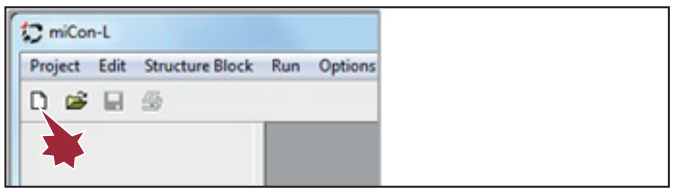
This opens the programming interface.



Programming interface

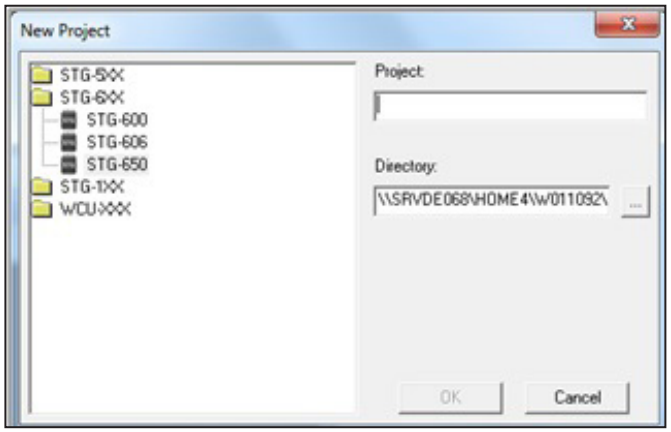
6 Configuration

6.1 Creating a project



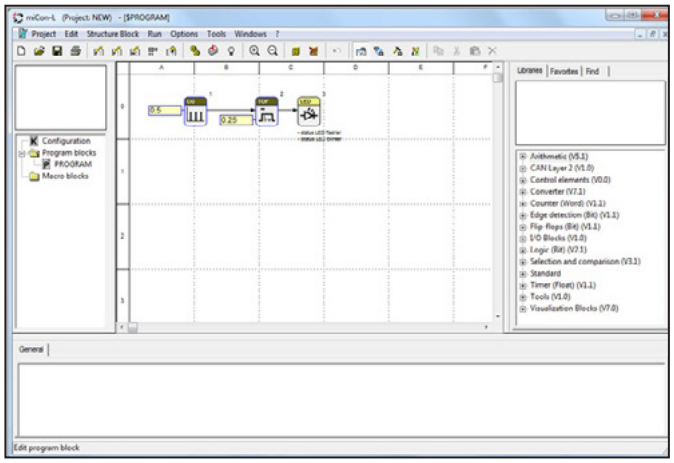
Creating a new project

► Click on the "New Project" icon.
The "New Project" window opens.



"New Project" window

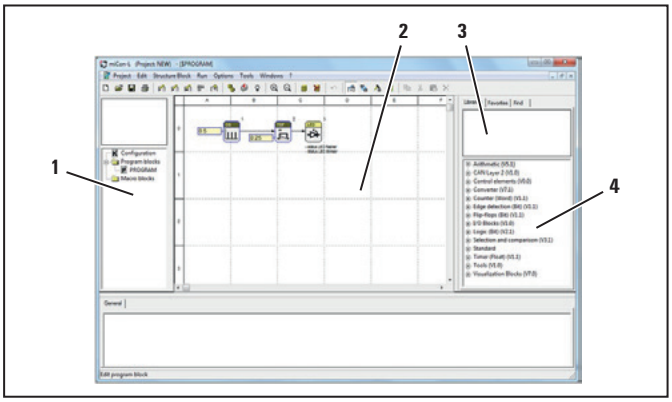
► To select your control, double-click on "WCU-XXX"
► Select the correct control.
► Enter a project name of your choosing.
► If you wish, you can also select a new file location.
► Confirm by pressing OK.
The programming interface for the newly created project is displayed.



Programming interface for the new project

6.2 Operating the programming interface

The programming interface is split into four areas.

