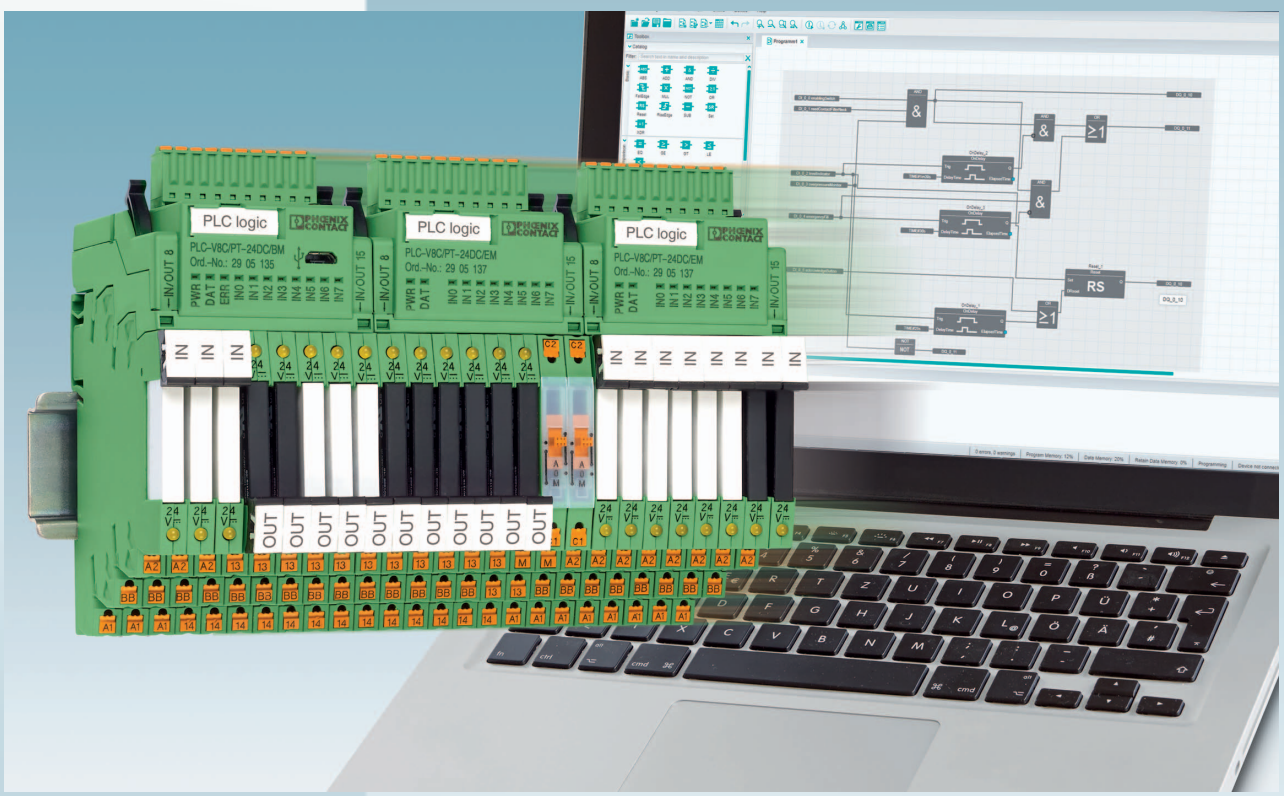

Installing and operating the PLC logic programmable logic relay system

User manual

PHOENIX CONTACT
INSPIRING INNOVATIONS

User manual

Installing and operating the PLC logic programmable logic relay system

2016-12-15

Designation: UM EN PLC logic

Revision: 01

Order No.: —

This user manual is valid for:

Designation	Order No.
PLC-V8C/SC-24DC/BM	2903094
PLC-V8C/PT-24DC/BM	2905135
PLC-V8C/SC-24DC/BM2	2907447
PLC-V8C/PT-24DC/BM2	2907446
PLC-V8C/SC-24DC/EM	2903095
PLC-V8C/PT-24DC/EM	2905137
PLC-V8C/SC-24DC/SAM	2905082
PLC-V8C/PT-24DC/SAM	2905136
PLC-V8C/SC-24DC/SAM2	2907445
PLC-V8C/PT-24DC/SAM2	2907443
LOGIC+ software	
PLC logic app software	

Please observe the following notes

User group of this manual

The use of products described in this manual is oriented exclusively to:

– Qualified electricians or persons instructed by them, who are familiar with applicable standards and other regulations regarding electrical engineering and, in particular, the relevant safety concepts.
– Qualified application programmers and software engineers, who are familiar with the safety concepts of automation technology and applicable standards.

Explanation of symbols used and signal words

This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety measures that follow this symbol to avoid possible injury or death.

There are three different categories of personal injury that are indicated with a signal word.

DANGER This indicates a hazardous situation which, if not avoided, will result in death or serious injury.

WARNING This indicates a hazardous situation which, if not avoided, could result in death or serious injury.

CAUTION This indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

This symbol together with the signal word **NOTE** and the accompanying text alert the reader to a situation which may cause damage or malfunction to the device, hardware/software, or surrounding property.

This symbol and the accompanying text provide the reader with additional information or refer to detailed sources of information.

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Table of contents

1 Overview of PLC logic

1.1 Quick finder

Here you will find an overview of frequently used information regarding your PLC logic relay system.

Table 1-1 Frequently used information

Access data	Default access data (see “Login” on page 53) User name: admin Password: admin Change the password during startup.
Initial startup	PWR and ERR LED flash during initial startup: The logic module is in stop mode, as a program has not been downloaded yet.
Call the web server	Connect the device and enter either of the following addresses in a standard browser: http://v8c_usb or 169.254.200.9 The following ports must be enabled by the firewall for the connection to the logic module: TCP 41100 UDP 137, 138, 139
Set the time	Connect the device and access the device via the web server, “Configuration, Realtime clock” menu item (see “Realtime clock” on page 55)
Analog values	All analog values are scaled to the 0 ... 1000 value range in the LOGIC+ software.
Installation of the PLC logic communication driver for the PC	For details regarding installation, see “Connection to the PC” on page 49
Support request via e-mail	plclogic-service@phoenixcontact.com

1.2 What is PLC logic?

The PLC logic programmable logic relay system consists of PLC-V8C logic modules, electromechanical relays, solid-state relays or analog terminal blocks from the PLC-INTERFACE series, and the LOGIC+ programming software.

The PLC-V8C logic modules together with the narrow 6.2 mm PLC-INTERFACE terminal blocks form a microcontroller which performs small automation tasks and replaces conventional switching and control devices, all without any extensive programming knowledge being required.

1.3 How does PLC logic work?

With eight fixed inputs and a further eight freely configurable I/O channels with electromechanical relays, solid-state relays or analog terminal blocks from the PLC-INTERFACE series, the system has a modular design and can process a maximum of 48 I/O signals with two PLC-V8C extension modules. Each of the freely configurable I/O channels can be configured as an input or output.

PLC logic is configured and programmed using the “LOGIC+” software. The software can be downloaded free of charge at phoenixcontact.net/products.

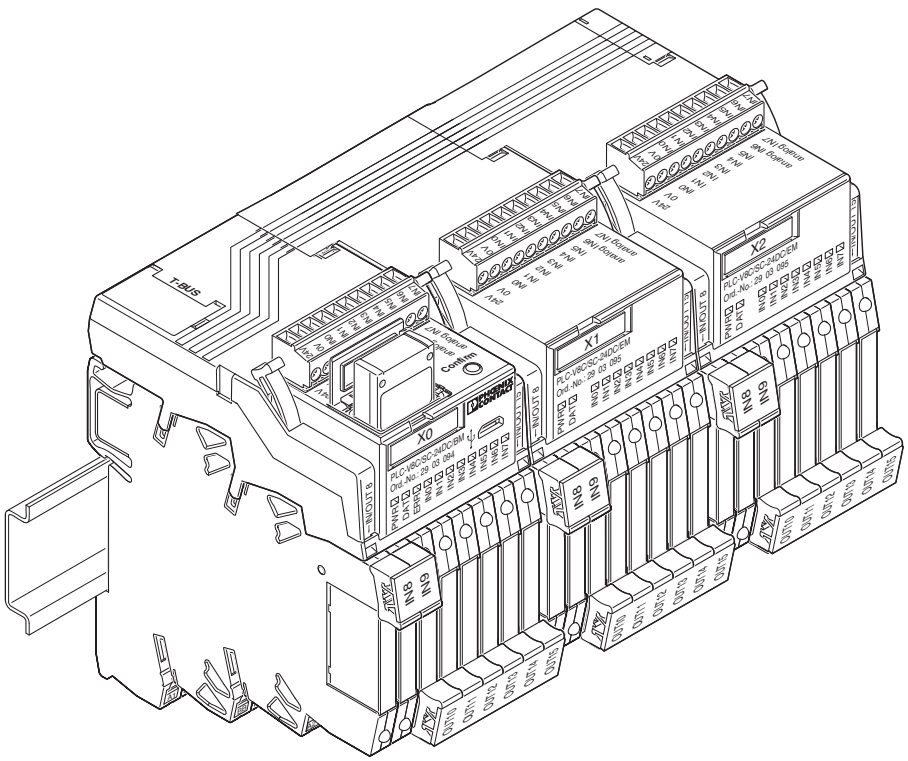


Figure 1-1 Entire system

1.4 What can PLC logic be used for?

PLC logic handles tasks in industrial, system, and installation technology as well as laboratory and training applications. Typical applications are listed in the table below.

Table 1-2 Possible applications

Application	Example
Applications with time functions	Switch-on/switch-off delay, weekly timer, pulse stretching, flashing relay
Small machines	Drives, pumps, valves, compressors, exhaust and filter systems, mixing machines, dosing machines
Handling equipment	Conveyors, lifting tables, freight elevators, silos, feeding systems
Heating, ventilation, air conditioning	Fans, cooling, heating, air conditioning systems
Building automation	Doors, barriers, shutters and blinds, sprinklers, lighting control systems
Other applications	Signaling systems (e.g., construction sites), alarm systems

2 Hardware description

The PLC-V8C logic modules are inserted in the bridge shafts of eight PLC-INTERFACE terminal blocks mounted side by side on a DIN rail. All logic modules feature the following:

– Eight integrated digital inputs: two of which can be configured as analog inputs (0 V ... 10 V)
– Connection via connector with screw or Push-in connection technology
– Programming possible using the LOGIC+ software

The following PLC-V8C types are available:

PLC-V8C stand-alone modules

Order No.	Designation
2905082	PLC-V8C/SC-24DC/SAM with screw connection
2905136	PLC-V8C/PT-24DC/SAM with Push-in connection

– Stand-alone logic module with 16 I/Os, cannot be extended
– Connection to PC via micro USB socket
– Integrated realtime clock
– Accommodates external IFS-CONFSTICK memory module
– A further eight channels can be configured with corresponding PLC-INTERFACE terminal blocks as digital inputs or outputs

PLC-V8C stand-alone modules 2

Order No.	Designation
2907445	PLC-V8C/SC-24DC/SAM2 with screw connection
2907443	PLC-V8C/PT-24DC/SAM2 with Push-in connection

– Stand-alone logic module with 16 I/Os, cannot be extended
– Connection to PC via micro USB socket
– Integrated realtime clock
– Accommodates external IFS-CONFSTICK memory module
– A further eight channels can be configured with corresponding PLC-INTERFACE terminal blocks as digital or analog inputs or outputs

PLC-V8C basic modules

Order No.	Designation
2903094	PLC-V8C/SC-24DC/BM with screw connection
2905135	PLC-V8C/PT-24DC/BM with Push-in connection

- Basic logic module with 16 I/Os, can be extended with a maximum of two extension modules (PLC-V8C.../EM) to 48 I/Os
- Connection to PC via micro USB socket
- Integrated realtime clock
- Accommodates external IFS-CONFSTICK memory module
- A further eight channels can be configured with corresponding PLC-INTERFACE terminal blocks as digital inputs or outputs
- Optional connection to Interface system gateways

PLC-V8C basic modules 2

Order No.	Designation
2907447	PLC-V8C/SC-24DC/BM2 with screw connection
2907446	PLC-V8C/PT-24DC/BM2 with Push-in connection

- Basic logic module with 16 I/Os, can be extended with a maximum of two extension modules (PLC-V8C.../EM) to 48 I/Os
- Connection to PC via micro USB socket
- Integrated realtime clock
- Accommodates external IFS-CONFSTICK memory module
- A further eight channels can be configured with corresponding PLC-INTERFACE terminal blocks as digital or analog inputs or outputs
- Optional connection to Interface system gateways

PLC-V8C extension modules

Order No.	Designation
2903095	PLC-V8C/SC-24DC/EM with screw connection
2905137	PLC-V8C/PT-24DC/EM with Push-in connection

Extension logic module with 16 I/Os, for extending the basic module

The following PLC-INTERFACE terminal blocks can be connected to PLC-V8C.

Each channel can be configured as an input or output using the LOGIC+ software.

Table 2-1 Corresponding PLC-INTERFACE terminal blocks

Type	Order designation	Order No.	Order designation	Order No.
	Push-in connection		**Screw connection**	
Relay output				
1 changeover contact, 6 A, 250 V AC/DC	PLC-RPT-24DC/21	2900299	PLC-RSC-24DC/21	2966171
1 changeover contact, 50 mA, 36 V DC, gold contact	PLC-RPT-24DC/21AU	2900306	PLC-RSC-24DC/21AU	2966265
1 N/O contact, 6 A, 250 V AC/DC, actuator type	PLC-RPT-24DC/1/ACT	2900312	PLC-RSC-24DC/1/ACT	2966210
1 N/O contact with switch, 6 A, 250 V AC/DC	PLC-RPT-24UC/1/S/H	2900328	PLC-RSC-24UC/1/S/H	2982236
Solid-state relay output				
100 mA, 3 V DC ... 48 V DC	PLC-OPT-24DC/48DC/100	2900352	PLC-OSC-24DC/48DC/100	2966728
3 A, 3 V DC ... 33 V DC	PLC-OPT-24DC/24DC/2	2900364	PLC-OSC-24DC/24DC/2	2966634
750 mA, 24 V AC ... 253 V AC	PLC-OPT-24DC/230AC/1	2900369	PLC-OSC-24DC/230AC/1	2967840
3 A, 3 V DC ... 33 V DC, actuator type	PLC-OPT-24DC/24DC/2/ACT	2900376	PLC-OSC-24DC/24DC/2/ACT	2966676
750 mA, 24 V AC ... 253 V AC, actuator type	-	-	PLC-OSC-24DC/230AC/1/ACT	2967947
1 A, 12 V DC ... 300 V DC	PLC-OPT-24DC/300DC/1	2900383	PLC-OSC-24DC/300DC/1	2980678
10 A, 3 V DC ... 33 V DC	PLC-OPT-24DC/24 DC/10/R	2900398	PLC-OSC-24DC/24DC/10/R	2982702
500 mA, 3 V DC ... 48 V DC, electronic changeover contact	PLC-OPT-24DC/48DC/500/W	2900378	PLC-OSC-24DC/48DC/500/W	2980636
TTL, 50 mA, 5 V DC	PLC-OPT-24DC/TTL	2900363	PLC-OSC-24DC/TTL	2982728
Analog input				
0 V … 10 V, 2 V … 10 V, 0 mA … 20 mA, 4 mA … 20 mA	PLC-APT-UI-IN	2906917	PLC-ASC-UI-IN	2906916
-50°C … 200°C	PLC-APT-PT100-IN	2906919	PLC-ASC-PT100-IN	2906918
Relay input				
24 V DC	PLC-RPT-24DC/1AU/SEN	2900313	PLC-RSC-24DC/1AU/SEN	2966317
120 V AC/DC	PLC-RPT-120UC/1AU/SEN	2900314	PLC-RSC-120UC/1AU/SEN	2966320
230 V AC/DC	PLC-RPT-230UC/1AU/SEN	2900315	PLC-RSC-230UC/1AU/SEN	2966333
5 V DC (basic terminal block without relay)	PLC-BSC- 5DC/ 1/SEN	2980267	-	-
Relay for 5 V DC basic terminal block	REL-MR-4,5DC/21AU	2961370	-	-
Solid-state relay input				
24 V DC	PLC-OPT-24DC/V8C/SEN	2908172	PLC-OSC-24DC/V8C/SEN	2908173
120 V AC/DC	PLC-OPT-120UC/V8C/SEN	2908174	PLC-OSC-120UC/V8C/SEN	2908175
230 V AC/DC	PLC-OPT-230UC/V8C/SEN	2908176	PLC-OSC-230UC/V8C/SEN	2908177
Analog output				
0 V … 10 V, 2 V … 10 V, 0 mA … 20 mA, 4 mA … 20 mA	PLC-APT-UI-OUT	2906921	PLC-ASC-UI-OUT	2906920
Dummy or reserve				
Basic terminal blocks output	PLC-BPT-24DC/21	2900445	PLC-BSC-24DC/21	2966016
Basic terminal blocks input	PLC-BPT-24DC/1/SEN	2900262	PLC-BSC-24DC/1/SEN	2966061

2.1 Hardware configuration examples

2.1.1 10 inputs, 6 outputs

Inputs	24 V DC via eight integrated inputs and two PLC-INTERFACE inputs via relays
Outputs	Via six PLC-INTERFACE relays, 1 N/O contact, 250 V AC/6 A
Connection technology	Screw connection
Required components	1x PLC-V8C/SC-24DC/SAM (Order No. 2905082) 2x PLC-RSC-24DC/1AU/SEN (Order No. 2966317) 6x PLC-RSC-24DC/1/ACT (Order No. 2966210)

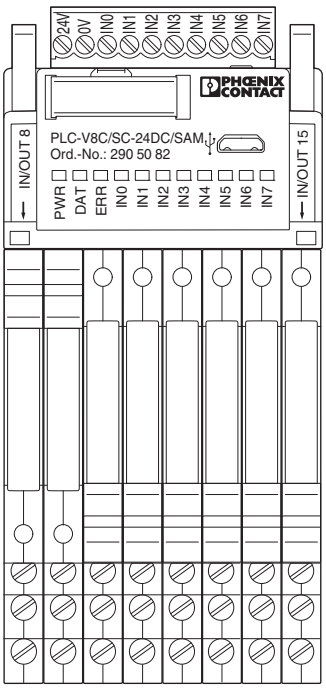


Figure 2-1 Configuration with 10 inputs, 6 outputs

2.1.2 8 inputs, 8 outputs

Inputs	All 24 V DC inputs via eight integrated inputs
Outputs	All outputs via PLC-INTERFACE relays, 1 changeover contact, 250 V AC/6 A
Connection technology	Screw connection
Required components	1x PLC-V8C/SC-24DC/SAM (Order No. 2905082) 8x PLC-RSC-24DC/21 (Order No. 2966171)

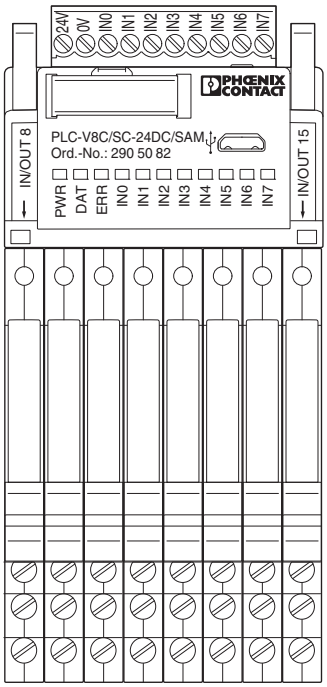


Figure 2-2 Configuration with 8 inputs, 8 outputs

2.1.3 20 inputs, 12 outputs

Inputs	16 24 V DC inputs via 2x eight integrated inputs and four 230 V AC inputs via PLC-INTERFACE relays
Outputs	12 outputs via PLC-INTERFACE solid-state relays, 230 V AC/750 mA
Connection technology	Screw connection
Required components	1x PLC-V8C/SC-24DC/BM (Order No. 2903094) 1x PLC-V8C/SC-24DC/EM (Order No. 2903095) 4x PLC-RSC/230UC/1AU/SEN (Order No. 2966333) 12x PLC-OSC-24DC/230AC/1/ACT (Order No. 2967947)

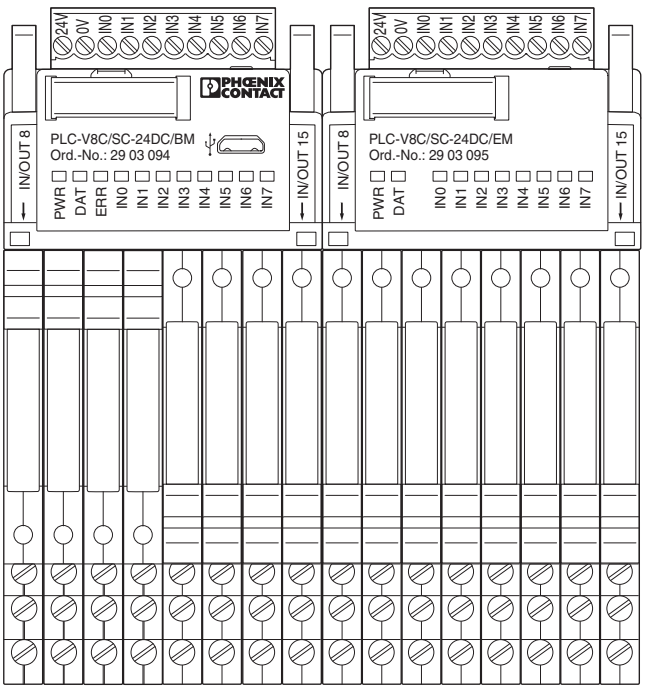


Figure 2-3 Configuration with 20 inputs, 12 outputs

3 Installing PLC logic

The logic module is supplied together with a packing slip with installation instructions. Read the complete packing slip carefully before installing the logic module.

NOTE: Electrostatic discharge

The logic module contains components that can be damaged or destroyed by electrostatic discharge. When handling the logic module, observe the necessary safety precautions against electrostatic discharge (ESD) according to EN 61340-5-1 and IEC 61340-5-1.

NOTE: Risk of damage to equipment

To avoid possible damage to the logic module, unpack and pack the logic module in accordance with the ESD regulations.