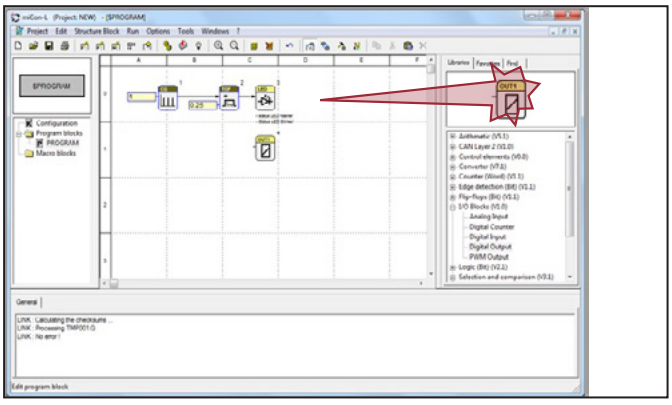


Working environment for miCon-L software

1 Program tree
2 Programming interface
3 Current selection
4 Selection area (libraries, favourites)

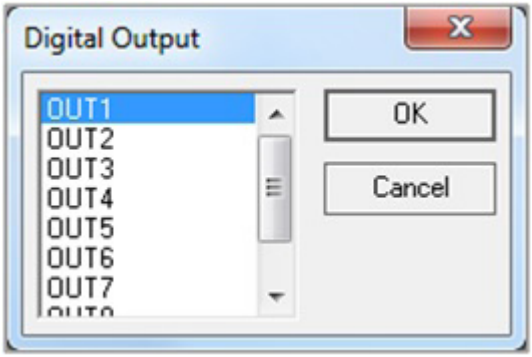
The new project already contains a program which causes the status LED to flash. Below is an example of how you can add an output (OUT1) to the circuit. This output (OUT1) should switch in the same cycle as the status LED.

► Select the appropriate function block from the library (e.g. digital output).
The selected function block is displayed in the top right corner.



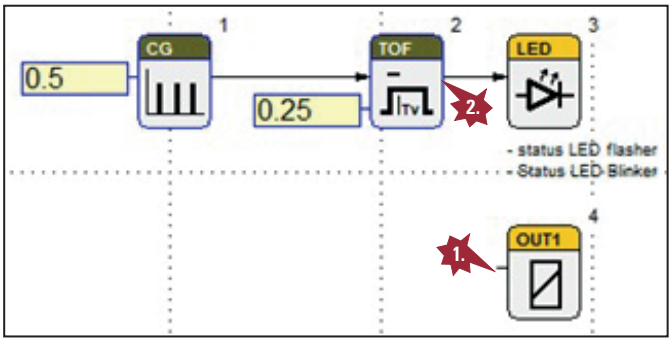
Add function block

► Drag the selected function block to the programming interface.
The "Digital Output" window opens.



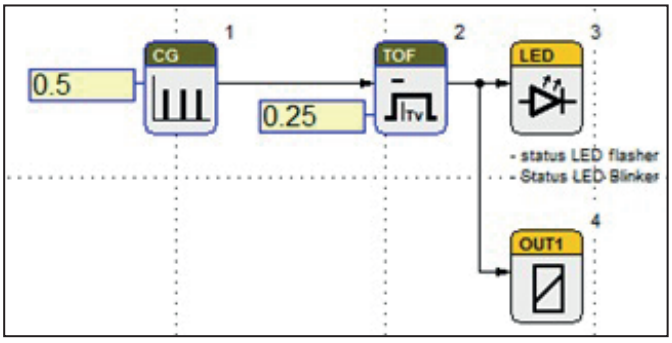
"Digital Output" window

- ► Assign the name OUT1 to the output and confirm by pressing OK.
- ► To link the function blocks to one another, first click on the input for the new function block (function block 4) and then on the output for the function block to connect it to (function block 2).



Connecting function blocks

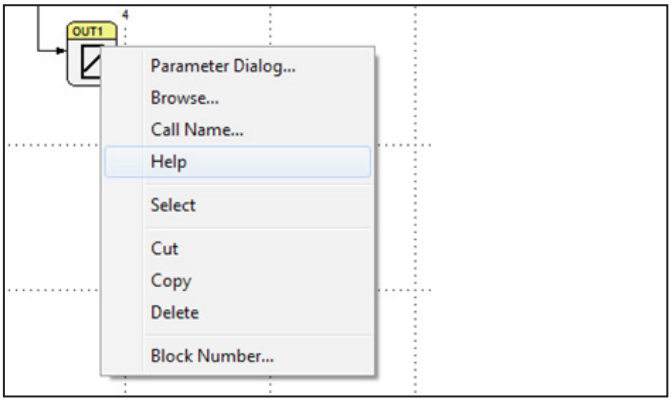
The connection between the function blocks is displayed.



Function blocks connected

6.3 Function block library

- ► In order to receive information on a function block in the programming interface, open the context-specific menu by right-clicking on the function block.
- ► Click on "Help".



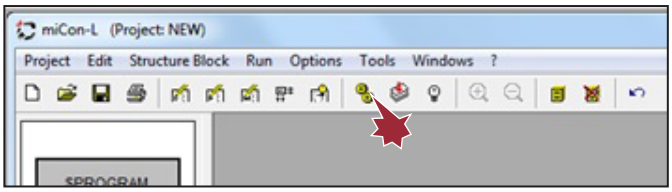
Context specific function block menu

miCon-L website contains a list of all function blocks with detailed explanations.

The remanent blocks write into an EEPROM memory. The number of writing cycles is limited to 100,000.

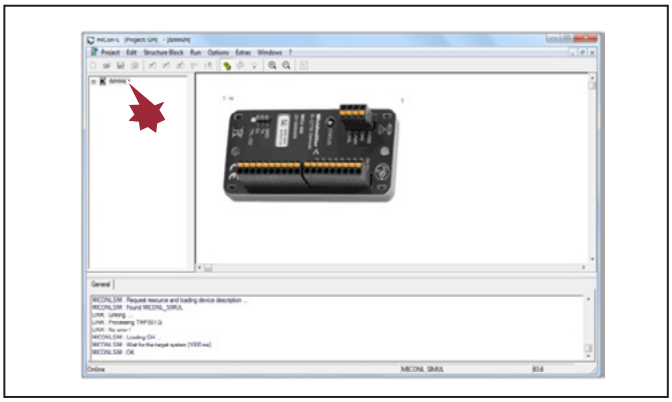
6.4 Simulation

Please note that "Simulation" as described on the miCon-L website and in this manual is also known as "Observation". The simulation tests the program for functionality and errors. No control needs to be connected.
You can:
- Switch inputs
- Change parameters



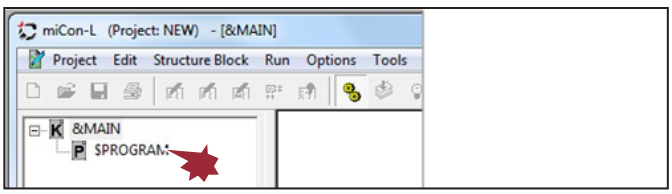
Start simulation

► Click on the "Simulation" icon.
The simulation window opens.



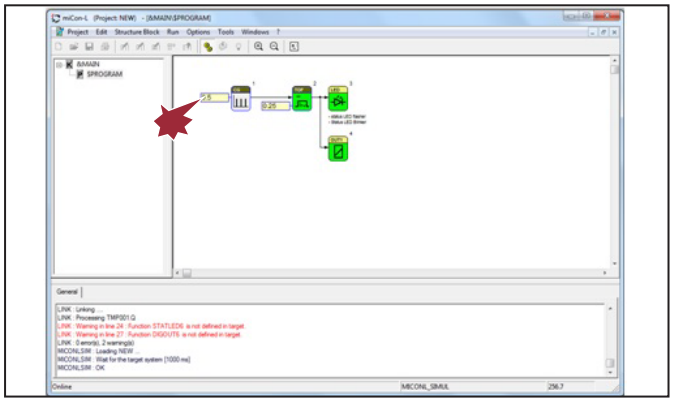
Simulation window

► If you have not yet done so, open up the "&MAIN" tree.