3.1 Connection and operating elements

3.1.1 Stand-alone logic modules

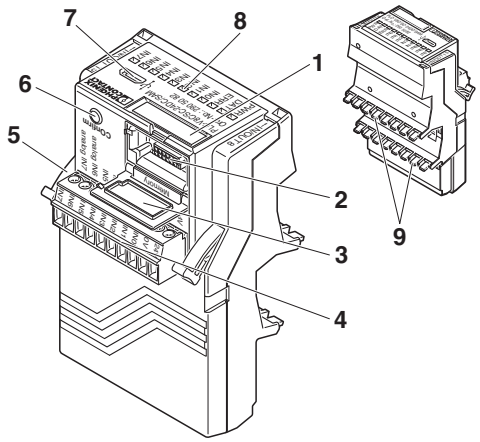


Figure 3-1 Connection and operating elements of stand-alone logic modules

1. Equipment marking label
2. Socket for memory module (Memory)
3. Cover for memory module
4. 10-pos. COMBICON connector
5. Eject lever
6. Confirmation button (Confirm)
7. Micro USB socket
8. Status LEDs
9. Contacts for PLC-INTERFACE terminal blocks

3.1.2 Basic logic modules

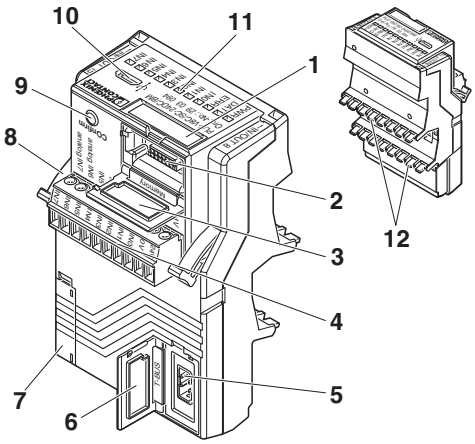


Figure 3-2 Connection and operating elements of basic logic modules

1. Equipment marking label
2. Socket for memory module (Memory)
3. Cover for memory module
4. 10-pos. COMBICON connector
5. DIN rail connector connection
6. DIN rail connector cover (T-BUS)
7. Covering hood and socket contacts for the extension module
8. Eject lever
9. Confirmation button (Confirm)
10. Micro USB socket
11. Status LEDs
12. Contacts for PLC-INTERFACE terminal blocks

3.1.3 Extension logic modules

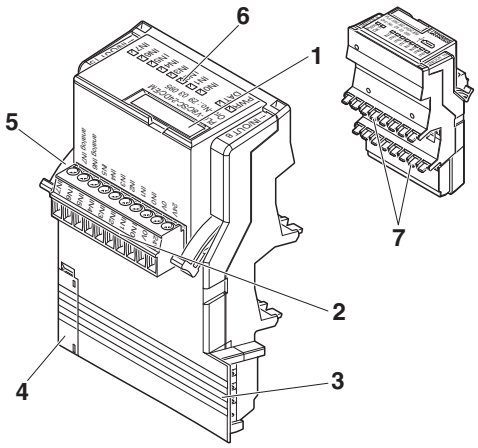


Figure 3-3 Connection and operating elements of extension logic modules

1. Equipment marking label
2. 10-pos. COMBICON connector
3. Knife contacts of extension modules
4. Covering hood and socket contacts for the extension module
5. Eject lever
6. Status LEDs
7. Contacts for PLC-INTERFACE terminal blocks

3.1.4 PLC-INTERFACE terminal blocks

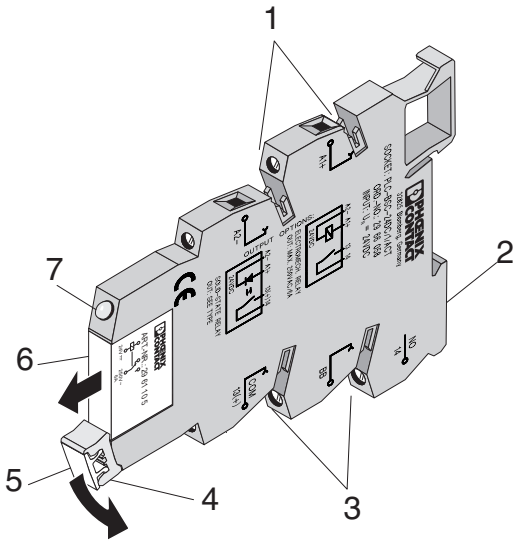


Figure 3-4 Connection and operating elements of PLC-INTERFACE terminal blocks

1. Contacts to accommodate the logic module
2. PLC-B... basic terminal block
3. Contact for plug-in bridge system
4. Snap-in lever for securing and ejecting the function electronics
5. Optional ZB 6 equipment marking label
6. Plug-in function electronics
7. LED status indicator

3.2 Diagnostics and status indicators

The device is equipped with 11 LED status or diagnostics indicators, from which the operating state can be read.

Table 3-1 Diagnostic and status indicators

	Basic module				Extension module		
	Green PWR LED	Green DAT LED	Red ERR LED	Yellow YE LED	Green PWR LED	Green DAT LED	Yellow YE LED
Messages							
Supply voltage not present	●	●	●	●	●	●	●
Supply voltage OK, program running, no data traffic to the extension module	○	●	●	●	○	●	●
Supply voltage OK, program running, data traffic to the extension module	○	●	●	●	○	○	●
Supply voltage OK, controller in stop mode	☼	●	☼	●	○	●	●
Supply voltage OK, connection to the extension module interrupted or error when saving retain variables	☼	●	☒	●	●	●	●
Supply voltage OK, firmware update of basic module running	○	☒	●	●	○	●	●
Supply voltage OK, firmware update of extension module running	○	●	●	●	○	☒	●
Supply voltage OK, internal error at basic module	○	●	○	●	○	●	●
Supply voltage OK, external error	○	●	☒	●	○	●	●
Supply voltage OK, short circuit at PLC outputs or overload error at basic or extension module	○	●	☒	●	○	●	●
Digital inputs							
Supply voltage OK, input at basic module, extension module controlled	○	●	●	○	○	●	○
Supply voltage OK, input at basic module, extension module not controlled	○	●	●	●	○	●	●
Memory stick							
Supply voltage OK, copying new program to the memory stick	○	☒	●	●	○	●	●
Supply voltage OK, finished copying	○	●	●	●	○	●	●
Supply voltage OK, new program on the memory stick	○	☒	☒	●	○	●	●
Supply voltage OK, error when handling the memory stick	○	☒	☼	●	○	●	●
IFS gateway							

Table 3-1 Diagnostic and status indicators [...]

	Basic module				Extension module		
	Green PWR LED	Green DAT LED	Red ERR LED	Yellow YE LED	Green PWR LED	Green DAT LED	Yellow YE LED
Supply voltage OK, data traffic to the IFS gateway	○	○	●	●	○	●	●
Supply voltage OK, data traffic to the IFS gateway, data traffic to the extension module	○	○	●	●	○	○	●
Supply voltage OK, no data traffic to the IFS gateway, no data traffic to the extension module	☼	●	☼	●	○	●	●
Supply voltage OK, data traffic to the IFS gateway, connection to the extension module interrupted	☼	○	☼	●	●	●	●
Supply voltage OK, data traffic to the IFS gateway, controller in stop mode	☼	○	☼	●	○	●	●

Table 3-2 Explanation of the symbols

Symbol	Description
●	LED is off
○	LED is on
☼	LED is flashing
☼	LED is flashing quickly

3.3 Circuit diagrams

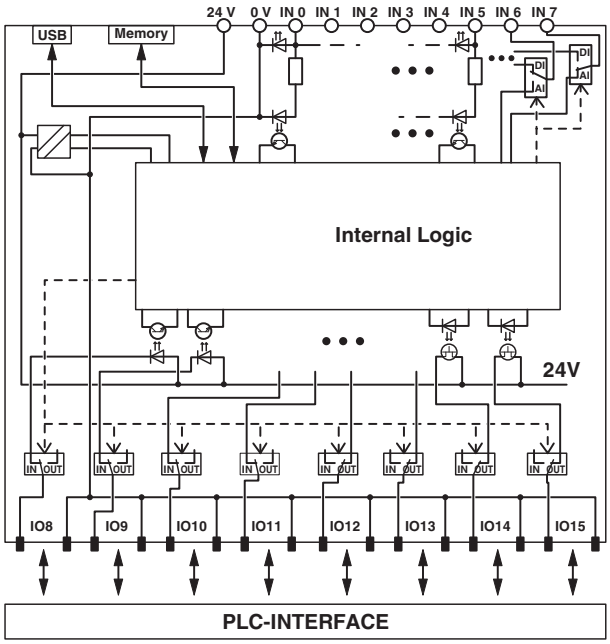


Figure 3-5 Basic circuit diagram for PLC-V8C/…/SAM

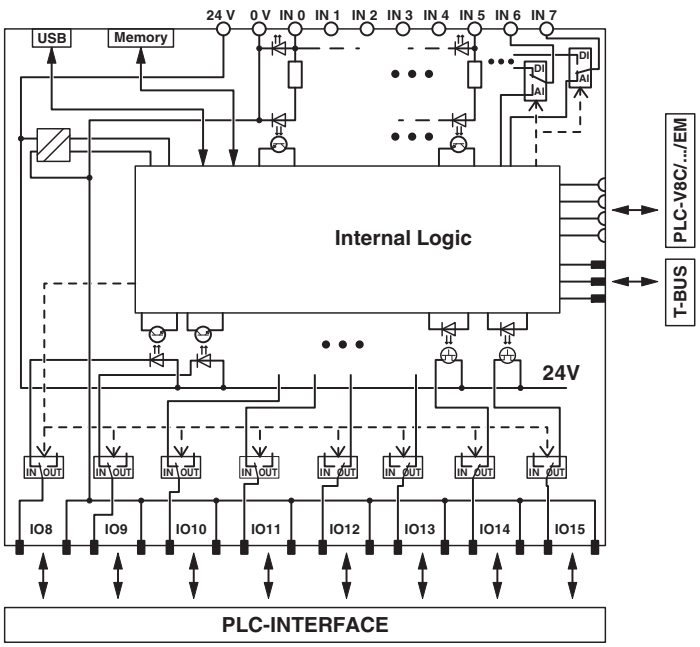


Figure 3-6 Basic circuit diagram for PLC-V8C/…/BM

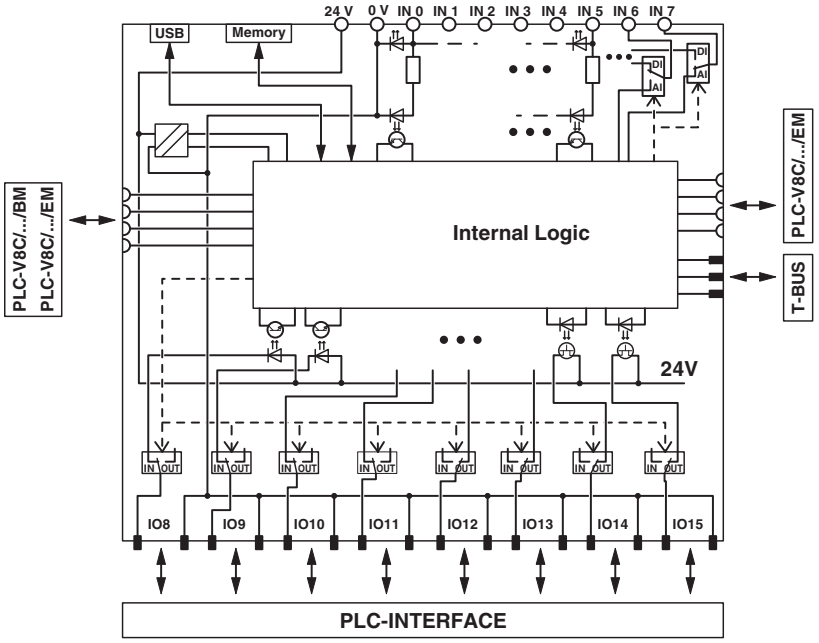


Figure 3-7 Basic circuit diagram for PLC-V8C/…/EM

3.4 Mounting and removing PLC logic

3.4.1 Safety notes

Position an end bracket at the start and end of a PLC logic structure (recommendation: CLIPFIX 35-5, Order No. 3022276). If subject to vibration, the DIN rail needs to be fixed at intervals of 10 cm.

3.4.2 Mounting stand-alone and basic modules

Proceed as follows to mount PLC logic:

1. Snap the eight corresponding PLC-INTERFACE terminal blocks (see Table 2-1 on page 15) side by side onto the DIN rail.

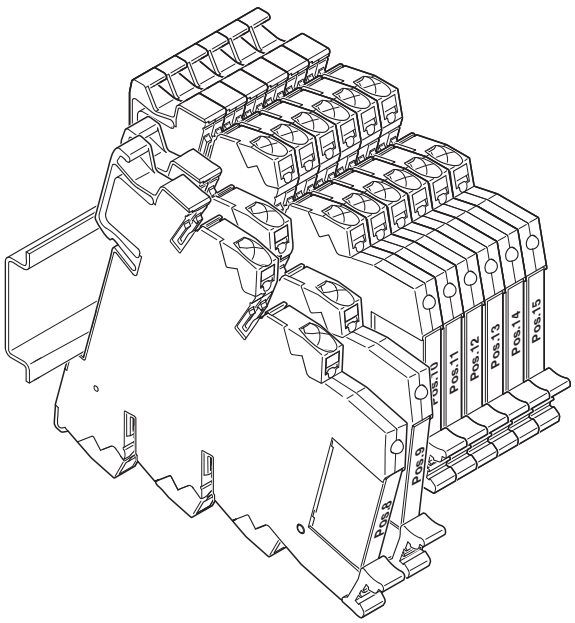


Figure 3-8 Snapping the PLC-INTERFACE terminal blocks onto the DIN rail

2. Insert the logic module (stand-alone or basic module) into the corresponding contacts of the eight PLC-INTERFACE terminal blocks. In general, the logic module is inserted in the contact locators of the PLC-INTERFACE terminal blocks, which also have a foot lever for the terminal block located on the side (item 1 Figure 3-4 on page 23).

3. Make sure that the logic module is flush with the PLC-INTERFACE terminal blocks. The logic module can then be fixed in place correctly.

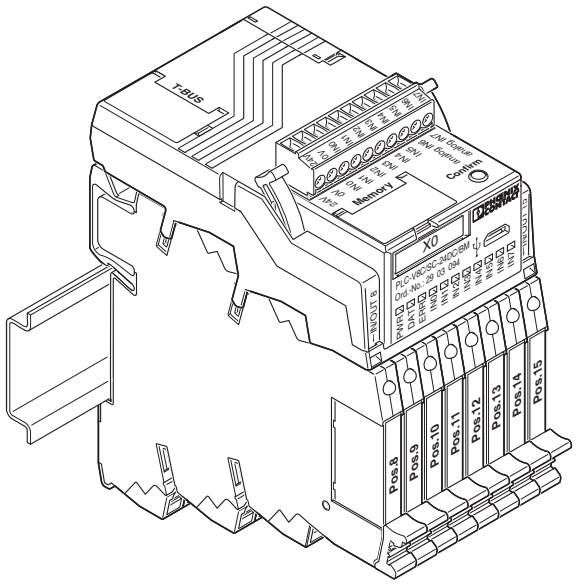
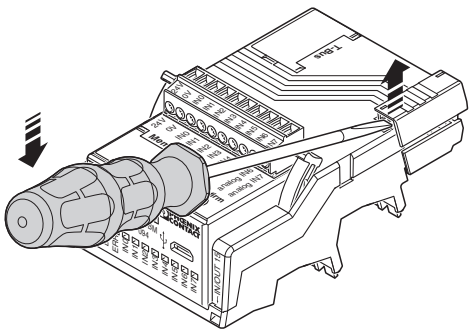


Figure 3-9 Logic module is fixed in place

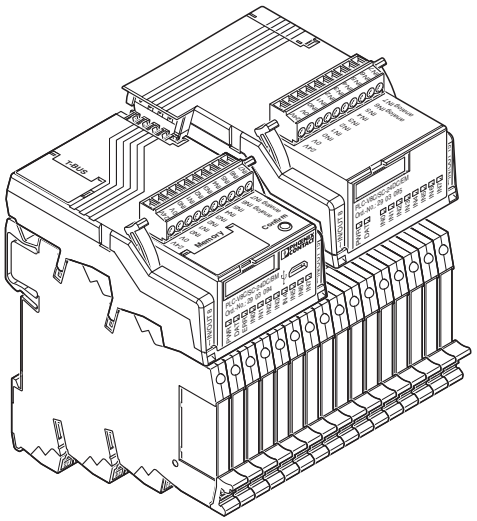
3.4.3 Mounting extension modules

If you require more I/O signals than are supported with the PLC-V8C...BM basic module, connect a maximum of two PLC-V8C...EM extension modules to the basic module.

1. Remove the covering hood (7) from the basic module (see Figure 3-2 on page 21).



2. Connect a further eight PLC-INTERFACE terminal blocks to the last PLC-INTERFACE terminal block of the basic module.
3. Insert the extension module in the bridge shafts of the PLC-INTERFACE terminal blocks. Contact is automatically established with the basic module via the plug-in connection (7) and (13) (see Figure 3-2 on page 21).



4. Proceed in the same way to attach a second extension module. To do this, remove the covering hood (7) on the first extension module (see Figure 3-3 on page 22).

3.4.4 Removal

The logic module is disconnected from the PLC-INTERFACE terminal blocks by simultaneously actuating both eject levers. Proceed as follows:

First remove the last extension module, followed by the first extension module and then the basic module.

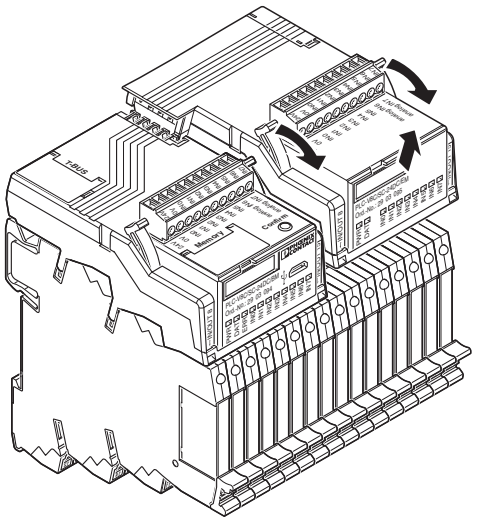


Figure 3-10 Actuating the eject levers to remove the logic modules

4 Connecting and wiring PLC logic

4.1 Power supply

The logic modules are supplied with voltage via the 10-pos. COMBICON connector. Optional extension modules must be supplied separately.

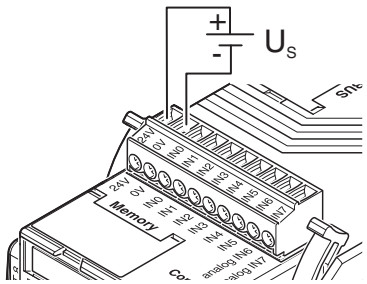


Figure 4-1 Power supply

Table 4-1 Connection data for the 10-pos. COMBICON connector

Connector type	Screw connection
Conductor cross section (solid/stranded)	0.14 - 1.5 mm²/0.14 - 1.5 mm²/28 - 16 AWG
Stripping length	7 mm
Tightening torque	0.22 - 0.25 Nm
Connector that can be ordered as replacement part	MC 1,5/10-ST-3,5 (unprinted) (Order No. 1840447)
Connector type	Push-in connection
Conductor cross section (solid/stranded)	0.14 - 1.5 mm²/0.14 - 1.5 mm²/28 - 16 AWG
Stripping length	9 mm
Connector that can be ordered as replacement part	FK-MCP 1,5/10-ST-3,5 (unprinted) (Order No. 1939989)

4.2 Inputs and outputs

4.2.1 Integrated inputs

Like the power supply, the eight integrated inputs (IN0 to IN7) are connected via the 10-pos. COMBICON connector (for connection data, see Table 4-1 on page 33).

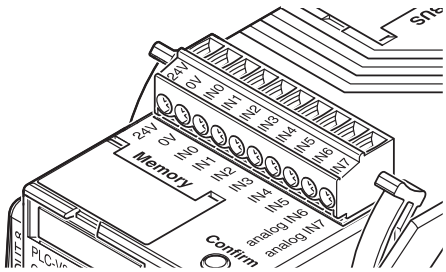


Figure 4-2 Integrated inputs

Table 4-2 Properties of the integrated inputs

Status	IN0 to IN5	IN6, IN7
Off	< 5 V DC	< 5 V DC
Input current	< 0.9 mA	< 1 mA
On	> 11 V DC	> 11 V DC
Input current	> 2.2 mA	> 2.3 mA

When the status changes from “Off” to “On”, the voltage must be > 11 V DC for at least one program cycle so that the logic module detects the new status. The same applies when the status changes from “On” to “Off”. In this case the voltage must be < 5 V DC for at least one program cycle so that the new status is detected.

For information on the cycle time, see “Cycle time” on page 82.

Inputs IN6 and IN7 can be used as digital inputs or as analog inputs (0 V DC ... 10 V DC voltage inputs). Configuration is carried out in the LOGIC+ software.

4.2.1.1 Connecting integrated inputs

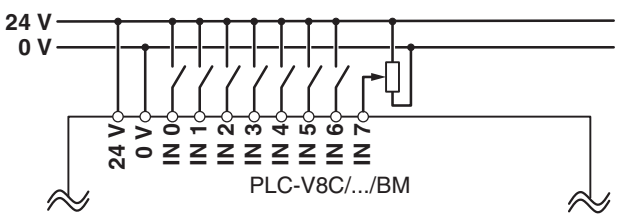


Figure 4-3 Connecting integrated inputs

The integrated inputs are non-isolated, i.e., they have the same ground as the supply voltage. For floating entries, the inputs are available via PLC-INTERFACE terminal blocks (POS.8 to POS.15).

4.2.1.2 Designation of the inputs

Table 4-3 Stand-alone logic module and basic logic module (station 0)

Connector designation	Designation in LOGIC+
IN0	DI_0_0
IN1	DI_0_1
IN2	DI_0_2
IN3	DI_0_3
IN4	DI_0_4
IN5	DI_0_5
IN6	DI_0_6 (digital), AI_0_6 (analog)
IN7	DI_0_7 (digital), AI_0_7 (analog)

Table 4-4 First extension logic module (station 1)

Connector designation	Designation in LOGIC+
IN0	DI_1_0
IN1	DI_1_1
IN2	DI_1_2
IN3	DI_1_3
IN4	DI_1_4
IN5	DI_1_5
IN6	DI_1_6 (digital), AI_1_6 (analog)
IN7	DI_1_7 (digital), AI_1_7 (analog)

Table 4-5 Second extension logic module (station 2)

Connector designation	Designation in LOGIC+
IN0	DI_2_0
IN1	DI_2_1
IN2	DI_2_2
IN3	DI_2_3
IN4	DI_2_4
IN5	DI_2_5
IN6	DI_2_6 (digital), AI_2_6 (analog)
IN7	DI_2_7 (digital), AI_2_7 (analog)

4.2.2 Inputs and outputs via PLC-INTERFACE terminal blocks

The PLC-V8C logic modules are inserted in the bridge shafts of eight PLC-INTERFACE terminal blocks mounted side by side on a DIN rail. These eight PLC-INTERFACE terminal blocks form the inputs or outputs at positions Pos.8 to Pos.15. Analog inputs or outputs are available for PLC-V8C...BM2 and PLC-V8C...SAM2. The relevant position is set as an input or output in the LOGIC+ software (see “Hardware configuration” on page 72). Once this is specified, the corresponding PLC-INTERFACE terminal block can be used at the relevant position. In order to ensure sufficient mechanical stability, use basic terminal blocks for channels that are not required. For a list of corresponding PLC-INTERFACE terminal blocks, refer to Table 2-1 on page 15.

NOTE: Risk of short circuit

When wiring a mixture of inputs/outputs via PLC-INTERFACE in the field, observe the different potentials on the same connection levels.

Terminal points BB, 13, and A2 have different potentials with output and input relays (see Figure 4-8 on page 41 and Figure 4-13 on page 45). Make sure that a short circuit does not occur when using FBST plug-in bridges. The following 2-pos. plug-in bridges are recommended for bridging the same potential and for the clear delimitation of different potentials.

Table 4-6 Recommended plug-in bridges

Color	Order designation	Order number
Red	FBST 6-PLC RD	2966236
Blue	FBST 6-PLC BU	2966182
Gray	FBST 6-PLC GY	2966825

4.2.2.1 Designation of inputs and outputs via PLC-INTERFACE terminal blocks

In the LOGIC+ software, digital inputs have the designation DI_X_X and digital outputs have the designation DQ_X_X.

In the LOGIC+ software, analog inputs have the designation AI_X_X and analog outputs have the designation AQ_X_X.