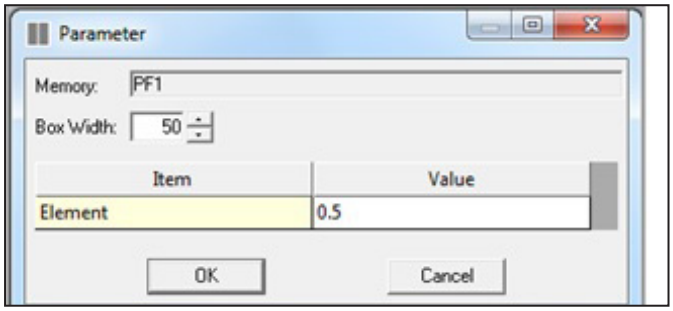
Open the program tree

► If you have not yet done so, open "$PROGRAM" by double-clicking on it.
This starts simulation.



Simulation

► In order to change a parameter, click on the relevant value.
The "Parameters" window opens.

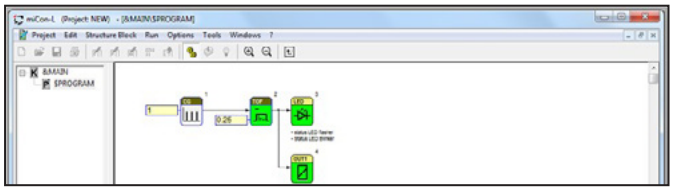


"Parameters" window

► Click on the value, change the parameter and confirm by pressing OK.

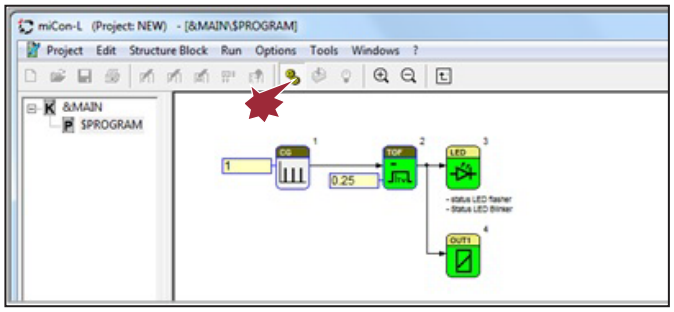
Always use a decimal point as a separator.

The new value is applied to the parameter (here, the value has been changed from 0.5 to 1).



Changed parameter

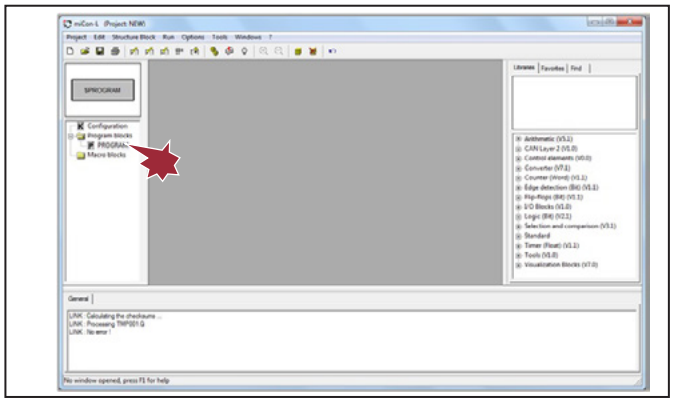
► Click on the "Simulation" icon to exit simulation.



Exit simulation

► Then close the window.

This takes you back to the programming interface.



Programming interface after simulation

► If you wish to continue editing your program, click on "PROGRAM" in the program tree.

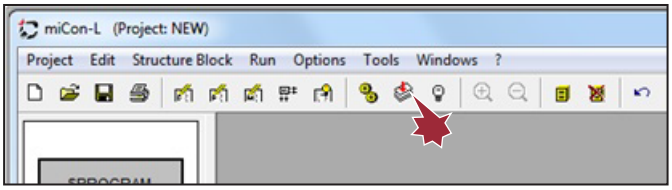
6.5 Loading program to the logic unit

To load a new or changed program to the logic unit, proceed as follows.

► Connect the logic unit to the power supply.

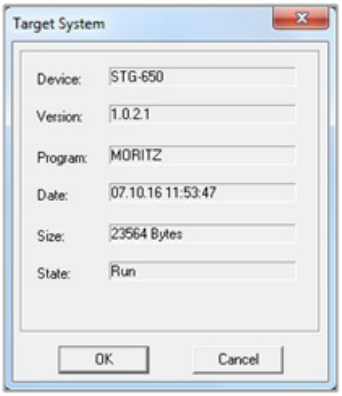
► Connect the logic unit to the PC using the USB cable.

► Click on the "Download" icon.



Start download

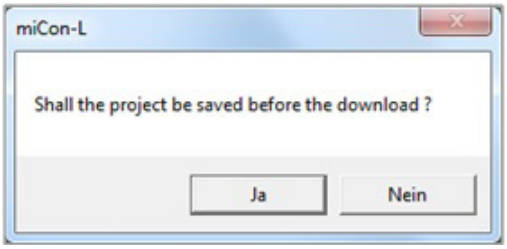
The "Register target system" opens if the program is not yet on the logic unit, e.g. because you have made a change or created it from scratch.



"Register target system" window.

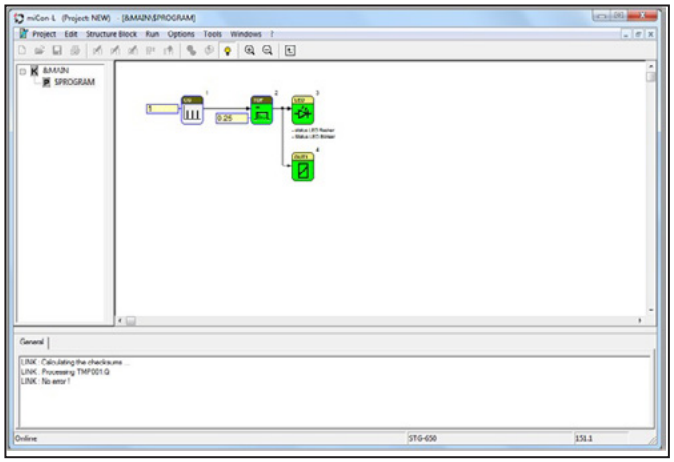
► Confirm by pressing OK.

The "miCon-L" window opens if you did not save your program before loading.



Save project

► Confirm by pressing "Yes" to save your project.
Online observation starts automatically.

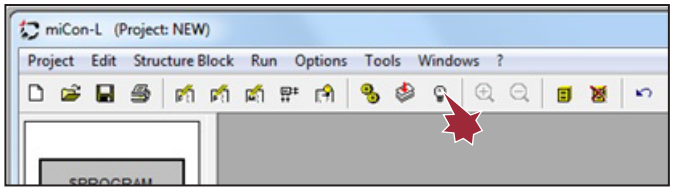


Online observation

To end online observation, see Chapter 6.6.

6.6 Online observation

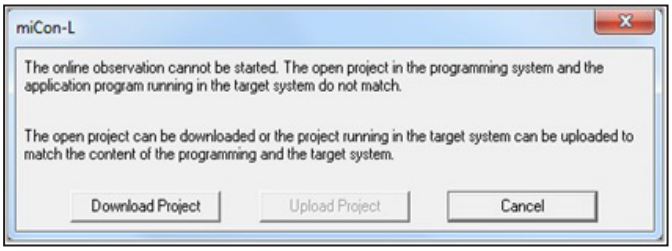
► Connect the logic unit to the power supply.
► Connect the logic unit to the PC using the USB cable.