Table 4-7 Stand-alone logic module and basic logic module (station 0)

Slot	Designation in LOGIC+
POS.8	DI_0_8 or DQ_0_8 or AI_0_8 or AQ_0_8
POS.9	DI_0_9 or DQ_0_9 or AI_0_9 or AQ_0_9
POS.10	DI_0_10 or DQ_0_10 or AI_0_10 or AQ_0_10
POS.11	DI_0_11 or DQ_0_11 or AI_0_11 or AQ_0_11
POS.12	DI_0_12 or DQ_0_12 or AI_0_12 or AQ_0_12
POS.13	DI_0_13 or DQ_0_13 or AI_0_13 or AQ_0_13
POS.14	DI_0_14 or DQ_0_14 or AI_0_14 or AQ_0_14
POS.15	DI_0_15 or DQ_0_15 or AI_0_15 or AQ_0_15

Table 4-8 First extension logic module (station 1)

Slot	Designation in LOGIC+
POS.8	DI_1_8 or DQ_1_8
POS.9	DI_1_9 or DQ_1_9
POS.10	DI_1_10 or DQ_1_10
POS.11	DI_1_11 or DQ_1_11
POS.12	DI_1_12 or DQ_1_12
POS.13	DI_1_13 or DQ_1_13
POS.14	DI_1_14 or DQ_1_14
POS.15	DI_1_15 or DQ_1_15

Table 4-9 Second extension logic module (station 2)

Slot	Designation in LOGIC+
POS.8	DI_2_8 or DQ_2_8
POS.9	DI_2_9 or DQ_2_9
POS.10	DI_2_10 or DQ_2_10
POS.11	DI_2_11 or DQ_2_11
POS.12	DI_2_12 or DQ_2_12
POS.13	DI_2_13 or DQ_2_13
POS.14	DI_2_14 or DQ_2_14
POS.15	DI_2_15 or DQ_2_15

4.2.2.2 Connection technology of PLC-INTERFACE terminal blocks

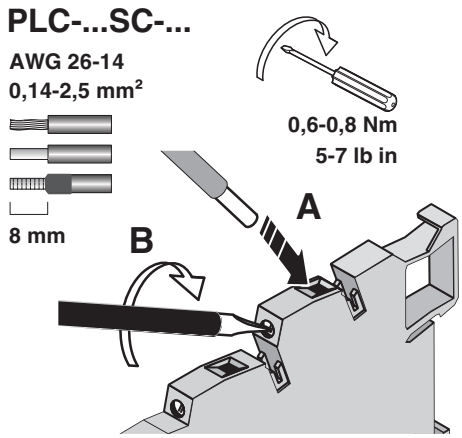


Figure 4-4 PLC modules with screw connection

PLC-...PT-...

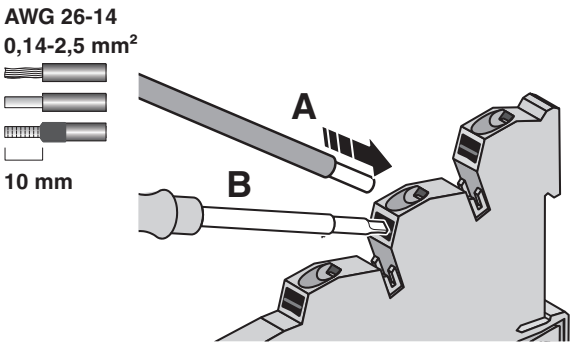


Figure 4-5 PLC modules with Push-in connection

Insert solid or stranded conductors with ferrules and a cross section ≥ 0.34 mm² directly in the clamping space (A). Reliable contact can be made with stranded conductors without ferrules by opening the spring beforehand using the pushbutton (B). Press the pushbutton (B) also to release the conductor.

4.2.2.3 Digital inputs via PLC-INTERFACE terminal blocks

If you have defined a slot as a digital input, you can use PLC-INTERFACE terminal blocks from the sensor series with electromechanical or solid-state relays. You can connect different input voltages. The digital inputs via the PLC-INTERFACE terminal blocks are therefore electrically isolated between field and logic level as well as between the individual channels.

Data sheets for the PLC-INTERFACE terminal blocks can be found at:
phoenixcontact.net/products

NOTE:

Voltages > 250 V are not permitted between the same terminal points on adjacent modules (L1, L2, L3).

Supply currents ≤ 6 A directly to the corresponding terminal points. For higher currents, use the PLC-ESK GY feed-in terminal (Order No. 2966508).

Wiring of digital inputs via PLC-INTERFACE terminal blocks

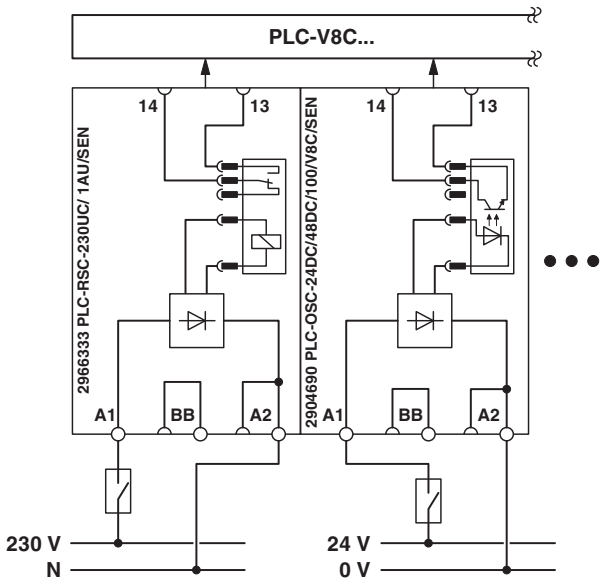


Figure 4-6 Wiring of digital inputs via PLC-INTERFACE terminal blocks

Basic circuit diagram with the example of an input terminal block with relay, 230 V AC (PLC-RSC-230UC/1 AU/SEN, Order No. 2966333) and an input terminal block with solid-state relay, 24 V DC (PLC-OSC-24DC/48DC/100/V8C/SEN, Order No. 2904690).

Pin assignment of digital inputs via PLC-INTERFACE terminal blocks

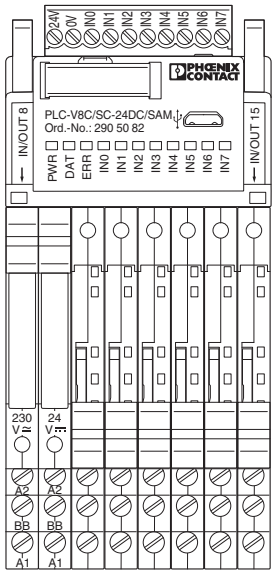


Figure 4-7 Pin assignment of digital inputs via PLC-INTERFACE terminal blocks

Connections of an input terminal block with relay, 230 V AC (PLC-RSC-230UC/1 AU/SEN, Order No. 2966333) and an input terminal block with solid-state relay, 24 V DC (PLC-OSC-24DC/48DC/100/V8C/SEN, Order No. 2904690).

Corresponding PLC-INTERFACE terminal blocks for digital inputs can be found in Table 2-1 on page 15.

Optional convenient connection when wiring digital inputs via PLC-INTERFACE terminal blocks

The PLC-…SEN sensor series for input signals offers additional connection convenience. A separate external terminal block is not required for the respective switch supply. The switch supply can be connected to terminal point “BB”.

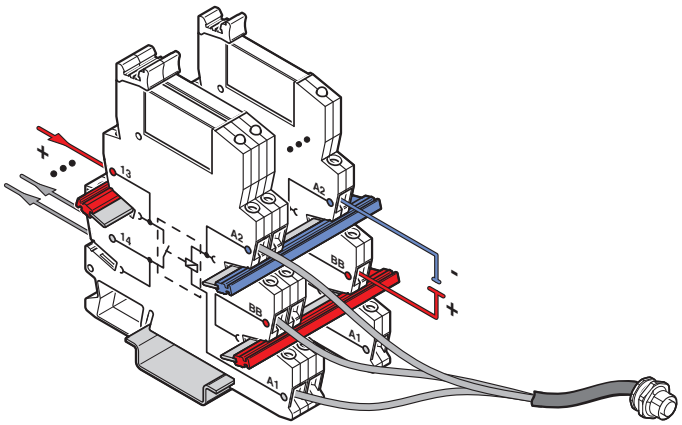


Figure 4-8 Convenient connection of the sensor series

4.2.2.4 Analog inputs via PLC-INTERFACE terminal blocks (PLC-V8C...BM2 and PLC-V8C…SAM2 only)

If you have defined a slot as an analog input, you can use PLC-ASC-UI-IN (Order No. 2906916), PLC-ASC-UI-IN (Order No. 2906917), PLC-ASC-PT100-IN (Order No. 2906918) or PLC-APT-PT100-IN (Order No. 2906919) PLC-INTERFACE terminal blocks.

Data sheets for the PLC-INTERFACE terminal blocks can be found at:
phoenixcontact.net/products

Wiring of analog inputs via PLC-INTERFACE terminal blocks

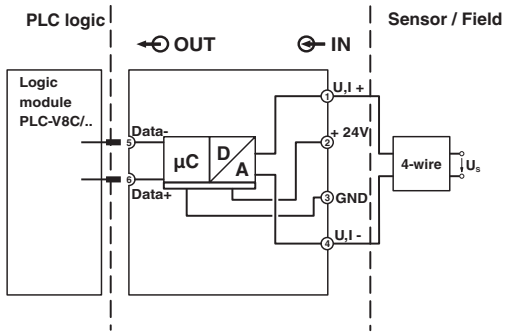


Figure 4-9 Wiring of analog input modules

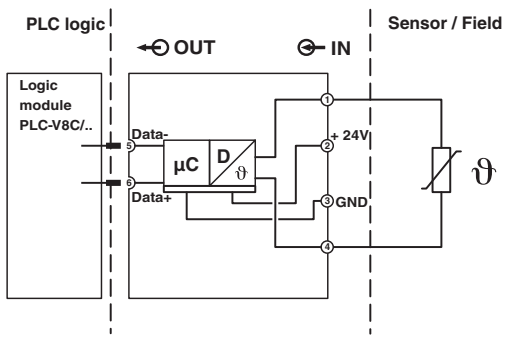


Figure 4-10 Wiring of Pt 100/Pt 1000 temperature transducers

Corresponding PLC-INTERFACE terminal blocks for analog inputs can be found in Table 2-1 on page 15.

4.2.2.5 Digital outputs via PLC-INTERFACE

When using PLC-INTERFACE terminal blocks, observe the requirements regarding noise emission for electrical and electronic equipment on the contact side.

In the event of a higher load and inductive load component, implement a contact protection circuit (e.g. freewheeling diode, varistor, RC element) at the load. This prevents interference voltages being coupled to other system parts. The relays also contribute to a longer electrical service life.

Data sheets for the PLC-INTERFACE terminal blocks can be found at:

phoenixcontact.net/products

NOTE:

Voltages > 250 V are not permitted between the same terminal points on adjacent modules (L1, L2, L3).

Supply currents ≤ 6 A directly to the corresponding terminal points. For higher currents, use the PLC-ESK GY feed-in terminal (Order No. 2966508).

If you have defined a slot as a digital output, you can choose corresponding PLC-INTERFACE terminal blocks with electromechanical or solid-state relays.

Wiring of digital outputs via PLC-INTERFACE terminal blocks

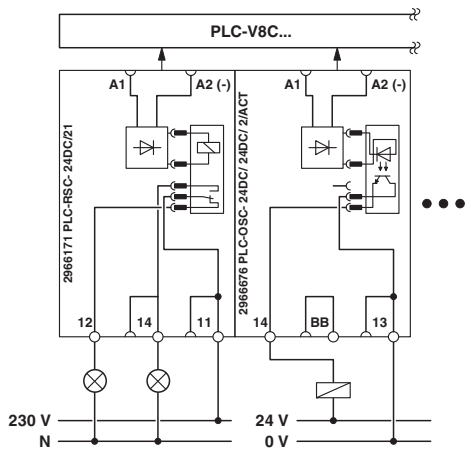


Figure 4-11 Wiring of digital outputs via PLC-INTERFACE terminal blocks

Basic circuit diagram with the example of an output terminal block with relay, 1 changeover contact (PLC-RSC-24DC/21, Order No. 2966171) and an output terminal block with solid-state relay, 24 V DC voltage output, and convenient actuator connection (PLC-OSC-24DC/24DC/2/ACT, Order No. 2966676).

Pin assignment of digital outputs via PLC-INTERFACE terminal blocks

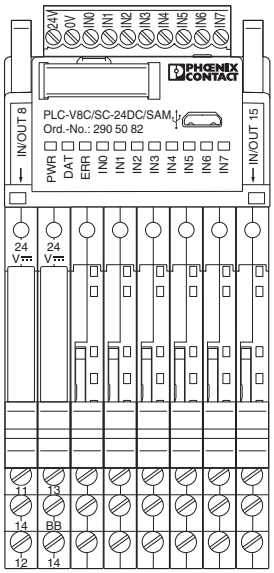


Figure 4-12 Pin assignment of digital outputs via PLC-INTERFACE terminal blocks

Connections of an output terminal block with relay, 1 changeover contact (PLC-RSC-24DC/21, Order No. 2966171) and an output terminal block with solid-state relay, 24 V DC voltage output, and convenient actuator connection (PLC-OSC-24DC/24DC/2/ACT, Order No. 2966676).

Corresponding PLC-INTERFACE terminal blocks for digital outputs can be found in Table 2-1 on page 15.

Optional convenient connection when wiring digital outputs via PLC-INTERFACE terminal blocks

The PLC-…ACT actuator series for output signals offers additional connection convenience. A separate external output terminal block is not required for the load return line. The load return line can be connected to terminal point “BB”.

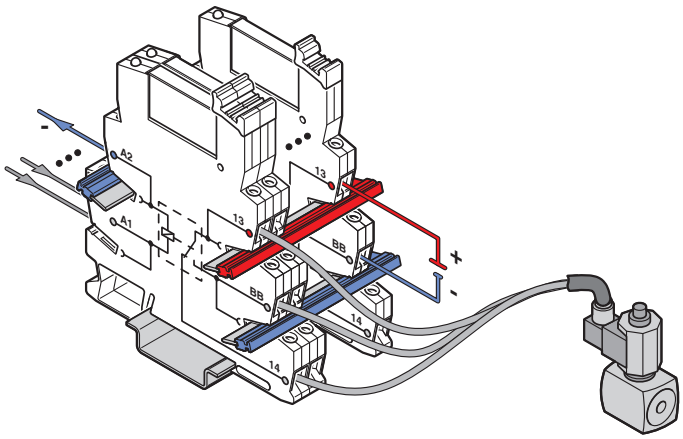


Figure 4-13 Convenient connection of the actuator series

4.2.2.6 Analog outputs via PLC-INTERFACE terminal blocks (PLC-V8C...BM2 and PLC-V8C…SAM2 only)

If you have defined a slot as an analog output, you can use PLC-ASC-UI-OUT (Order No. 2906920) or PLC-ASC-UI-OUT (Order No. 2906921) PLC-INTERFACE terminal blocks.

Data sheets for the PLC-INTERFACE terminal blocks can be found at:
phoenixcontact.net/products

Wiring of analog outputs via PLC-INTERFACE terminal blocks

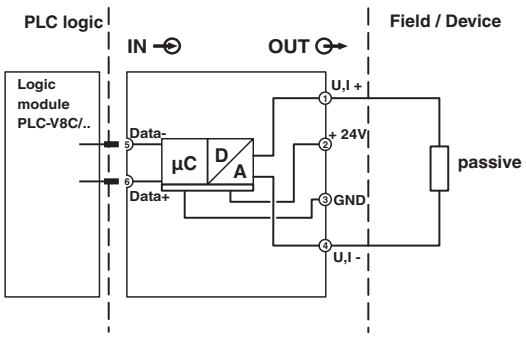


Figure 4-14 Wiring of analog outputs via PLC-INTERFACE terminal blocks

Corresponding PLC-INTERFACE terminal blocks for analog outputs can be found in Table 2-1 on page 15.

4.3 Micro USB connection

The micro USB connection can be used for communication between a PC and PLC logic.

A standard micro USB A to USB B connecting cable, e.g., CAB-USB A/MICRO USB B/2,0M (Order No. 2701626), is required for the connection between PLC logic and a PC.

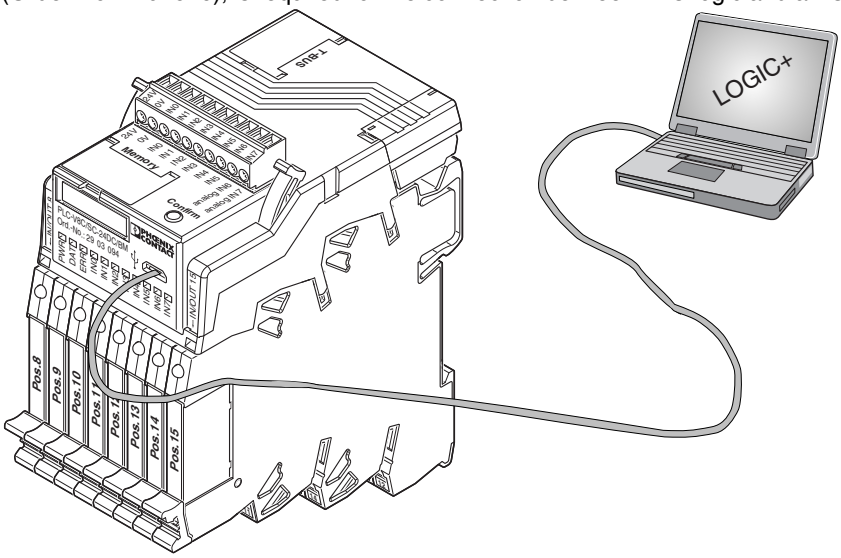


Figure 4-15 PLC logic and PC connection

5 Startup

5.1 LOGIC+ software installation

The required LOGIC+ software can be downloaded free of charge at phoenixcontact.net/products. After downloading, follow the installation instructions to the end.

5.2 Device driver installation

Download the driver at phoenixcontact.net/products. If you have purchased STARTERKIT1, you will also find the driver on the USB card supplied.

Start the driver setup file.

Administrator rights may be required to install the drivers.

5.3 Connection to the PC

If PLC logic is mounted as described in Section 3 on page 19, supply each of the logic modules with power. The PWR LED now lights up on every logic module.

Connect PLC logic to the PC (see Section 4.3 on page 47).

When the software is started, it automatically detects the PLC-V8C logic module as soon as the USB connection is established.

If the driver has been correctly identified, “Phoenix CDC ECM Network Adapter” appears under “Network adapters” in the Windows Device Manager.

The Ethernet network adapter is emulated via USB. This connection may be blocked by the firewall you are using. If so, contact your system administrator.

5.4 Configuration via web server

You can access the web server in a web browser by calling page http://v8c_usb.

Internet Explorer 10 or Mozilla Firefox 10 is required as a minimum in order to use the full scope of functions of the web server.

5.4.1 Monitoring, Diagnostics

5.4.1.1 Overview

Important device and project information is displayed on the overview page.

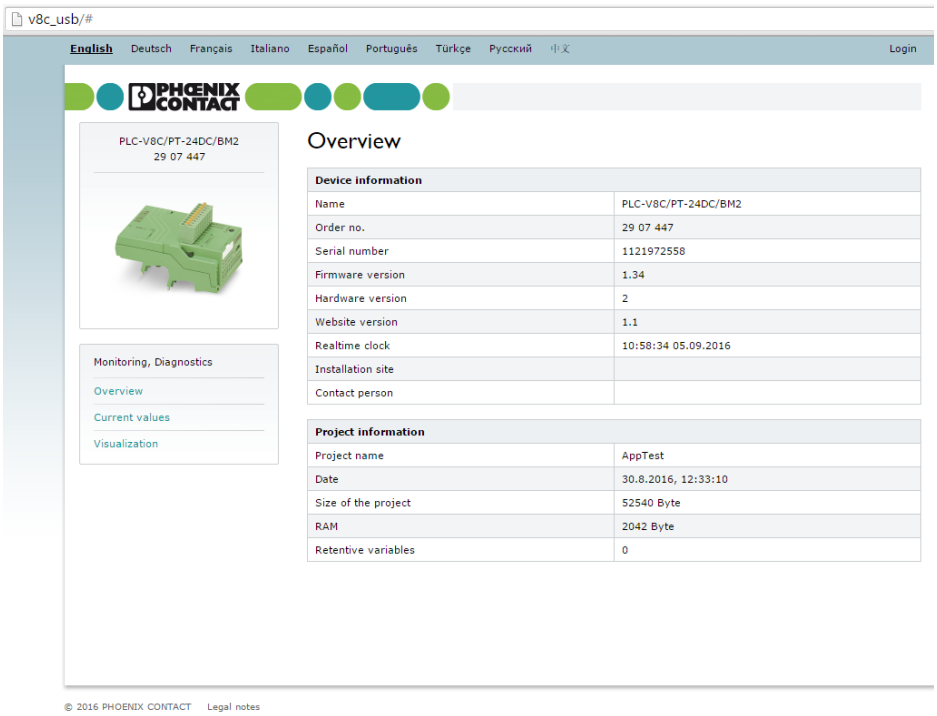


Figure 5-1 Overview

5.4.1.2 Current values

Current values and states of the hardware are displayed on this page, such as input and output states and error messages.

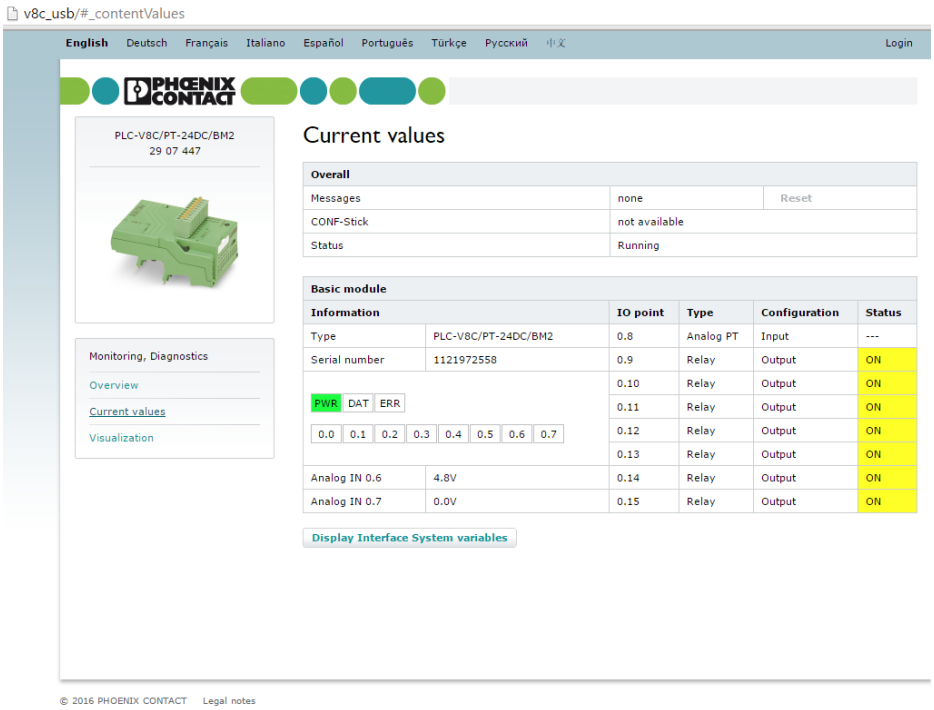


Figure 5-2 Current values

5.4.1.3 Visualization

The configured visualization pages are displayed on this page. Variables and various states can be displayed clearly here. The visualization is divided into several pages.

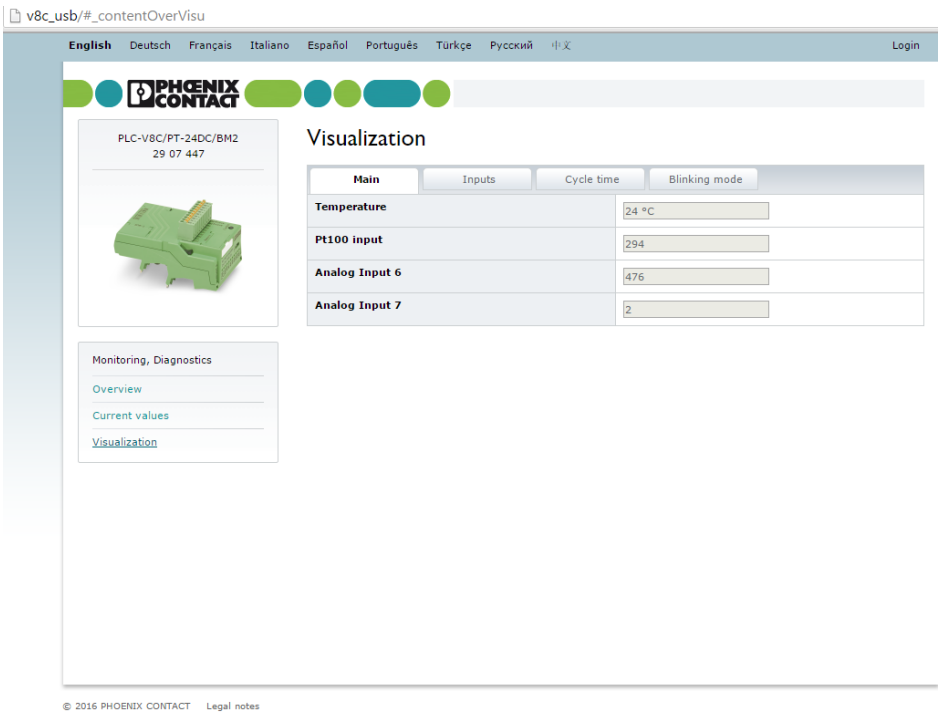


Figure 5-3 Visualization

5.4.2 Login

The configuration of the logic module is protected by a user name and password. To log into the logic module, click on the “Login” button in the top right corner.

Use the following for standard login:

– User name: admin
– Password: admin

Change the password during initial startup.

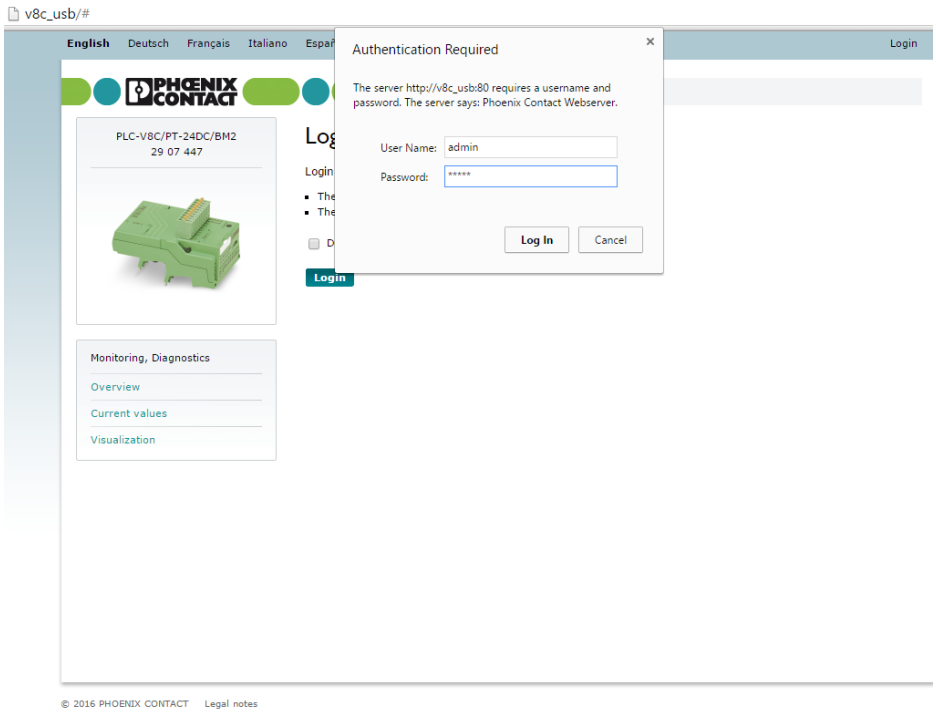


Figure 5-4 Login

If you cannot remember the password, you can recover the password via a support request. In order to recover the password, you need a recovery key, which is linked to the device serial number. The recovery key can be requested by e-mail from PHOENIX CONTACT Support (stating the device serial number): plclogic-service@phoenixcontact.com.

5.4.3 Configuration

5.4.3.1 General

You can enter information for device identification on this page.

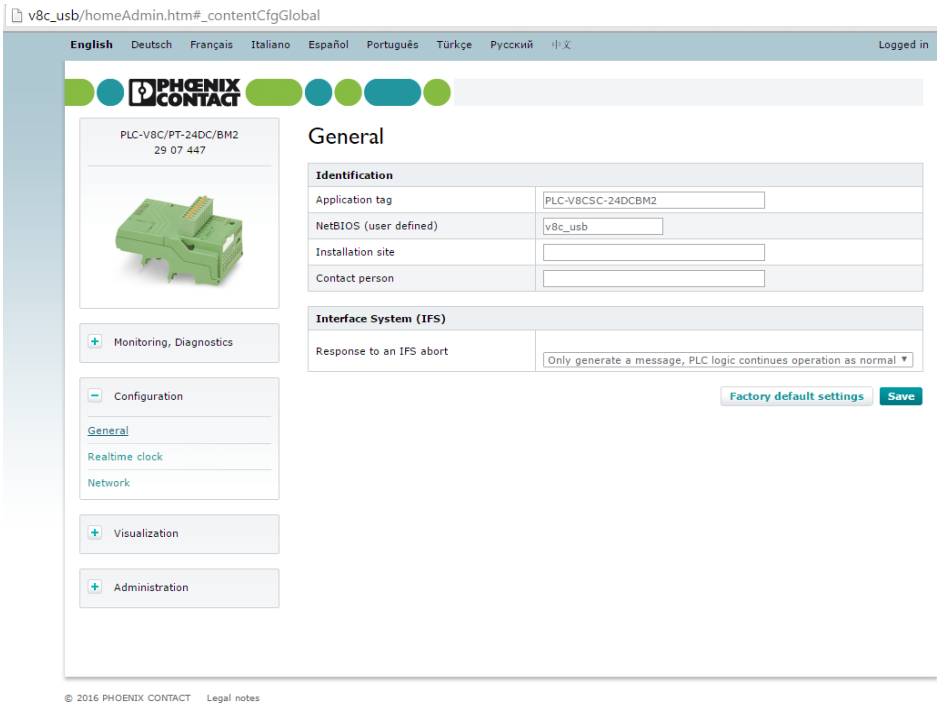


Figure 5-5 General configuration settings

Parameter	Description	Selection	Default setting
Application tag	The application tag is used to clearly identify the components within the system.	– Min. 2 characters – Max. 32 characters – Letters or numbers	PLC-V8CSC-24DCBM or PLC-V8CPT-24DCBM or PLC-V8CSC-24DCSAM or PLC-V8CPT-24DCSAM
NetBIOS (user defined)	The integrated web server of the logic module can be called in the web browser using this name (http://<NetBIOS>).	– Min. 2 characters – Max. 16 characters – Letters or numbers	v8c_usb

Parameter	Description	Selection	Default setting
Installation site (optional)	Information regarding the installation location can be entered here.	– Min. 2 characters – Max. 32 characters – All Latin fonts and all standard special characters	
Contact person (optional)	Information regarding the contact person can be entered here.	– Min. 2 characters – Max. 32 characters – All Latin fonts and all standard special characters	
Response to an IFS abort	The behavior in the event of an IFS gateway connection abort can be defined here.	– Stop and reset all outputs – Only generate a message, PLC logic continues operation as normal	Only generate a message, PLC logic continues operation as normal

5.4.3.2 Realtime clock

The realtime clock can be configured on this page.

You can synchronize the realtime clock with the system time of the connected computer or set it manually. You have the option of configuring the realtime clock so that it automatically switches to/from daylight saving time.

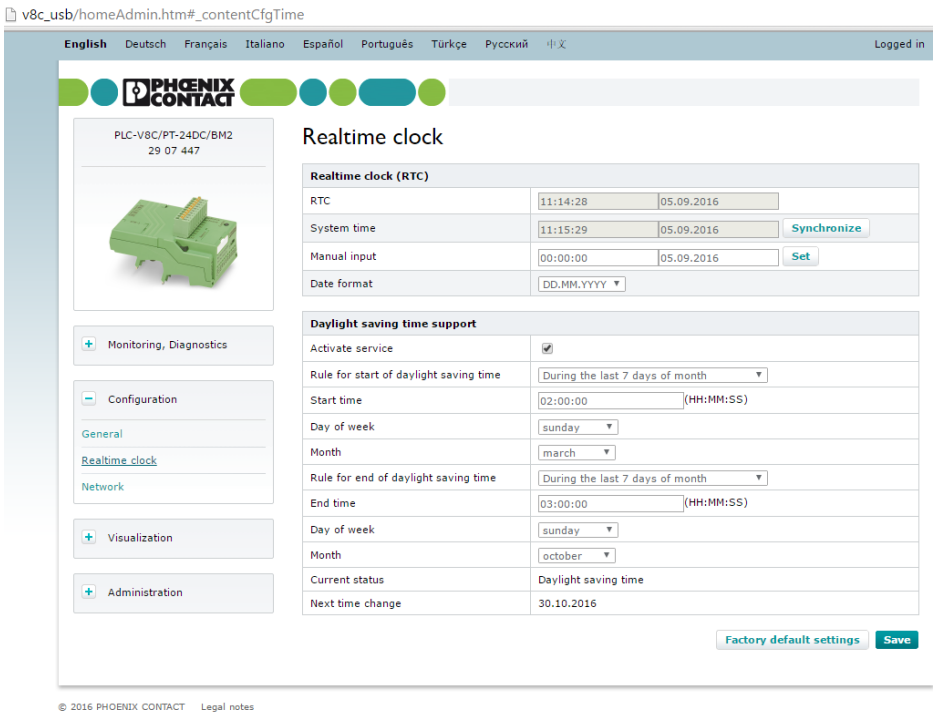


Figure 5-6 Configuring the realtime clock

5.4.3.3 Network

Settings for the IP address can be made on this page. Do not make changes in this area unless you have been specifically requested to do so by PHOENIX CONTACT Support. Incorrect settings may mean that the device has to be sent in for servicing.

The device provides a subnet (255.255.255.252). The device assigns the first host address of the selected subnet to itself. The second address is assigned to the connected PC.

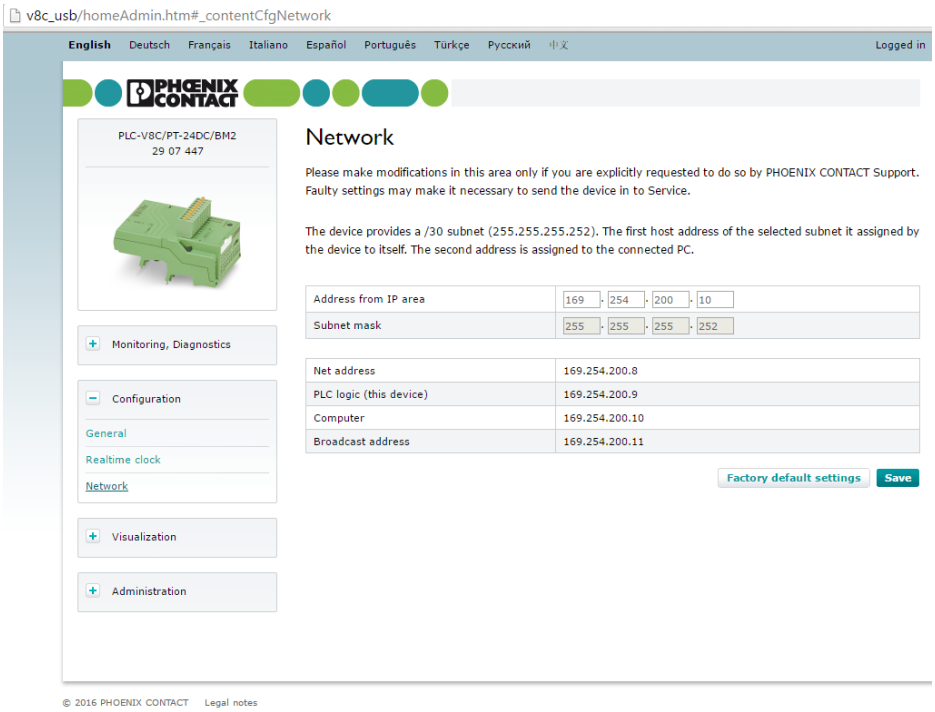


Figure 5-7 Setting the IP address

Parameter	Description	Selection	Default setting
Address from IP area	Internet Protocol address (IP address) of the connected computer	– Min. 0 – Max. 255	169.254.200.10

5.4.4 Visualization

5.4.4.1 Configuration

The basic visualization settings can be selected on this page.

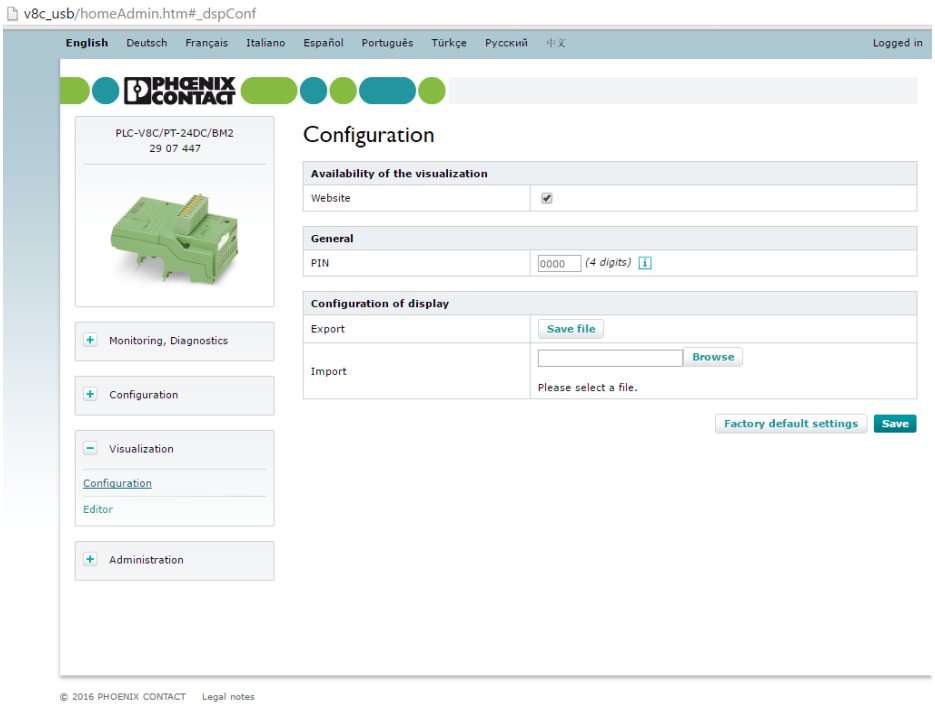


Figure 5-8 Visualization configuration

Parameter	Description	Selection	Default setting
Website	Choose whether or not a visualization should be visible on the website	– On – Off	Off
PIN	A pin can be assigned here in order to protect individual visualization pages from external manipulation.	– 4 characters – Numbers only	Empty
Export	Export the active visualization configuration	–	
Import	Import a previously exported configuration	–	

5.4.4.2 Editor

The available visualization pages are listed on this page. You can create new pages, delete existing ones or change the order of pages.

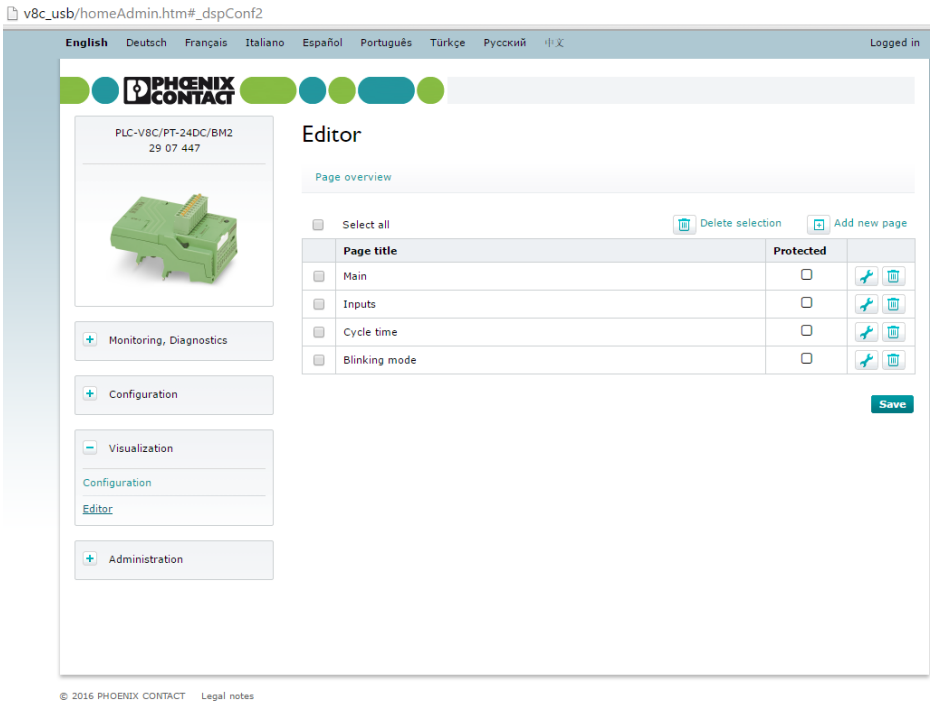


Figure 5-9 Editor - page overview

To open the configuration of individual visualization pages, click on the wrench icon.

The 5 rows of a visualization page are listed here. You can edit each individual row, specify a title for the page, and activate PIN protection.

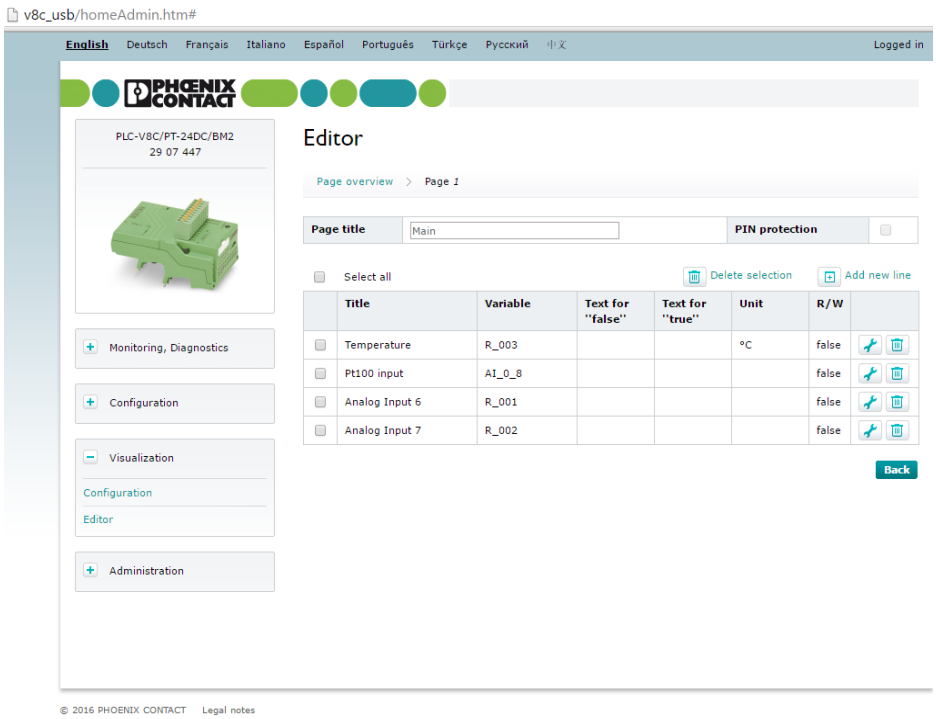


Figure 5-10 Editor - page configuration

A variable from the active program can be displayed in each row.

The following variables are available:

– Flags
– Register
– Time register
– All hardware inputs and outputs
– Interface system variables

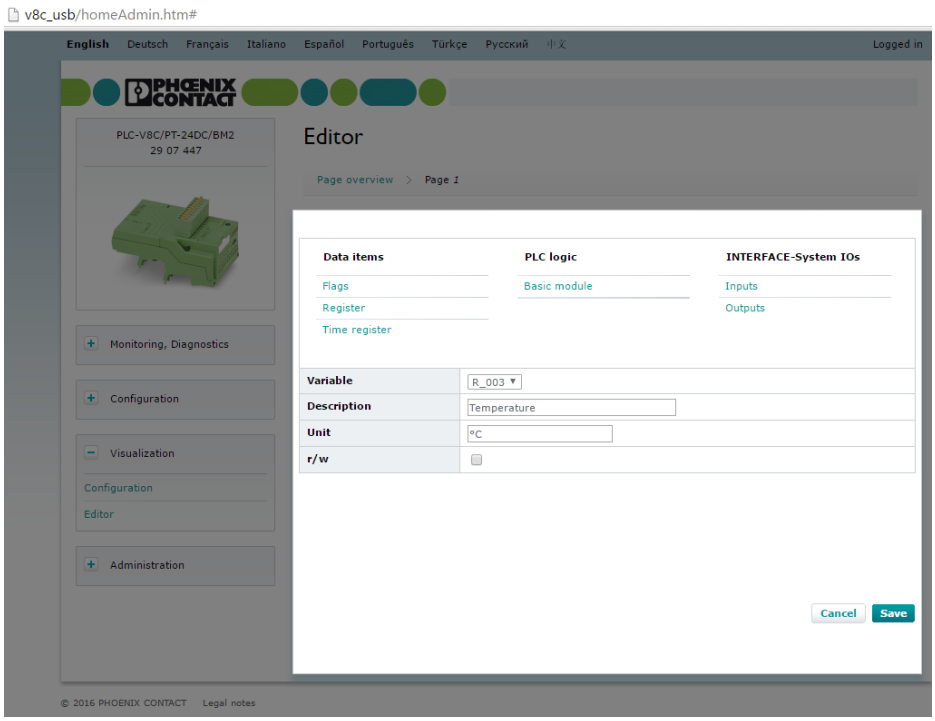


Figure 5-11 Editor - variables

5.4.5 Administration

5.4.5.1 Access control

You can set the password for access control to the web server and LOGIC+ on this page.

NOTE:
If you forget the password, you must contact PHOENIX CONTACT Support by e-mail (stating the device serial number):
plclogic-service@phoenixcontact.com

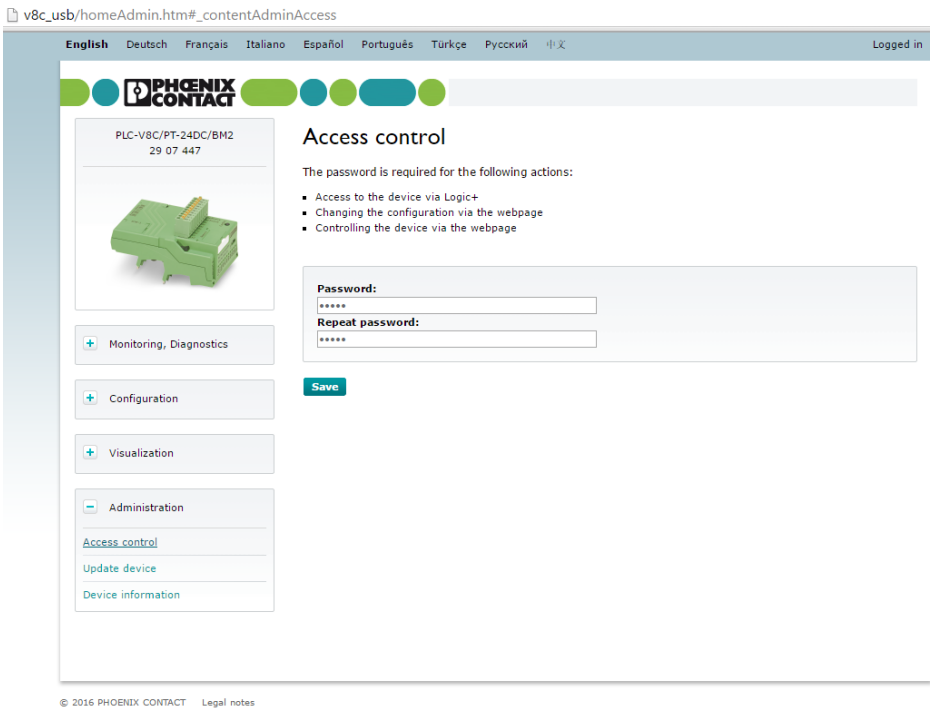


Figure 5-12 Setting the password

Parameter	Description	Selection	Default setting
Password	Enter the new password	– Min. 2 characters – Max. 32 characters – A-Z, a-z, 0-9	admin
Repeat password	Enter the new password again	– Min. 2 characters – Max. 32 characters – A-Z, a-z, 0-9	admin

5.4.5.2 Update device

If new firmware or a new version of the web server is available for the basic module, you can start the update on this page.