Start online observation

► To start online observation, click on the "Online/Offline" icon.
► If you have not yet done so, open up the "&MAIN" tree.
► If you have not yet done so, double-click on "$PROGRAM" to open it.

The "miCon-L" window opens if there is no program on the logic unit yet or the program is not the same as yours.

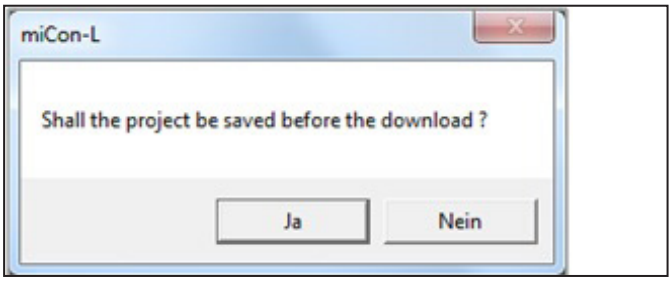


"miCon-L" window

► To load your program onto the logic unit, click on the "Download project" button.
The program is loaded onto the logic unit.

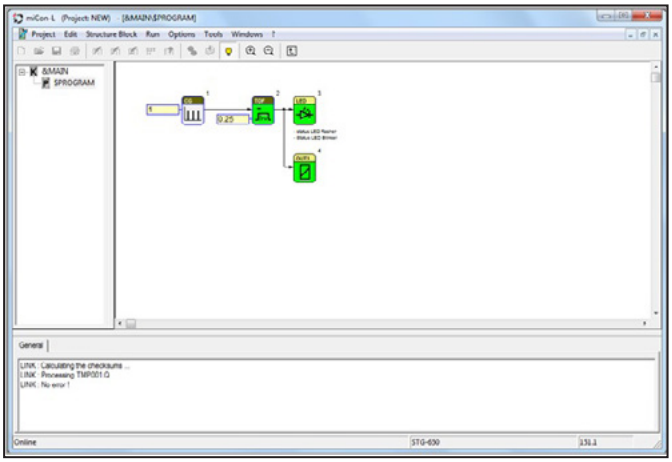
This program is still on the control after a voltage drop.

The "miCon-L" window opens if you did not save your program before loading.



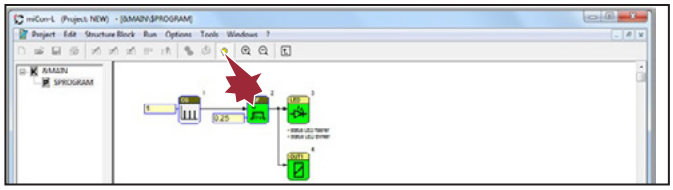
Save project

► Confirm by pressing "Yes" to save your project.
Online observation starts automatically.



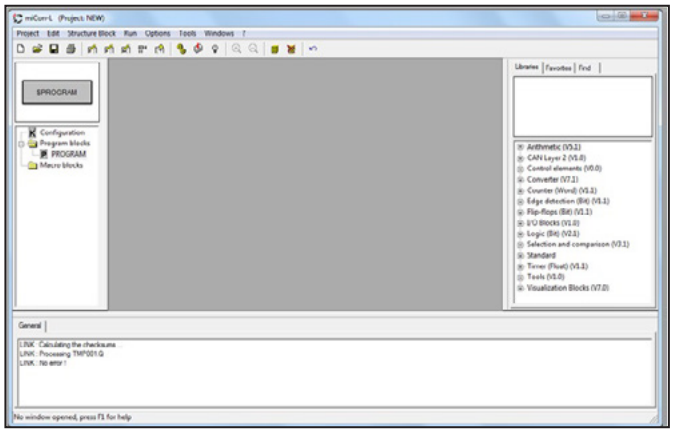
Online observation

► To end online observation, click on the "Online/Offline" icon and then close the window.