Firmware updates have the file name “configFile.ee” and web server updates have the file name “WebServer.IMG”.

Do not change the file name, as otherwise the update will not work.

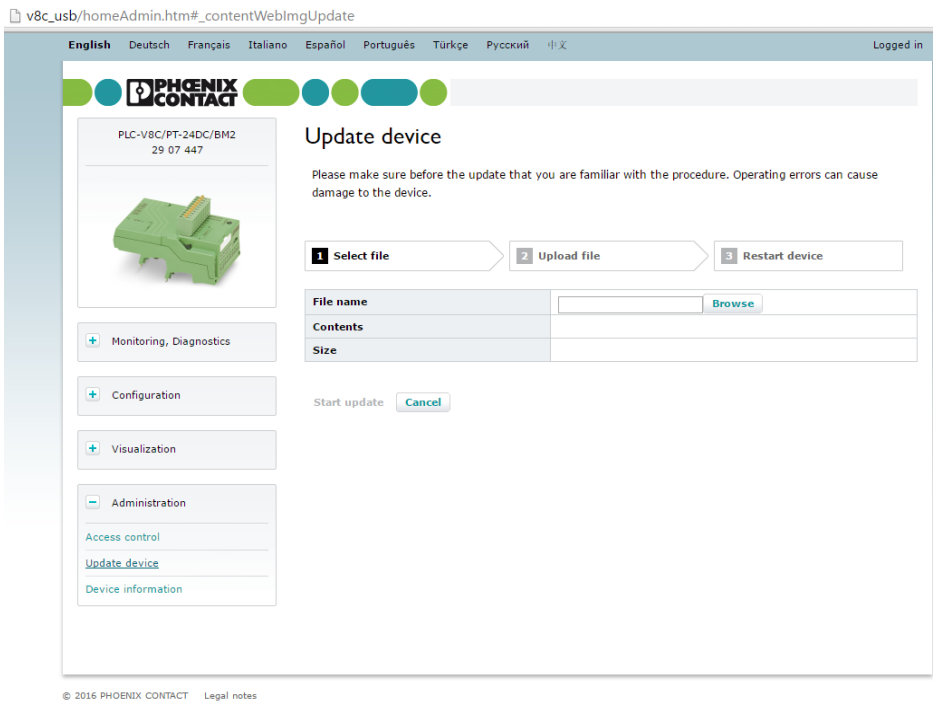


Figure 5-13 Starting the firmware update

Click on the “Browse” button and then navigate to the storage location for the update.

The update can then be started if a valid file has been detected. To do this, click on the “Start update” button.

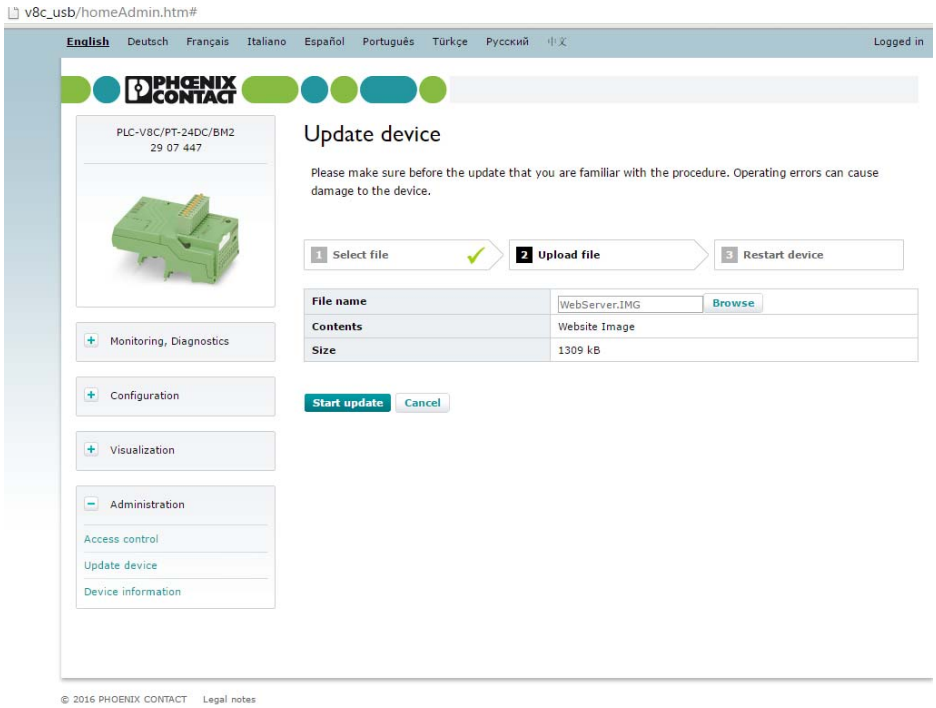


Figure 5-14 Firmware update - selecting the file

The current progress is displayed during the update.

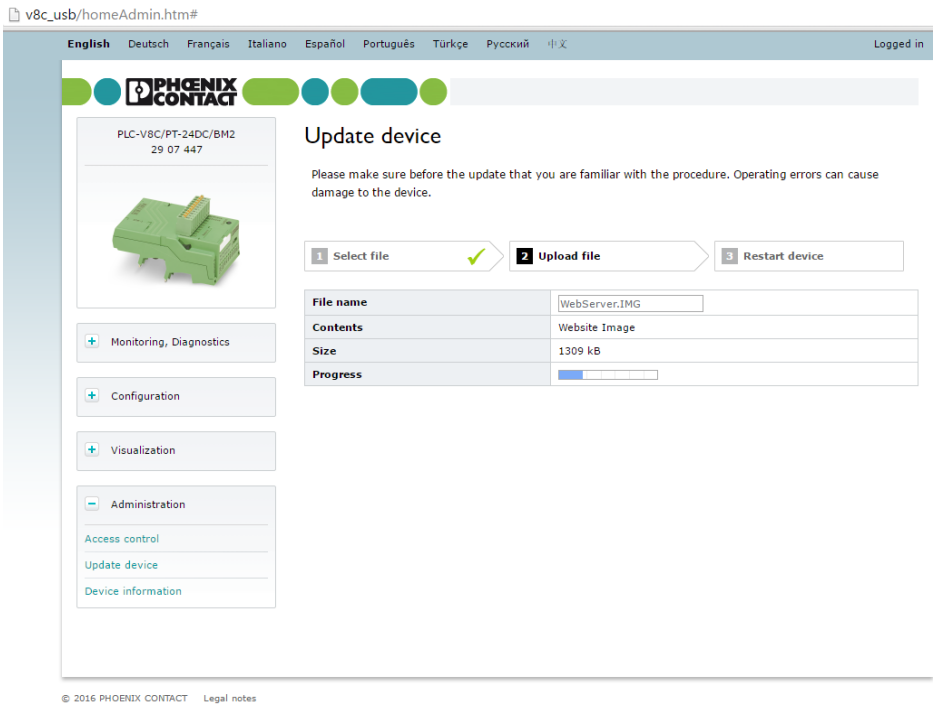


Figure 5-15 Firmware update - progress indicator

Following successful installation, the device restarts automatically. To view the active device configuration following restart, you must empty the browser cache (e.g., with Ctrl + Shift + Delete).

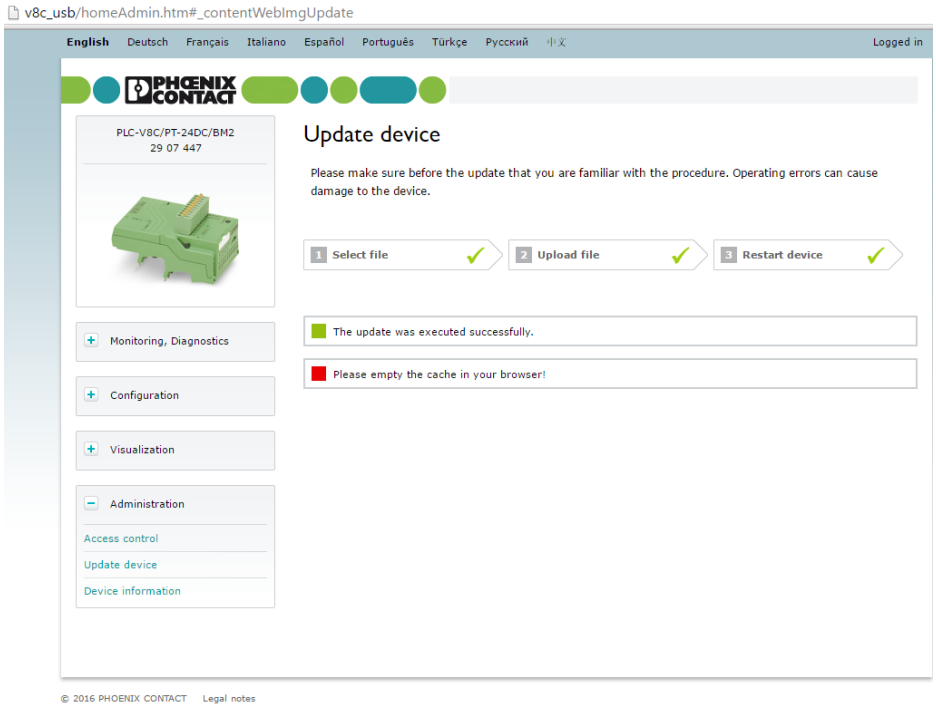


Figure 5-16 Firmware update - emptying the cache

5.4.5.3 Device information

All important information is displayed on this page, such as:

– Serial number of the logic module
– Firmware version
– IP configuration
– eCLR information

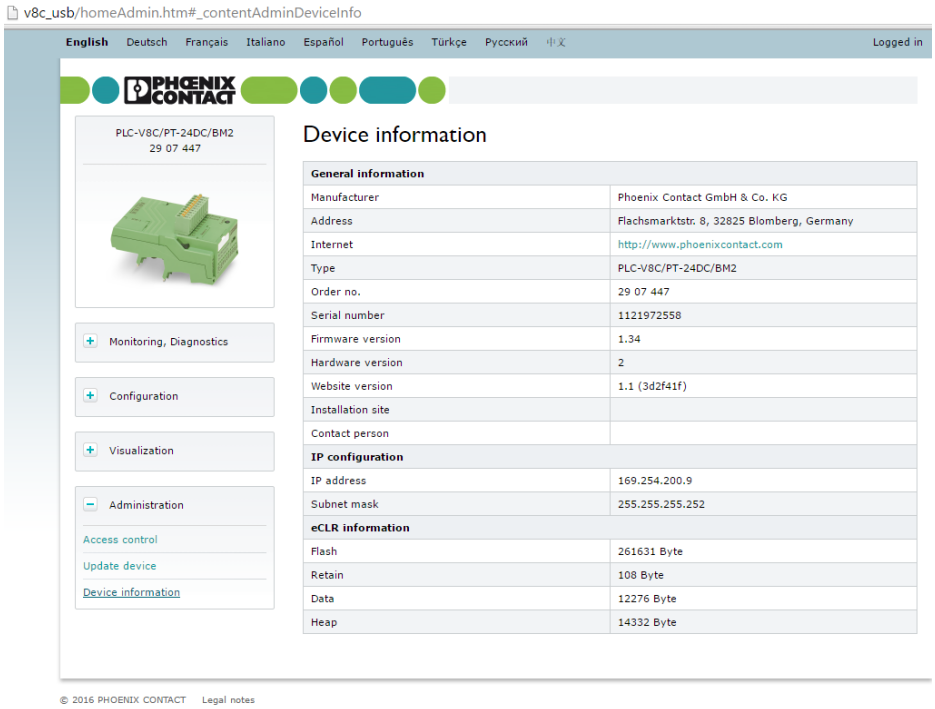


Figure 5-17 Overview of device information

5.5 Programming with LOGIC+

LOGIC+ is used for the configuration and programming of PLC logic. LOGIC+ allows you to conveniently develop the project on your own PC and to then send the project to the connected device and execute it. LOGIC+ supports you in every phase of project development, from project planning and configuration/parameterization to program start.

A detailed description of the LOGIC+ software can be found under “Help” in the software. Read this information carefully before creating your first project.

5.5.1 System requirements

The following software and hardware requirements must be met so that LOGIC+ can be executed on your PC under one of the operating systems listed.

Table 5-1 Windows 7 Service Pack 1

Designation	Description
Processor	1 GHz or faster 32-bit (x86) or 64-bit processor (x64)
RAM	2 GB, minimum
Graphics card	Microsoft DirectX 9 graphics card with WDDM driver
.Net Framework 4.6	The link to the download is provided in the setup routine.
Security updates	KB3033929

Table 5-2 Windows 8.1

Designation	Description
Processor	1 GHz or faster 32-bit (x86) or 64-bit processor (x64)
RAM	2 GB, minimum
Graphics card	Microsoft DirectX 9 graphics card with WDDM driver
.Net Framework 4.6	The link to the download is provided in the setup routine.

Table 5-3 Windows 10

Designation	Description
Processor	1 GHz or faster 32-bit (x86) or 64-bit processor (x64)
RAM	2 GB, minimum
Graphics card	Microsoft DirectX 9 graphics card with WDDM driver
.Net Framework 4.6	Is installed

Additional requirements

- Input devices: keyboard, mouse
- USB connection to connect the device
- Internet browser

5.5.2 Starting LOGIC+

Following successful installation on the PC, open LOGIC+.

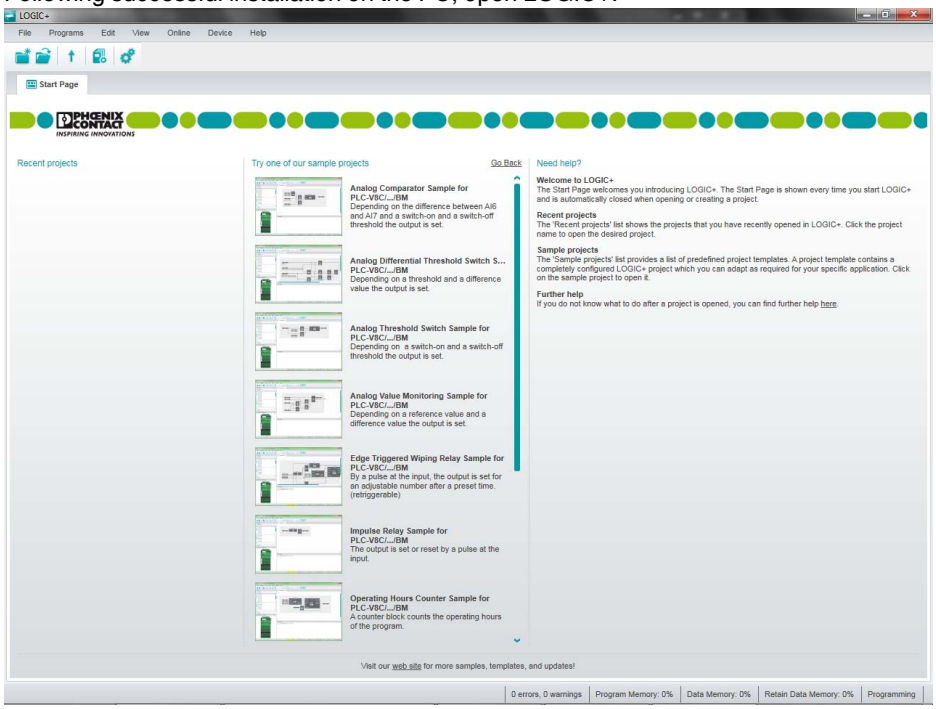


Figure 5-18 LOGIC+ start page

The start page is displayed when you open LOGIC+. The start page is closed automatically as soon as you open or create a project.

You should now familiarize yourself with LOGIC+ by calling “Help” in the menu bar.

5.5.2.1 Description of the LOGIC+ interface

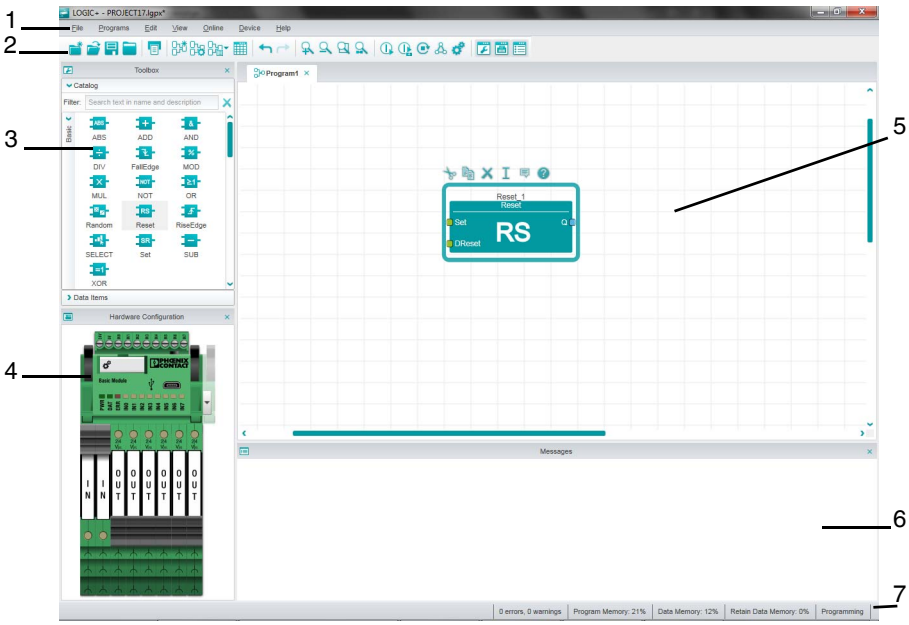


Figure 5-19 LOGIC+ interface

Table 5-4 Areas of the LOGIC+ interface

No.	Area	Description
1	Menu bar	Provides access to the LOGIC+ commands and online help.
2	Tool bar	Provides access to frequently used commands.
3	Toolbox	Contains all elements that are required for programming. Elements from the toolbox are always added to the program by means of drag and drop.
4	Hardware configuration	Provides a graphical representation of the device. You can configure the inputs and outputs of the connected device here.
5	Graphical editor	Workspace where you develop your program. Graphical objects from the toolbox and input/output signals from the hardware configuration are inserted in the workspace and then connected by means of drag and drop.
6	Message window	Displays all messages output by LOGIC+.
7	Status bar	Displays the status of the communication connection between the PC and the connected device, the number of errors and warnings, plus the memory used and the device status.

Table 5-5 Buttons in the tool bar

Icon	Meaning	Keyboard shortcut
	Create a new project	Ctrl + N
	Open an existing project	Ctrl + O
	Upload project sources from device	
	Add or remove libraries or disable libraries for the current project	
	Save the current project	Ctrl + S
	Close the current project	
	Print	Ctrl + P
	Create a new program	
	Rename or delete a program or change the program execution order	
	Open a program or switch to an open program	
	Open the data item editor	
	Undo	Ctrl + Z
	Redo	Ctrl + Y
	Increase size of object displayed in the active program window	
	Decrease size of object displayed in the active program window	
	Resize contents of active window to the default size	
	Displays the full contents in the current window size	

Table 5-5 Buttons in the tool bar [...]

Icon	Meaning	Keyboard shortcut
	Execute program on simulated device	F5
	Execute program on the device	
	Stop program execution and reset the device	
	Open the communication settings	
	Configure the hardware settings	
	Show or hide the toolbox window	
	Show or hide the hardware configuration	
	Show or hide the message window	
	Resume execution	Alt + F5
	Pause execution	Shift + F5
	Execute a step in the procedure	F10
	Switch to the breakpoint at the current point	F9
	Remove all breakpoints in the active program worksheet	
	Activate/deactivate breakpoint at the current position	
	Lock all breakpoints in the active program worksheet	
	Switch back to programming	Ctrl + F5
	Show or hide the watch window	

5.5.3 Hardware configuration

NOTE:

PLC logic does **not** check that the hardware view in LOGIC+ matches the actual hardware. The hardware configuration in LOGIC+ and the configuration of the connected device on which the project is to be executed must be identical. This means that the arrangement of the segments and the assignment of the inputs and outputs in the hardware configuration in LOGIC+ and for the connected device must be the same.

Make sure that both configurations match. Otherwise this may result in undesirable behavior in the application. Make sure that this will not lead to any hazardous situations.

The hardware configuration in LOGIC+ can be used to configure each channel as an input or output with electromechanical relays, solid-state relays or analog terminal blocks.

For more details, refer to the help in LOGIC+.

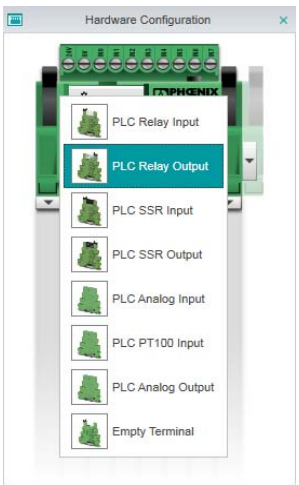


Figure 5-20 Hardware configuration

5.5.4 Function blocks

As described in the LOGIC+ help, programs can be created in function block diagram (FBD) or ladder diagram (LD). The following function blocks are available in LOGIC+ for both languages.

Table 5-6 Available functions/function blocks

Block	Description
ABS	Mathematical calculation of the absolute value
ADD	Mathematical addition
AND	Logical AND
Counter	Up/down counter
DIV	Mathematical division
EQ	“Is equal” comparator
FallEdge	Detect falling edge
GE	“Greater than or equal to” comparator
GT	“Greater than” comparator
LE	“Less than or equal to” comparator
LIMITER	Limit value to minimum and maximum
LT	“Less than” comparator
MAX	Detect maximum value
MIN	Detect minimum value
MOD	Division with remainder
MUL	Mathematical multiplication
NOT	Invert state
OffDelay	Timer for switch-off delay
OnDelay	Timer for switch-on delay
OR	Logical OR
PulseGen	Pulse generator
PulseTimer	Output pulse with a defined pulse length
Random	Random number generator
Reset	Self-holding relay with reset priority
RiseEdge	Detect rising edge
SELECT	Selection function
Set	Self-holding relay with set priority
SUB	Mathematical subtraction
WeekTimer	Weekly timer
XOR	Exclusive OR

5.5.5 Memory required for functions/function blocks

The logic module has 228,863 bytes of program memory available and 11,024 bytes of mass storage available.

Table 5-7 Memory required for standard functions/function blocks

Function/function block	Program memory		Mass storage
	With program sources	Without program sources	
ABS (first instance)	5388 bytes	5132 bytes	0 bytes
ABS (subsequent instance)	160 bytes	76 bytes	0 bytes
ADD	284 bytes	4 bytes	0 bytes
AND	288 bytes	4 bytes	0 bytes
Counter (first instance)	1256 bytes	816 bytes	64 bytes
Counter (subsequent instance)	176 bytes	96 bytes	64 bytes
DIV	308 bytes	32 bytes	0 bytes
EQ	272 bytes	4 bytes	0 bytes
FallEdge (first instance)	2256 bytes	1980 bytes	64 bytes
FallEdge (subsequent instance)	192 bytes	104 bytes	64 bytes
GE	292 bytes	16 bytes	0 bytes
GT	276 bytes	4 bytes	0 bytes
LE	292 bytes	16 bytes	0 bytes
LIMITER (first instance)	7296 bytes	6960 bytes	0 bytes
LIMITER (subsequent instance)	296 bytes	144 bytes	0 bytes
LT	276 bytes	4 bytes	0 bytes
MAX (first instance)	5620 bytes	5358 bytes	0 bytes
MAX (subsequent instance)	232 bytes	108 bytes	0 bytes
MIN (first instance)	5612 bytes	5336 bytes	0 bytes
MIN (subsequent instance)	220 bytes	108 bytes	0 bytes
MOD	300 bytes	36 bytes	0 bytes
MUL	280 bytes	4 bytes	0 bytes
NOT	264 bytes	8 bytes	0 bytes
OffDelay (first instance)	2764 bytes	2400 bytes	144 bytes
OffDelay (subsequent instance)	288 bytes	116 bytes	144 bytes
OnDelay (first instance)	2780 bytes	2416 bytes	144 bytes
OnDelay (subsequent instance)	284 bytes	112 bytes	144 bytes
OR	272 bytes	4 bytes	0 bytes
PulseGen (first instance)	1432 bytes	1048 bytes	88 bytes

Table 5-7 Memory required for standard functions/function blocks [...]

Function/function block	Program memory		Mass storage
	With program sources	Without program sources	
PulseGen (subsequent instance)	296 bytes	116 bytes	88 bytes
PulseTimer (first instance)	2964 bytes	2608 bytes	144 bytes
PulseTimer (subsequent instance)	292 bytes	116 bytes	144 bytes
Random (first instance)	1676 bytes	1288 bytes	112 bytes
Random (subsequent instance)	164 bytes	96 bytes	112 bytes
Reset (first instance)	2308 bytes	1980 bytes	64 bytes
Reset (subsequent instance)	136 bytes	96 bytes	64 bytes
RiseEdge (first instance)	2272 bytes	1964 bytes	64 bytes
RiseEdge (first instance)	132 bytes	100 bytes	64 bytes
SELECT (first instance)	2956 bytes	2672 bytes	0 bytes
SELECT (subsequent instance)	268 bytes	112 bytes	0 bytes
Set (first instance)	2304 bytes	1980 bytes	64 bytes
Set (subsequent instance)	140 bytes	92 bytes	64 bytes
SUB	264 bytes	4 bytes	0 bytes
WeekTimer (first instance)	5104 bytes	4068 bytes	524 bytes
WeekTimer (subsequent instance)	476 bytes	100 bytes	524 bytes
XOR	280 bytes	4 bytes	0 bytes

Table 5-8 Memory required for Interface System V1.1

Function/function block	Program memory		Mass storage
	With program sources	Without program sources	
Check16Bit (first instance)	1114 bytes	748 bytes	64 bytes
Check16Bit (subsequent instance)	156 bytes	100 bytes	64 bytes
FlagsToIFS (first instance)	2000 bytes	1460 bytes	120 bytes
FlagsToIFS (subsequent instance)	268 bytes	100 bytes	120 bytes
IFSToFlags (first instance)	2108 bytes	1560 bytes	120 bytes
IFSToFlags (subsequent instance)	268 bytes	100 bytes	120 bytes

Table 5-9 Memory required for Analog V1.1

Function/function block	Program memory		Mass storage
	With program sources	Without program sources	
AnalogFilter (first instance)	1076 bytes	700 bytes	80 bytes
AnalogFilter (subsequent instance)	160 bytes	104 bytes	80 bytes
DifferentialThresholdSwitch (first instance)	1120 bytes	748 bytes	64 bytes
DifferentialThresholdSwitch (subsequent instance)	184 bytes	116 bytes	64 bytes
MinMaxAvg (first instance)	4296 bytes	3868 bytes	280 bytes
MinMaxAvg (subsequent instance)	166 bytes	100 bytes	280 bytes
MinMaxHold (first instance)	1032 bytes	660 bytes	56 bytes
MinMaxHold (subsequent instance)	160 bytes	100 bytes	56 bytes
MoveAvg (first instance)	2476 bytes	2104 bytes	104 bytes
MoveAvg (subsequent instance)	156 bytes	96 bytes	104 bytes
Multiplexer (first instance)	1168 bytes	764 bytes	72 bytes
Multiplexer (subsequent instance)	180 bytes	100 bytes	72 bytes
PIDControl (first instance)	2108 bytes	1620 bytes	160 bytes
PIDControl (subsequent instance)	212 bytes	104 bytes	160 bytes
Pt 100 (first instance)	2488 bytes	2132 bytes	88 bytes
Pt 100 (subsequent instance)	140 bytes	96 bytes	88 bytes
Pt 1000 (first instance)	2580 bytes	2228 bytes	88 bytes
Pt 1000 (subsequent instance)	144 bytes	96 bytes	88 bytes
PWM (first instance)	1864 bytes	1456 bytes	144 bytes
PWM (subsequent instance)	160 bytes	92 bytes	144 bytes
Ramp (first instance)	1828 bytes	1368 bytes	120 bytes
Ramp (subsequent instance)	196 bytes	99 bytes	120 bytes
ScaleAnalogIn (first instance)	1460 bytes	1052 bytes	96 bytes
ScaleAnalogIn (subsequent instance)	180 bytes	104 bytes	96 bytes
ScaleAnalogOut (first instance)	1480 bytes	1068 bytes	96 bytes

Table 5-9 Memory required for Analog V1.1

Function/function block	Program memory		Mass storage
	With program sources	Without program sources	
ScaleAnalogOut (subsequent instance)	476 bytes	104 bytes	96 bytes
ThresholdSwitch (first instance)	2688 bytes	2304 bytes	96 bytes
ThresholdSwitch (subsequent instance)	172 bytes	104 bytes	96 bytes

Table 5-10 Memory required for Special V1.2

Function/function block	Program memory		Mass storage
	With program sources	Without program sources	
CycleTime (first instance)	1052 bytes	744 bytes	64 bytes
CycleTime (subsequent instance)	140 bytes	100 bytes	64 bytes
ImpulseRelay (first instance)	2284 bytes	1976 bytes	72 bytes
ImpulseRelay (subsequent instance)	144 bytes	104 bytes	72 bytes
MemoryNumber (first instance)	238 bytes	2020 bytes	96 bytes
MemoryNumber (subsequent instance)	156 bytes	104 bytes	96 bytes
MemoryTime (first instance)	2376 bytes	2012 bytes	96 bytes
MemoryTime (subsequent instance)	144 bytes	100 bytes	96 bytes
OffDelayReset (first instance)	1256 bytes	872 bytes	88 bytes
OffDelayReset (subsequent instance)	160 bytes	104 bytes	88 bytes
RetainCounter (first instance)	3764 bytes	3320 bytes	224 bytes
RetainCounter (subsequent instance)	228 bytes	144 bytes	224 bytes
ShiftRegister (first instance)	2768 bytes	2312 bytes	96 bytes
ShiftRegister (subsequent instance)	192 bytes	104 bytes	96 bytes
ShutterControl (first instance)	5356 bytes	4820 bytes	480 bytes
ShutterControl (subsequent instance)	228 bytes	104 bytes	480 bytes
WipingRelay (first instance)	2724 bytes	2368 bytes	144 bytes
WipingRelay (subsequent instance)	144 bytes	100 bytes	144 bytes

5.5.6 Data item types in LOGIC+

Table 5-11 Data item types

Name	Description	Value range
Flags	The flag name consists of the string “F_xxx“ (where xxx = 0...127) and, if defined, the identifier. A maximum of 128 flags can be used in a project.	Value is set to TRUE or FALSE (1 or 0, ON or OFF).
Registers	The register name consists of the string “R_xxx“ (where xxx = 0...127) and, if defined, the identifier. A maximum of 128 registers can be used in a project.	Numerical value (integer value only) -2,147,483,648 to 2,147,483,647
Digital inputs	Digital inputs have the designation “DI_x_y”, where x is the station number (basic logic module = 0) and y is the input number. The number of available digital inputs depends on the device configuration. See “Inputs and outputs” on page 34	Value is set to TRUE or FALSE (1 or 0, ON or OFF).
Digital outputs	Digital outputs have the designation “DQ_x_y”, where x is the station number (basic logic module = 0) and y is the output number. The number of available digital outputs depends on the device configuration. See “Inputs and outputs” on page 34	Value is set to TRUE or FALSE (1 or 0, ON or OFF).
Analog inputs	Analog inputs are used to monitor voltages or values. Analog inputs have the designation “AI_x_y”, where x is the station number (basic logic module = 0) and y is the input number. The number of available analog inputs depends on the device configuration. See “Inputs and outputs” on page 34	Numerical value (integer value only). Value range: 0 to 1000 The analog inputs at IN6 and IN7 process 0 V ... 10 V input signals. PLC logic analog values: 0 V … 10 V Values in LOGIC+: 0 … 1000 Voltage values in 10 mV increments can therefore be read from PLC logic in LOGIC+.
Analog outputs	Analog outputs are used to output voltages or currents. Analog outputs have the designation “AQ_x_y”, where x is the station number (basic logic module = 0) and y is the output number. The number of available analog outputs depends on the device configuration. See “Inputs and outputs” on page 34	0 V ... 10 V or 2 V ... 10 V voltage or 0 mA ... 20 mA or 4 mA ... 20 mA current
Interface system inputs	Inputs that come from a gateway have the designation IFS_Input_x (where x = 0...15). See “Communication with PLC logic” on page 91	Numerical value (integer value only) -32,768 ... 32,767 (signed INT) 0 ... 65,535 (unsigned INT)
Interface system outputs	Outputs that are transferred to a gateway have the designation IFS_Output_x (where x = 0...15). See “Communication with PLC logic” on page 91	Numerical value (integer value only) -32,768 ... 32,767 (signed INT) 0 ... 65,535 (unsigned INT)

5.5.7 Connecting the device to LOGIC+

Connect the device to the PC.

Make sure the device is detected by LOGIC+.

You can now perform the following actions:

– Execute a project on the device
– Monitor a project in online mode
– Set device parameters
– Upload project sources from the device

Here, connection means that:

– The device must be connected to the PC on which LOGIC+ is executed via a USB cable.
– You must set the communication parameters in LOGIC+ so that LOGIC+ can access the device.

Use a USB cable to connect PLC logic to a free USB connection on your PC on which LOGIC+ is running. To open the “Communication Settings” dialog, select “File > Communication Settings” or click on the “Communication Settings” button in the tool bar.

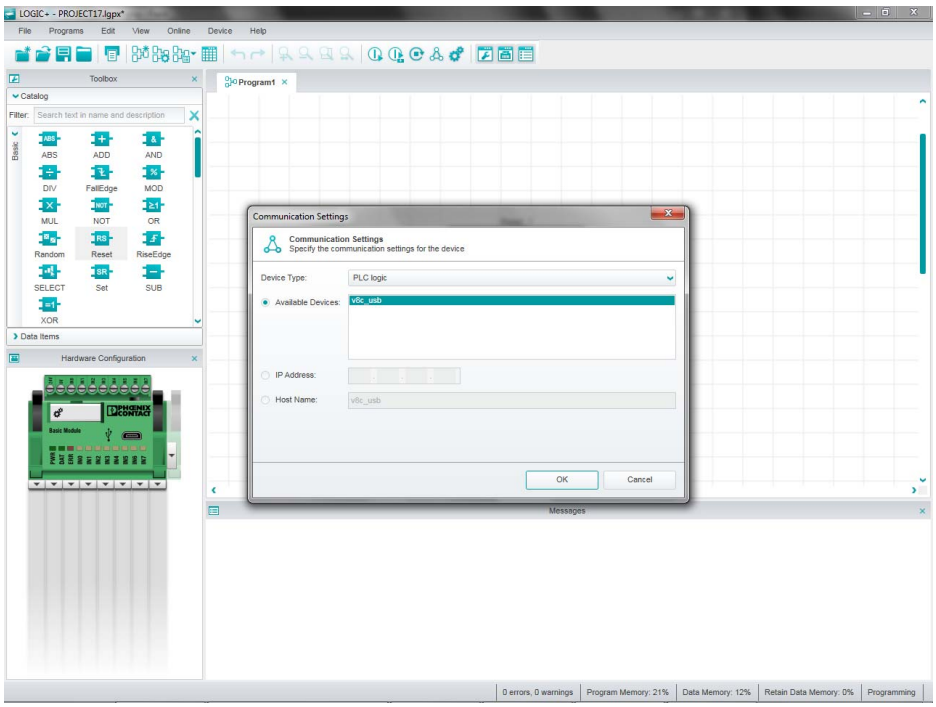


Figure 5-21 Communication settings

In the “Communication Settings” dialog, select the device that is connected to your PC in the “Selected Device” list box. The device name corresponds to the NetBIOS name specified on the device configuration page. The default NetBIOS name is “v8c_usb”.

For information on how to open the configuration page and change the NetBIOS name, see “Configuration via web server” on page 50.

As soon as LOGIC+ detects the connected device at the USB connection, the message “The device <device name> is available” appears at the bottom of the dialog (see Figure 5-21 on page 79). If the device is not found, a corresponding message appears in the dialog. If so, check whether the device is connected correctly to the PC or select a different device.

You can cancel this operation with “Cancel”. To close the “Communication Settings” dialog again, click on “OK”.

5.5.8 Executing a project on PLC logic

NOTE:
The project is immediately executed (started) on the device. Online mode is activated when you click on the “Execute on device” button. Make sure that this will not lead to any hazardous situations.

The integrated simulation can be used to test the behavior of the project with no device connected.

Password protection

The project is protected against unauthorized transfer and execution on the device with a password. This password is checked every time the “Execute on device” command is performed. The device password can be changed on the device configuration page. For information on how to open this page and change the password, see “Configuration via web server” on page 50.

To execute the project on the device and switch to online mode, proceed as follows:

1. Make sure that there are no error messages regarding the project in the message window.
2. Make sure that the configuration of the inputs and outputs in the hardware configuration corresponds to the configuration of the inputs and outputs on the device. If this is not the case, change the hardware configuration in LOGIC+.
3. Select “Online > Execute on device” or click on the “Execute on device” button in the tool bar.
4. In the dialog that appears, the memory required is displayed and you can select the “Include sources” option. If you select this option, when the compiled project is transferred to the logic module, the original LOGIC+ project is also transferred together with all comments and identifiers.

   You can also download the project again later directly from the logic module.

After successfully transferring and starting the project on the device, online mode is activated. The watch window appears at the bottom of the program window. The tool bar contains additional buttons which can be used to control the device and debug the active project. The status bar displays the states “Running” and “Device connected”.

While the project is being executed on the device and online mode is activated, you can perform the following actions:

– Monitor the active project in online mode
– Stop and resume the active project
– Debug the project by overwriting values
– Group data items and inputs/outputs from several programs in the watch window in order to view their online values at a glance
– Debug the project

To return to programming mode, click on the “Back to programming” button in the tool bar. Alternatively, use the keyboard shortcut <Ctrl> + <F5>.

Behavior during transfer

LOGIC+ behaves differently when a project is executed.

Its behavior depends on the following factors:

– The current device status indicated in the status bar: for example, a project is being cyclically executed on the device or project execution has been stopped.
– The project loaded in the internal memory of the device.

The following generally applies:

Each time the “Execute on device” button is pressed, LOGIC+ checks whether a project is already stored on the device. If the project on the device and the project to be transferred are not identical, the device is reset. The current project is transferred to the device and executed immediately. If the project on the device and the LOGIC+ project are identical, the project is executed immediately.

5.5.9 Memory and size of a program

The project size is limited by the memory available on the connected device. During programming, LOGIC+ monitors the memory used. The current memory used on the device is indicated by a percentage value in the status bar.

Among other things, the project size depends on the number of different function blocks.

5.5.10 Cycle time

The cycle time is the time required to process a complete program once. The time required for one program cycle can be determined by means of the following example program.

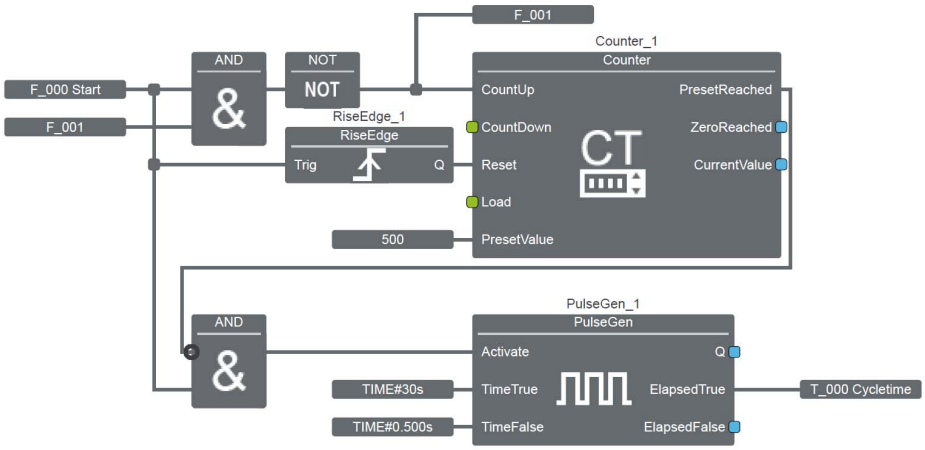


Figure 5-22 Determining the cycle time

This example program can be inserted in programs that have already been created. The example program indicates the cycle time of the program created. Overwrite flag “F_000_Start” with TRUE to start the calculation. The program counts 1000 cycles and indicates the time required for this in time register “T_000 Cycletime”. This value must then be divided by 1000 to determine the value for one cycle.

Example: T_000 indicates the value “T#1.996s”.

The cycle time is therefore 1.996 ms.

Alternatively, you can use the CycleTime function block from the “Special” library. The library is available to download free of charge at phoenixcontact.com.

5.6 IFS-CONFSTICK (memory)

PLC logic programs are stored using the IFS-CONFSTICK memory module (Order No. 2986122) or programs can be easily transferred to other devices.

If settings such as time or date are required on the new device, these values can be configured via the integrated web server. The new device does not need access to the LOGIC+ software for this.

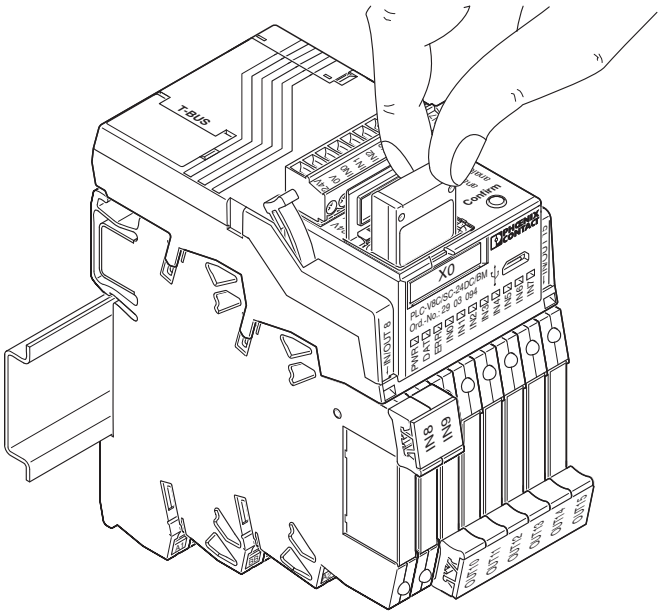


Figure 5-23 Inserting the IFS-CONFSTICK

5.6.1 Writing the device configuration and program to the IFS-CONFSTICK

1. Press the Confirm button on the logic module.
2. Insert the memory module in the logic module within 4 s.
   The copying of the configuration and program is started.
   The DAT LED flashes while saving.
   The DAT LED goes out when backup is completed.
3. Remove the memory module.

5.6.2 Running the device configuration and program on the logic module

1. Insert the memory module in the logic module.
   The configuration/program is checked automatically. If another configuration/program is detected on the device, the DAT and ERR LEDs flash alternately.
2. Press the Confirm button within 6 s.
   The copying of the configuration and program is started (DAT LED flashes).
   An automatic restart is then performed (PWR and ERR LEDs flash simultaneously).
   When the PWR LED is permanently on, this means that the process has been completed.

5.7 Configuration and monitoring via Bluetooth

5.7.1 Bluetooth adapter

The IFS-BT-PROG-ADAPTER Bluetooth adapter (Order No. 2905872) can be used to establish a wireless connection between PLC logic and a smartphone with Android or iOS. To do this, insert the Bluetooth adapter with S-PORT interface into the Memory socket.

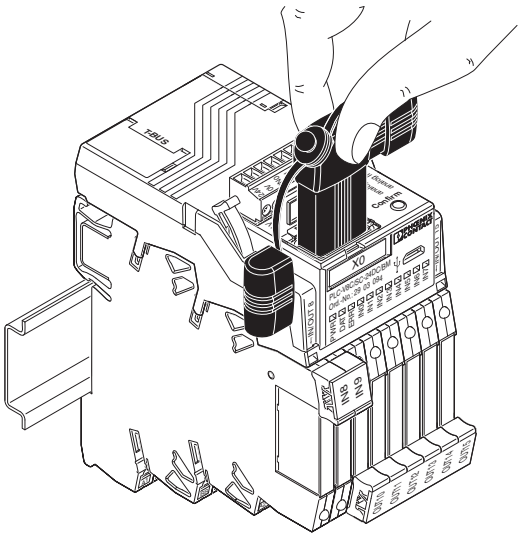


Figure 5-24 Bluetooth adapter

5.7.2 PLC logic app

Downloading the app

The PLC logic app is available in the Google Play Store and Apple App Store.

Establishing the connection to the Bluetooth adapter

When you start the PLC logic app, it searches for available Bluetooth adapters. The Bluetooth adapters found are displayed in a list.

Further help for the PLC logic app can be found in the app itself.

5.8 Integration in third-party bus systems using the example of PROFIBUS DP

An adaptable EM-PB-GATEWAY-IFS, which is available as an option, can be used to integrate PLC logic into a PROFIBUS DP network. This enables communication with a higher-level controller for remote control, diagnostics, and visualization purposes.

The following components are required for this.

Table 5-12 Components for integration in PROFIBUS DP

Description	Order No.	Order designation
Gateway for PROFIBUS DP	2297620	EM-PB-GATEWAY-IFS
Programming adapter for the PROFIBUS gateway	2320500	IFS-USB-DATACABLE
DIN rail connector	2707437	ME22,5 TBUS 1,5/5-ST-3,81 GN
Connecting cable for connecting PLC logic to the DIN rail connector, length: 30 cm	2905263	PLC-V8C/CAB/TBUS/0,3M

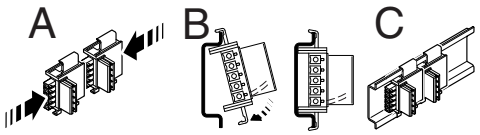
The following downloads are also required.

Go to phoenixcontact.com and enter “EM-PB-GATEWAY-IFS” or “2297620” in the search field. The following tools can be found under Downloads:

– IFS-CONF-SUITE-INTERFACE Setup
– GSD file for EM-PB-GATEWAY-IFS

5.8.1 Mounting

1. Snap the DIN rail connector onto the DIN rail.



2. Snap the gateway onto the DIN rail connector.

   The gateway is positioned mechanically using the DIN rail connector. The connections on the bottom of the gateway make contact with the connections on the DIN rail connector.