Ending online observation

This takes you back to the programming interface.



Programming interface after online observation

► If you wish to continue editing your program, click on "PROGRAM" in the program tree.

6.7 Example project

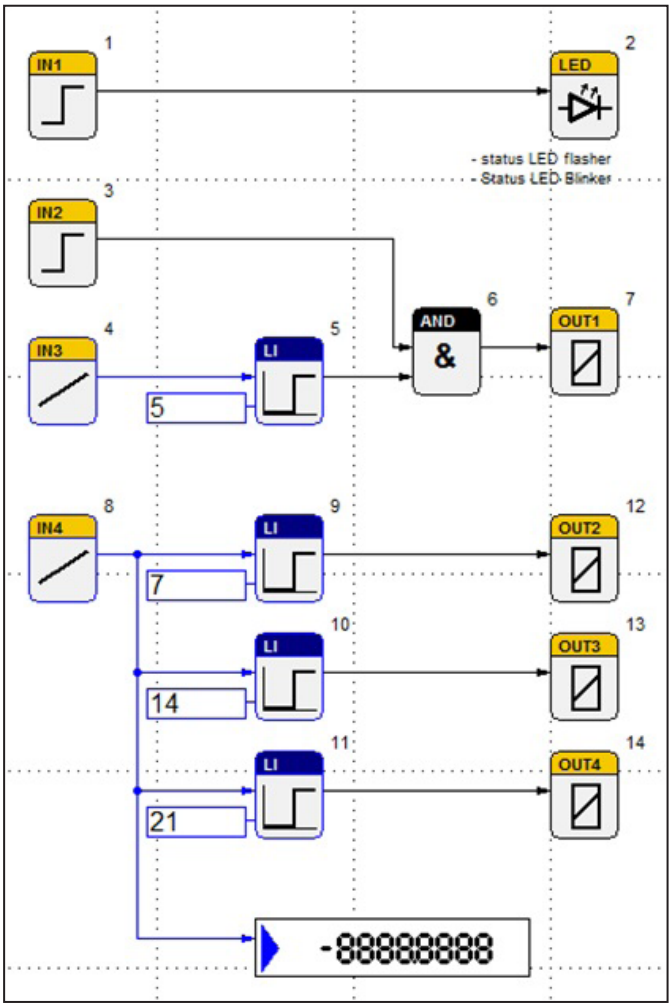
The basics of creating and simulating projects have been explained in the previous chapter. In the example "Building automation" project, the logic unit is to be used to control a water tank and a ventilation unit within a building.

The following functions are to be implemented:

- When a switch is actuated (Input 1/Switch1/IN 1), the status LED should light up.
- The ventilation unit (Output 1/OUT 1) is switched on using another switch (Input 2/Switch 2/IN 2) if the temperature sensor (Input 3/IN 3) generates a signal greater than 5 V. If the temperature drops or the switch is switched off again, the ventilation unit stops.
- The water fill level on the tank is passed to the control by a potentiometer (Input 4/IN 4). Depending on the fill level, the outputs are switched to display the water level.
- Output 2 OUT 2 7 V
  This output switches a lamp which displays when the tank is 30 % full.
- Output 3 OUT 3 14 V
  This output switches a signal horn which sounds when the tank is 30 % full.
- Output 4 OUT 4 21 V
  This output switches all the water pumps on so that the water is no longer pumped into the tank and it cannot overflow.

TIP: The F1 button provides comprehensive help on all topics!