3. Connect the T-BUS connection on the PLC-V8C logic module to the DIN rail connector using the appropriate PLC-V8C/CAB/TBUS/0,3M cable (Order No. 2905263).

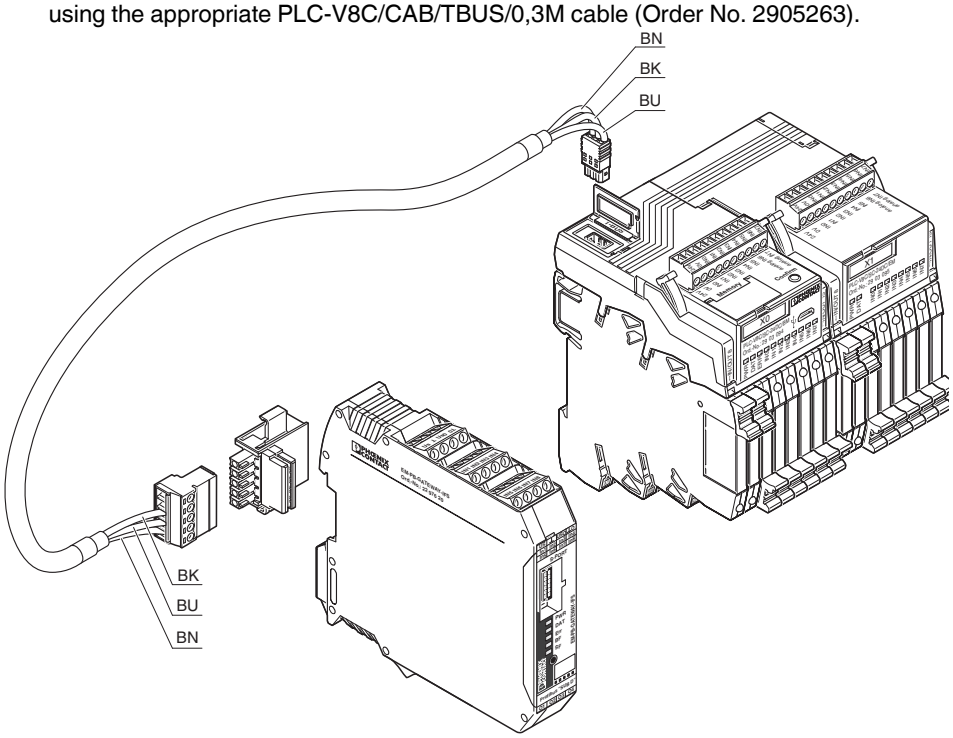


Figure 5-25 Mounting the PROFIBUS gateway and PLC logic

Due to the design, only one PLC logic device can be connected to the gateway. Therefore in this combination, only one PLC logic device can be integrated into a PROFIBUS network.

5.8.2 EM-PB-GATEWAY-IFS gateway

Before starting up the gateway, carefully read through the packing slip supplied with the device. For detailed information on the gateway, refer to the gateway system manual available at phoenixcontact.net/products.

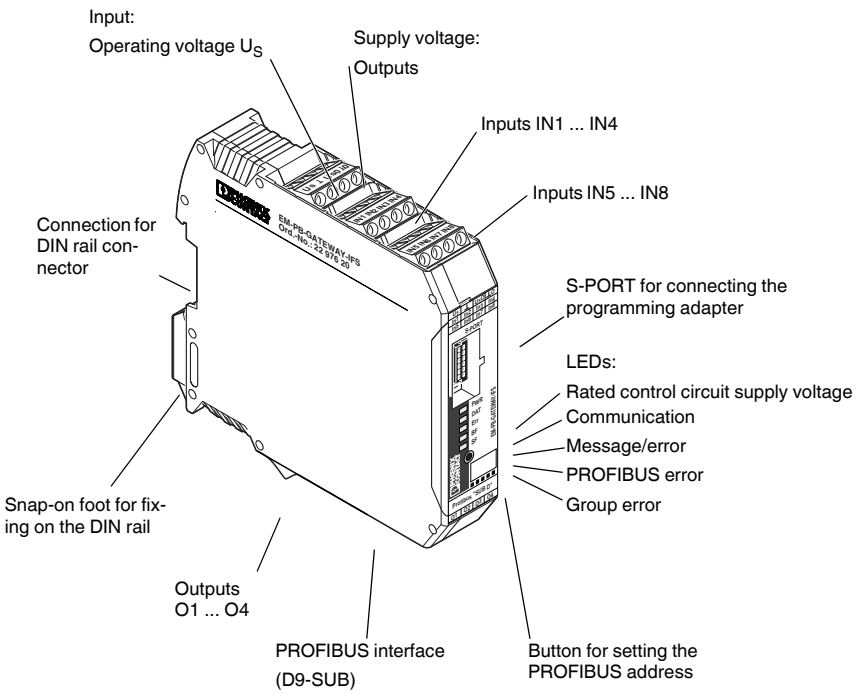


Figure 5-26EM-PB-GATEWAY-IFS

The EM-PB-GATEWAY-IFS PROFIBUS module (Order No. 2297620) is a module that enables PLC logic to be connected to PROFIBUS DP. The module is certified according to specification DPV1 (EN 50170). The EM-PB-GATEWAY-IFS can communicate with PLC logic via the DIN rail connector and an appropriate connecting cable. The assignment of the process data can be individually adapted to the application requirements by means of the GSD file (device master data). The GSD file (containing the characteristic communication features of the PROFIBUS module) is available on the Internet at phoenixcontact.net/products. The PROFIBUS address is set using a button and a device (PC, memory stick, actuator) connected to the S-PORT as an option. The module does not provide PROFIBUS termination. An appropriate connector should be used for this, if required.

5.8.3 Block diagram

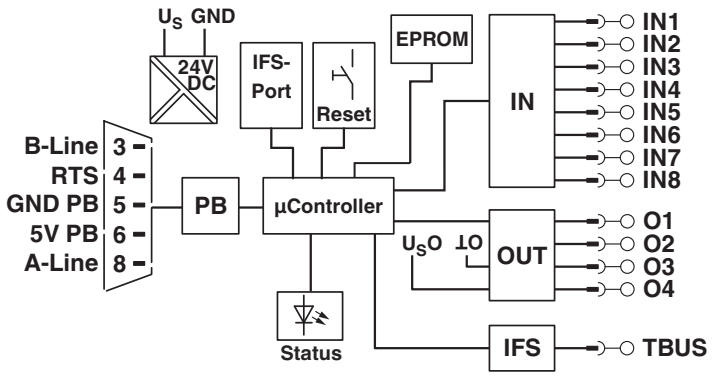


Figure 5-27 Block diagram

5.8.4 Status LEDs

Five LEDs visualize the various operating states of the gateway.

The status LEDs are used to indicate the PROFIBUS address and the addresses of the connected IFS devices in parameterization mode when setting the address.

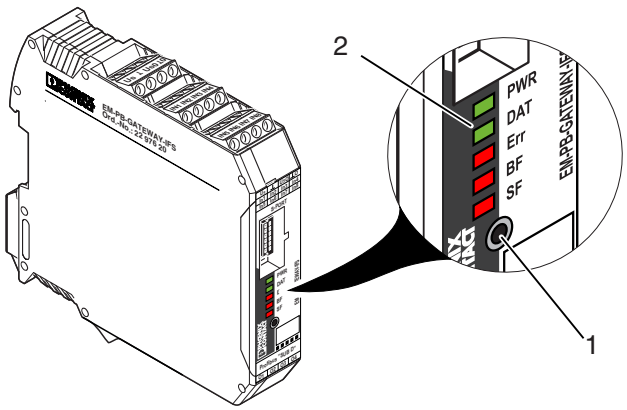


Figure 5-28 Status LEDs

1 Button for setting the PROFIBUS address
2 Status LEDs

LED	Description
PWR LED (green)	**Device status**
Off	No supply voltage. Microcontroller does not start.
On	Supply voltage OK. Microcontroller is running.
Flashing at 1.4 Hz (slow)	Setting the PROFIBUS address
Flashing at 2.8 Hz (fast)	IFS address assignment

LED [...]	Description
DAT LED (green)	**Communication**
Off	No data traffic
On	Cyclic data traffic
Flashing at 1.4 Hz (slow)	Device is being configured
ERR LED (red)	**Device or process error**
Off	No error
On	Serious internal error
Flashing at 2.8 Hz (fast)	I/O error, e.g., overload of the output driver
BF LED (red)	**PROFIBUS error**
Off	No error
On	No cyclic data exchange (C1 master not present)
Flashing at 1.4 Hz (slow)	PROFIBUS parameterization invalid
Flashing at 2.8 Hz (fast)	PROFIBUS configuration invalid
SF LED (red)	**Group error**
Off	No error
On	Connected device has an internal error or is not present
	Process error or I/O error on a device
Flashing at 1.4 Hz (slow)	PROFIBUS configuration and station structure do not match
Flashing at 2.8 Hz (fast)	

5.8.5 Communication with PLC logic

5.8.5.1 Setting in the LOGIC+ software

The Interface system IOs are required for communication with a gateway. They can be found in the “Data Items” tab in the toolbox in LOGIC+.

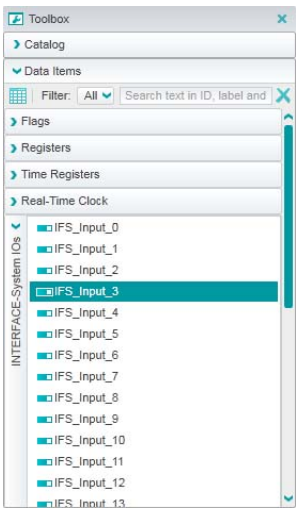


Figure 5-29 Interface system IOs

These Interface system IOs are used as 16-bit words. In order to read these 16-bit words as individual bits, the “IFSToFlags” and “FlagsToIFS” function blocks from the “INTERFACE System” library are required, which can be downloaded free of charge at phoenixcontact.net/products.

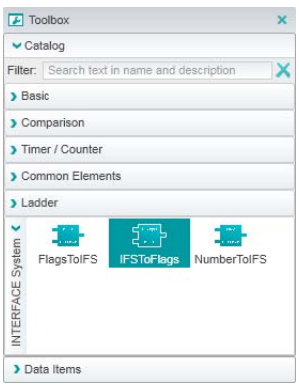


Figure 5-30 Function blocks

The “IFSToFlags” function block can be used to break down an input word from the IFS gateway into its 16 bits.

The “FlagsToIFS” block combines the 16 individual bits into a 16-bit word that can be read by the IFS gateway.

Since LOGIC+ uses double integers (signed DINT, 32 bits) and the gateway uses integers (INT, 16 bits), you must watch out for an overrange or underrange of the value ranges.

Signed INT = -32,768 ... 32,767

Unsigned INT = 0 ... 65,535

You can use the “Check16Bit” function block for this.

An example program is shown in the screenshot below where input “IFS_Input_0” is broken down into its 16 bits and provided directly at the hardware outputs of the logic module + an extension module.

Furthermore, the values of the logic module realtime clock are forwarded to the gateway as numerical values.

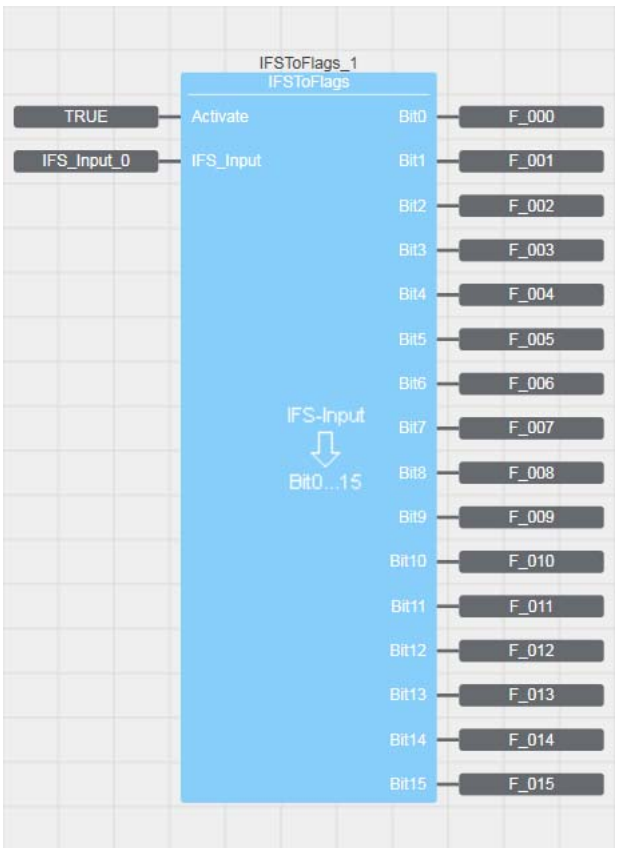


Figure 5-31 Example program

5.8.5.2 Settings on the gateway

For the setting options for other gateways (Modbus/TCP, CANopen®, etc.), refer to application note “EM-XXX-GATEWAY-IFS”, which is available as a download for the respective gateway at phoenixcontact.net/products.

The connection between the gateway and a PC is established using the IFS-USB-DATACABLE programming adapter (Order No. 2320500).

Insert the programming adapter into the S-PORT interface of the gateway. A USB connector is available on the PC side.

The IFS-CONF-SUITE-INTERFACE software is required in order to parameterize the gateway. It is available to download free of charge at phoenixcontact.net/products.

Install the following components:

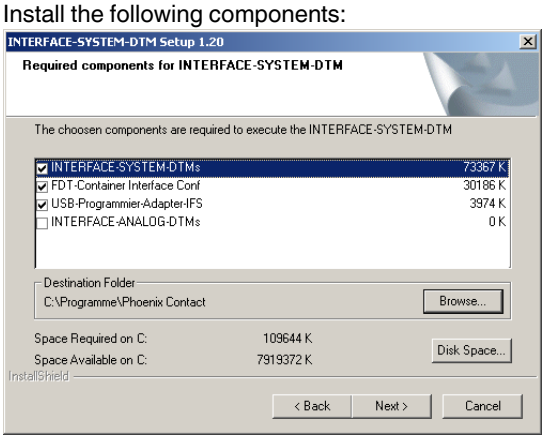


Figure 5-32 Installing components

Before parameterizing the required settings on the gateway, arrange the components as described in “Mounting” on page 87.

1. Connect the T-BUS connection on the PLC-V8C logic module to the DIN rail connector using the appropriate PLC-V8C/CAB/TBUS/0,3M cable (Order No. 2905263).
2. Establish the connection between the gateway and a PC using the IFS-USB-DATACABLE programming adapter (Order No. 2320500).
3. Supply the gateway and the PLC logic module with the operating voltage (24 V DC, see technical data in the corresponding packing slip).
4. Start the IFS-CONF program (FDT container) so that the gateway recognizes the Interface system IOs used.
5. When IFS-CONF is started for the first time, you need to create a new user who is assigned the role of “Administrator”. A password does not have to be assigned. You can create additional user names with different roles. (For example maintenance personnel, operating personnel or observers can be assigned different rights).

The user name is requested every time IFS-CONF is started. Keep a note of your user name.

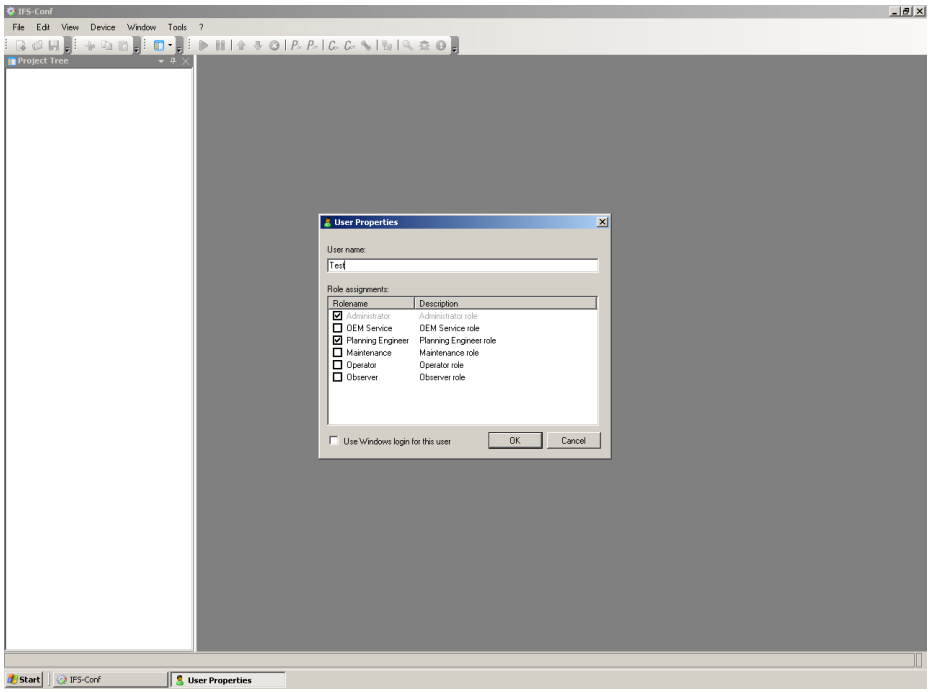


Figure 5-33 User Properties > creating a user

6. The installed device drivers for PLC logic are loaded in the next step.

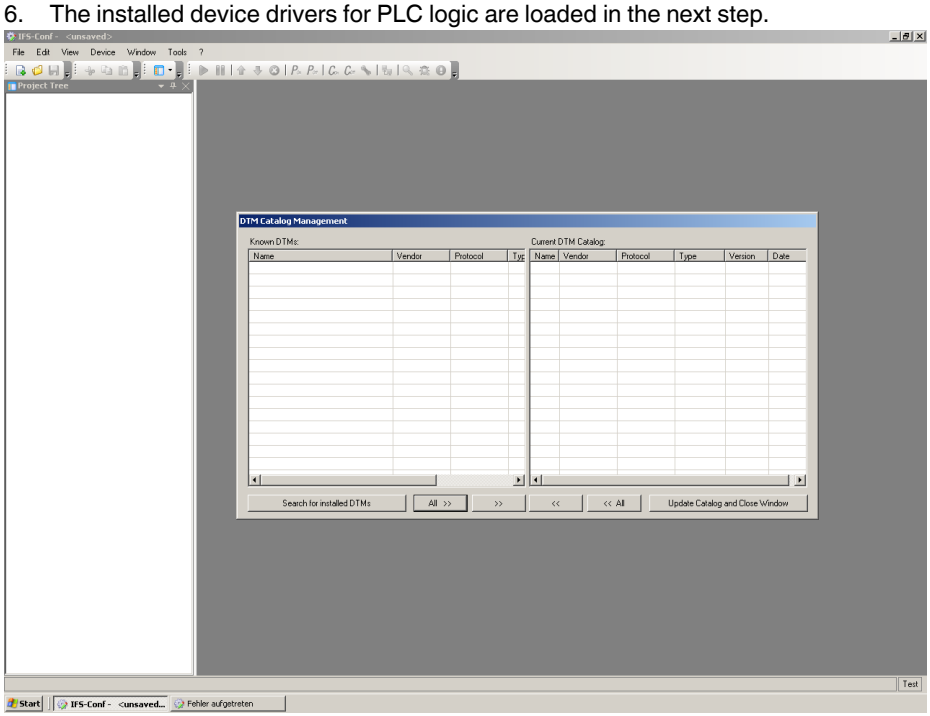


Figure 5-34 Loading device drivers

7. Click on the “Search for installed DTMs” button.

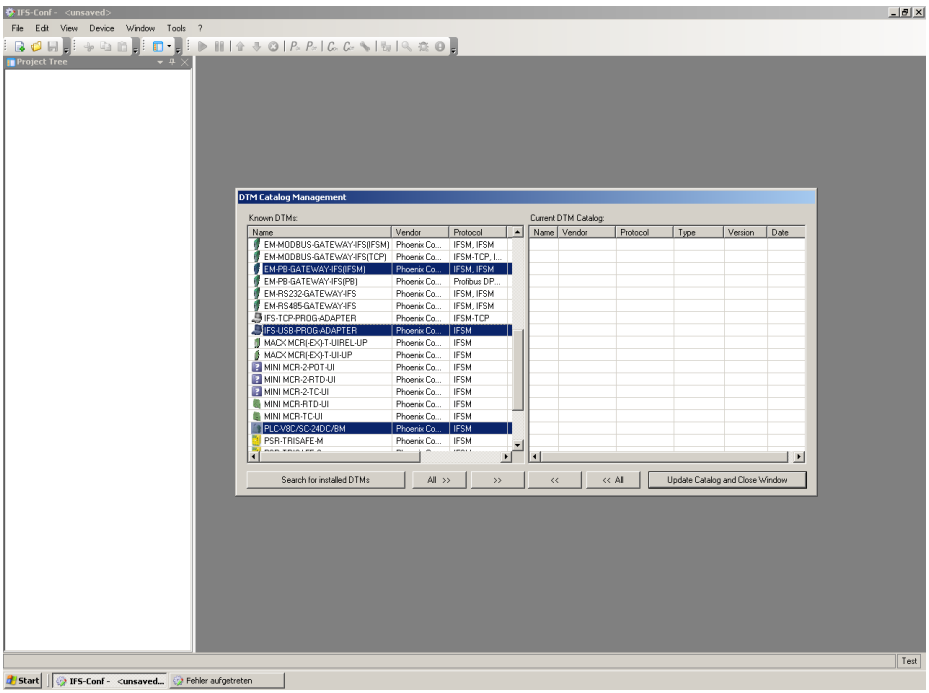


Figure 5-35 Display of installed DTMs

8. Select the EM-PB-GATEWAY-IFS(IFSM) gateway, the IFS-USB-PROG-ADAPTER programming adapter, and the PLC-V8C logic module.
9. Add the selected devices to the current DTM catalog by clicking on the “>>” button.
10. Click on the “Update Catalog and Close Window” button.

The program performs an automatic topology scan. The hardware structure is read.