The finished program should look as follows:



Solution for example project

7 Technical Data

Technical Data	WCU 501 (Order no. 1517130000)	WCU 650 (Order no. 2010680000)
General data		
Type of connection	Pluggable spring-type terminals (0.25 – 1.5 mm²)	
Operating voltage	+VDD: 7 ... 32 V DC	
Input fuse	Max. 8 A (external)	
Wire connection method	PUSH IN	
Optical function display	LED	
Interface	Serial RS232	TTL 232
Degree of protection	IP20	
Safety	Watchdog Brown out detection Power up timer	Watchdog Fail-safe oscillator 16 MHz Brown out detection, Power up timer
Current consumption	< 4 mA	Nominal 15 mA @ 32 V DC
Encapsulation compound	Polyurethane (PU)	
Reverse polarity protection	-	Yes (combined with external fuse)
Analogue inputs		
Number	3	6
Pin assignment	IN 3, IN 4, IN 5	IN 1, IN 2, IN 3, IN 4, IN 5, IN 6
Resolution	10-bit	12-bit
Input voltage	0 ... 30 V DC	
Input resistance	> 11 kΩ	
Accuracy	± 3% (0.5 V DC)	± 2% (0.25 V DC)
Digital inputs		
Number	2	4
Pin assignment	IN 1, IN 2	IN 7, IN 8, IN 9, IN 10
Input frequency	≤ 1 kHz	
Input voltage	0 - 30 V DC	
Input resistance	> 30 kΩ	
Pulse length	≥ 1 ms	
Threshold voltage Off	≤ 5 V DC	≤ 2 V DC
Threshold voltage On	> 5 V DC	≥ 4 V DC
Digital outputs		
Number	4	8
Pin assignment	OUT 1, OUT 2, OUT 3, OUT 4	OUT 1, OUT 2, OUT 3, OUT 4, OUT 5, OUT 6, OUT 7, OUT 8
Output voltage	+VDD - 0.45 V	
Total output current	≤ 4 A	≤ 6 A
Output current per channel	< 1.5 A	
Switching frequency	0 ... 100 Hz	
PWM output		
Number	1, can also be used as digital output	
Type	Ground-switching	

Technical Data	WCU 501 (Order no. 1517130000)	WCU 650 (Order no. 2010680000)
Pin assignment	OUT 5	OUT 9
Output voltage	≤ GND + 0.25 V	
Output current per channel	≤ 1 A	
Switching frequency	1...5 kHz	1...10 kHz
CAN interface		
Baud rate	-	100, 125, 250, 500 kbit
Bus system	-	ISO 11898-2, CAN 2.0B, CAN 2.0A
Identifier	-	11 bit / 29 bit
Dimensions and weight		
Weight (without cables and adapters)	50 g	102 g
Height	40 mm	93 mm
Width	44 mm	45 mm
Depth	31 mm	30 mm

8 Ordering data

	Order no.	Part designation	Description
	1517130000	LOGIC UNIT WCU 501	Graphically programmable logic unit WCU 501 with two pluggable spring-type screw terminals
	1548720000	WCU 501 STARTER KIT	WCU 501 logic unit with RS232 cable and RS232 USB converter
	2515030000	WCU 501 RS232 CABLE	RS232 cable for WCU 501 (without RS232 USB converter)
	2010680000	LOGIC UNIT WCU 650	Graphically programmable logic unit WCU 650 with CAN interface and three pluggable spring-type terminals
	2007290000	WCU 650 STARTER KIT	WCU 650 logic unit with USB programing adapter
	2515020000	WCU 650 PC CABLE	USB programming adapter for WCU 650

Weidmüller – Your Partner in Industrial Connectivity

As experienced experts we support our customers and partners around the world with products, solutions and services in the industrial environment of power, signal and data. We are at home in their industries and markets and know the technological challenges of tomorrow. We are therefore continuously developing innovative, sustainable and useful solutions for their individual needs. Together we set standards in Industrial Connectivity.

Weidmüller Interface GmbH & Co. KG
Klingenbergstraße 16
D-32758 Detmold, Germany
T +49 5231 14-0
F +49 5231 14-292083
www.weidmueller.com

You can find your local Weidmüller contact on the Internet at www.weidmueller.com/corporate/locations worldwide

Order number: 2530270000/01/12.2017