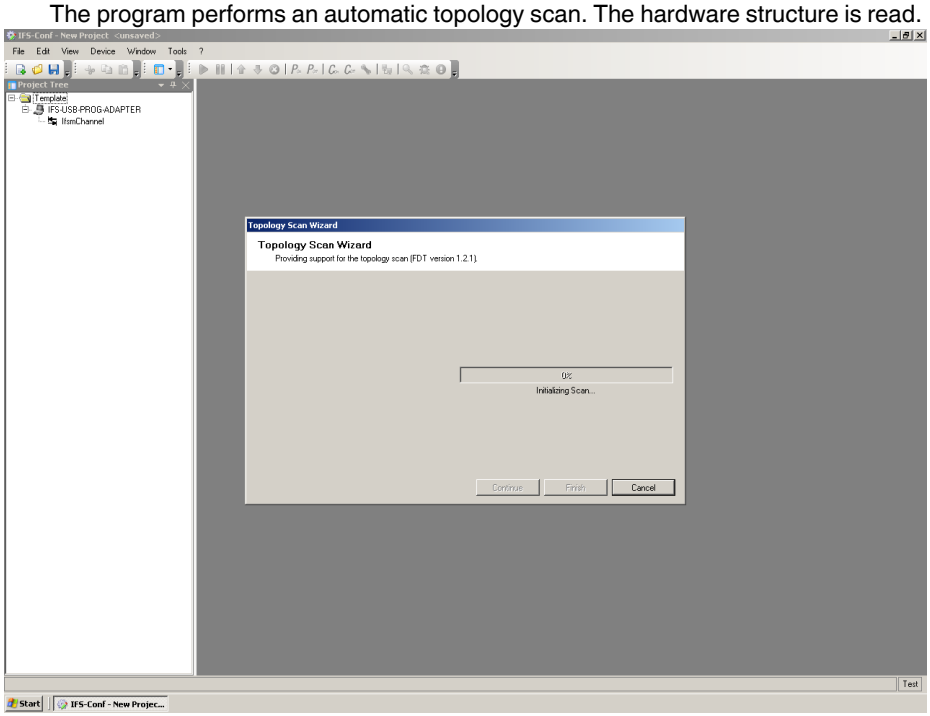


Figure 5-36 Topology scan

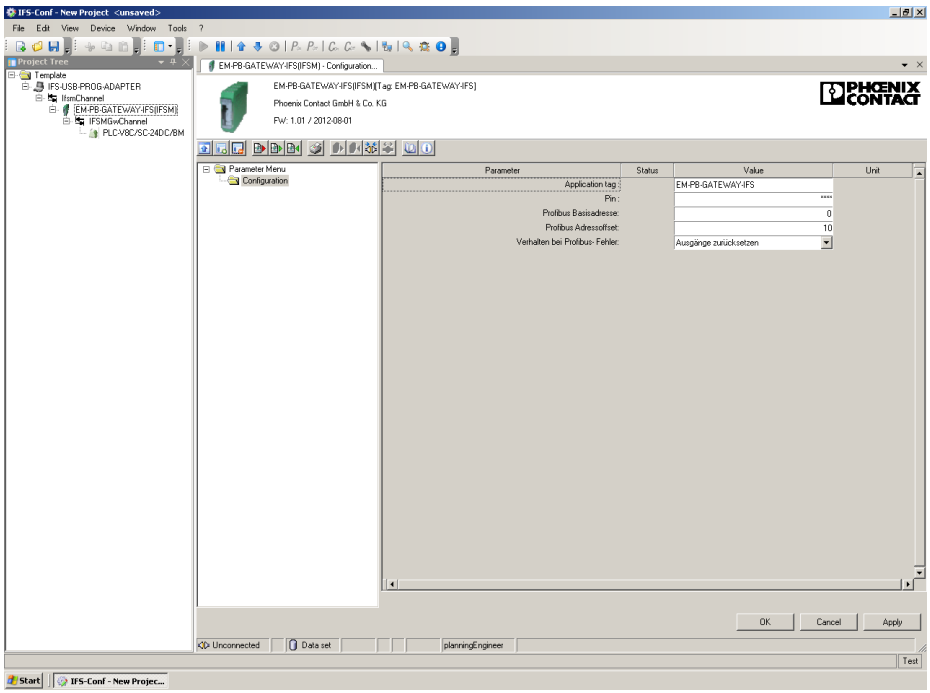


Figure 5-37 Hardware structure

11. Double-click on the EM-PB-GATEWAY-IFS (IFSM) in the project tree.

This opens the gateway settings window.

12. In the settings window, set the desired PROFIBUS address for the gateway under “PROFIBUS address offset”.
13. If you change the preset value, this information must be written to the gateway again. To do this, click on “Apply”.
14. You then need to connect to the gateway by clicking on “Connect” and write the new address to the gateway by clicking on “Write to device”.
15. Right-click on the EM-PB-GATEWAY-IFS in the project tree and select “Functions > Process value configuration”.

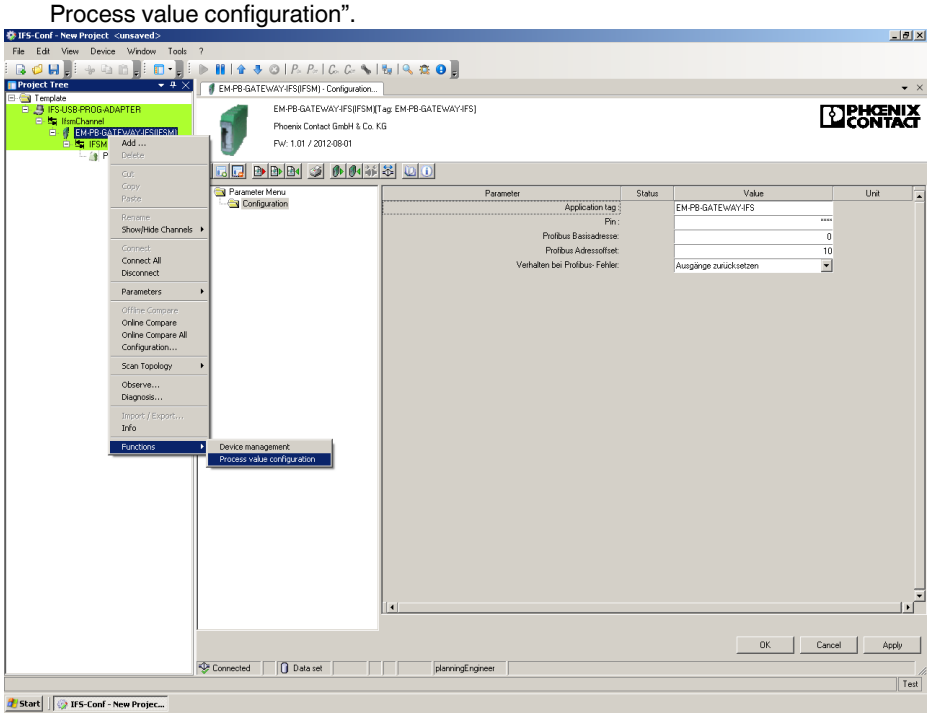


Figure 5-38 Opening the process data configuration

This is split into “Inputs” and “Outputs”.

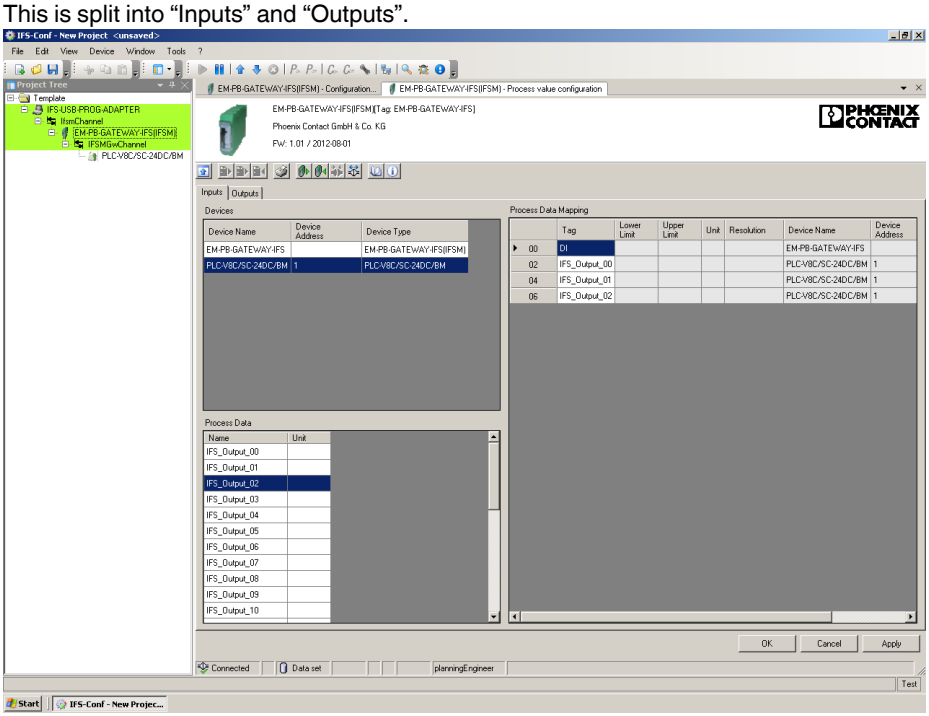


Figure 5-39 Process data configuration: inputs - outputs

Here, an output in LOGIC+ (e.g., IFS_Output_0) is an input for the gateway and can be found on the “Input” tab.

16. Select “PLC-V8C…BM” in the “Devices” area.
    Process data that can be selected is visible in the “Process Data” window (see also “Process data addressing” on page 103).

17. Move the required process data to the “Process Data Mapping” window by means of drag and drop.

    For example, “IFS_Output_00”, “IFS_Output_01”, and “IFS_Output_02” from the example program (see Figure 5-31 on page 92) for LOGIC+.

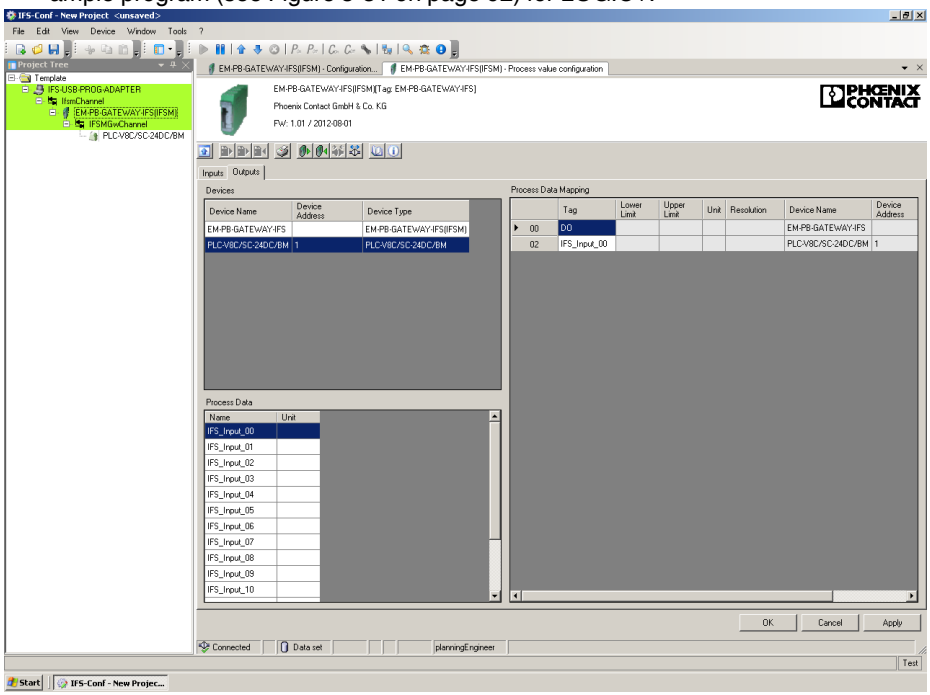


Figure 5-40 Process data configuration: example

18. Define the outputs in the process data assignment in the same way.
19. Apply the process data assignments by clicking on the “Apply” button in the active DTM project.
20. Click on the “Connect” button to establish a connection to the gateway.
21. Send the current configuration to the gateway by clicking on the “Write to device” button.

    The values are now available in the gateway. They can be requested from the gateway via a PROFIBUS DP master.

5.8.5.3 Gateway communication with a PROFIBUS DP master

For additional settings, a connection must be established between the gateway and a PROFIBUS DP master (e.g., Siemens S7 controller) via a standard PROFIBUS cable.

A PROFIBUS interface is available on the gateway via a 9-pos. D-SUB connector (socket).

A Siemens S7-300 controller is shown in later screenshots.

A GSD file is required in order to integrate the gateway into the bus configuration. This is available to download at phoenixcontact.net/products.

After integrating the GSD in the STEP 7 catalog, the gateway can be found in the “PROFIBUS DP > Additional Field Devices > Gateway” area. The “EM-PB-GATEWAY-IFS” must now be inserted in the PROFIBUS bus configuration.

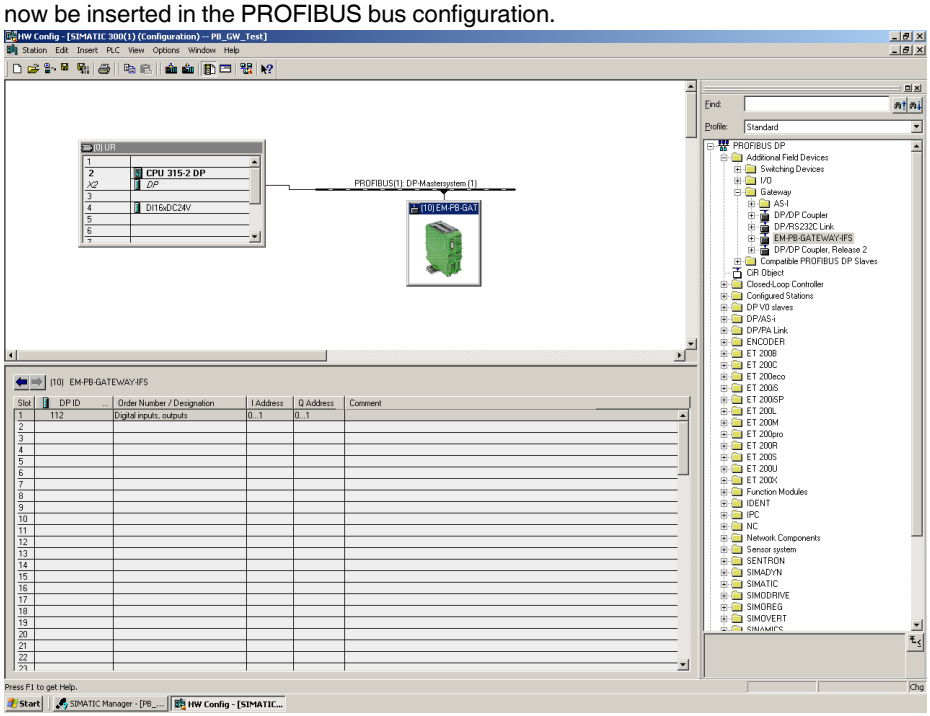


Figure 5-41 Inserting the gateway in the bus configuration

1. Open the properties window by double-clicking on the gateway in the bus configuration.
2. On the “Parameter Assignment” tab, set the “Configuration via DTM” entry to “Enabled” and the “Byte order” to “Intel”.

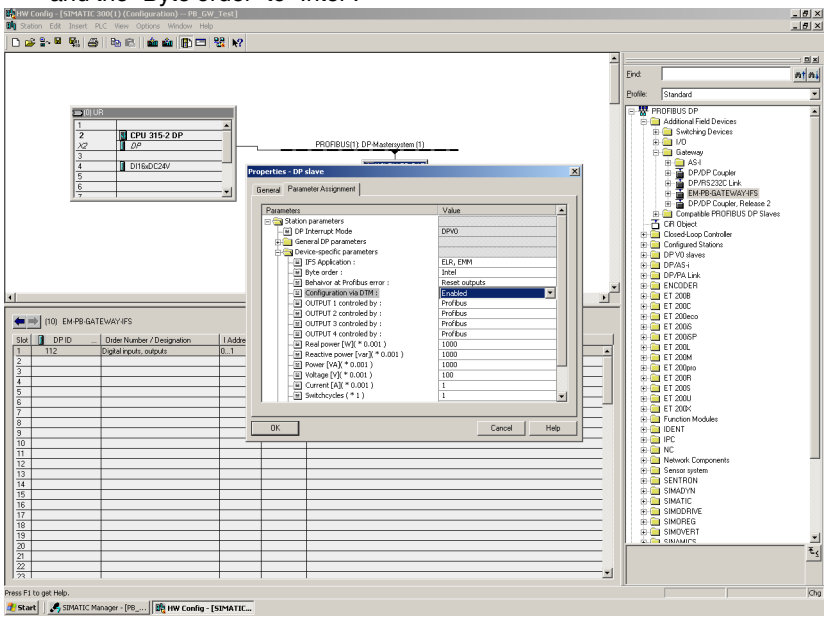


Figure 5-42 Setting the “Configuration via DTM” and “Byte order” entries

3. Open the EM-PB-GATEWAY-IFS in the catalog. The possible process words are listed.

“Byte order” sets the byte order of the transferred data.
– Motorola: Big Endian (the high byte is saved first)
– Intel: Little Endian (the low byte is saved first)

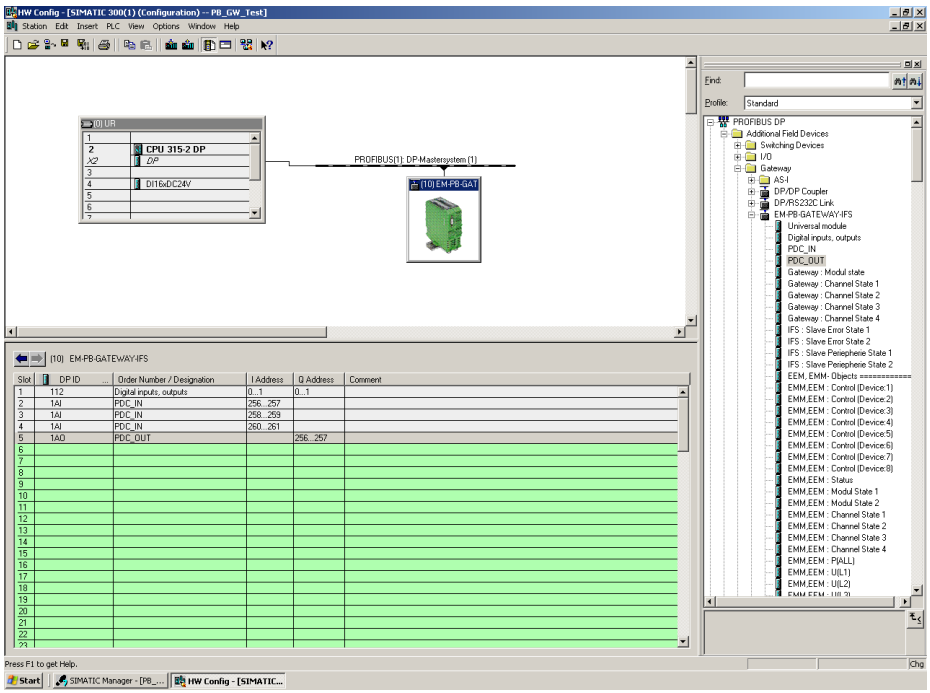
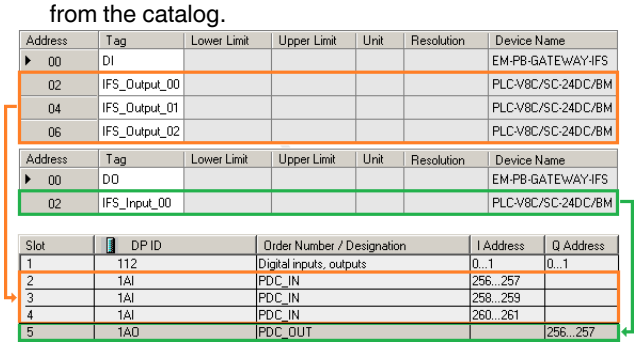


Figure 5-43 Listing process words

4. For PLC logic, use “PDC_IN” (input from DTM) and “PDC_OUT” (output from DTM) from the catalog.



Address	Tag	Lower Limit	Upper Limit	Unit	Resolution	Device Name
00	DI					EM-PB-GATEWAY-IFS
02	IFS_Output_00					PLC-V8C/SC-24DC/BM
04	IFS_Output_01					PLC-V8C/SC-24DC/BM
06	IFS_Output_02					PLC-V8C/SC-24DC/BM

Address	Tag	Lower Limit	Upper Limit	Unit	Resolution	Device Name
00	DO					EM-PB-GATEWAY-IFS
02	IFS_Input_00					PLC-V8C/SC-24DC/BM

Slot	DP ID	Order Number / Designation	I Address	Q Address
1	112	Digital inputs, outputs	0...1	0...1
2	1AI	PDC_IN	256...257	
3	1AI	PDC_IN	258...259	
4	1AI	PDC_IN	260...261	
5	1AO	PDC_OUT		256...257

Figure 5-44 “PDC_IN” (input from DTM) and “PDC_OUT” (output from DTM)

The order of the inputs and outputs must be the same as the process data assignment in the DTM.

Input and output addresses are assigned automatically by STEP 7 when added. They can now be used in the program code.

5.9 Communication via Modbus/RTU

Using the IFS-RS232-DATACABLE RS-232 connecting cable (Order No. 2320490), PLC logic (acting as a Modbus slave) can communicate with a Modbus master.

To do this, insert the connecting cable into the Memory socket for the memory module.

PLC logic is assigned slave ID 192.

Connection settings of the serial port:

– 115,200 baud
– 8 data bits
– Even parity
– 1 stop bit

5.9.1 Process data addressing

Table 5-13 Status of the basic module

Name	Address		Bit	Description
	Hex	Bin		
BM_STATE	7420	29728	0	Device status 0: system in STOP state or not configured 1: system in RUN state
			1	Communication status 0: no data traffic to the gateway 1: cyclic data traffic to the gateway
			2	Internal error
			3	External error
			4	Reserved
			5	Reserved
			6	Reserved
			7	Reserved
			8	Error at extension module 1
			9	Error at extension module 2
			10	Reserved
			11	Reserved
			12	Reserved
			13	Reserved
			14	Reserved
			15	Reserved

Table 5-14 Digital inputs/outputs of the basic module

Name	Address		Bit	Description
	Hex	Bin		
BM_IN_OUT	7421	29729	0	Input IN0 (DI_0_0)
			1	Input IN1 (DI_0_1)
			2	Input IN2 (DI_0_2)
			3	Input IN3 (DI_0_3)
			4	Input IN4 (DI_0_4)
			5	Input IN5 (DI_0_5)
			6	Input IN6 (DI_0_6)
			7	Input IN7 (DI_0_7)
			8	Input/output 8 (DI_0_8 / DQ_0_8)
			9	Input/output 9 (DI_0_9 / DQ_0_9)
			10	Input/output 10 (DI_0_10 / DQ_0_10)
			11	Input/output 11 (DI_0_11 / DQ_0_11)
			12	Input/output 12 (DI_0_12 / DQ_0_12)
			13	Input/output 13 (DI_0_13 / DQ_0_13)
			14	Input/output 14 (DI_0_14 / DQ_0_14)
			15	Input/output 15 (DI_0_15 / DQ_0_15)

Table 5-15 Analog inputs/outputs of the basic module

Name	Address		Bit	Description
	Hex	Bin		
BM_ANALOG_6	7422	29730	-	Analog input value IN6 (AI_0_6)
BM_ANALOG_7	7423	29731	-	Analog input value IN7 (AI_0_7)
BM_ANALOG_8	742C	29740	-	Analog input/output 8 (AI_0_8 / AO_0_8)
BM_ANALOG_9	742D	29741	-	Analog input/output 9 (AI_0_9 / AO_0_9)
BM_ANALOG_10	742E	29742	-	Analog input/output 10 (AI_0_10 / AO_0_10)
BM_ANALOG_11	742F	29743	-	Analog input/output 11 (AI_0_11 / AO_0_11)
BM_ANALOG_12	7430	29744	-	Analog input/output 12 (AI_0_12 / AO_0_12)
BM_ANALOG_13	7431	29745	-	Analog input/output 13 (AI_0_13 / AO_0_13)
BM_ANALOG_14	7432	29746	-	Analog input/output 14 (AI_0_14 / AO_0_14)
BM_ANALOG_15	7433	29747	-	Analog input/output 15 (AI_0_15 / AO_0_15)

Table 5-16 Status of extension module 1

Name	Address		Bit	Description
	Hex	Bin		
EM_1_STATUS	7424	29732	0	Reserved
			1	Reserved
			2	Internal error
			3	External error
			4	Reserved
			5	Reserved
			6	Reserved
			7	Reserved
			8	Reserved
			9	Reserved
			10	Reserved
			11	Reserved
			12	Reserved
			13	Reserved
			14	Reserved
			15	Reserved

Table 5-17 Inputs/outputs of extension module 1

Name	Address		Bit	Description
	Hex	Bin		
EM_1_IN_OUT	7425	29733	0	Input IN0 (DI_1_0)
			1	Input IN1 (DI_1_1)
			2	Input IN2 (DI_1_2)
			3	Input IN3 (DI_1_3)
			4	Input IN4 (DI_1_4)
			5	Input IN5 (DI_1_5)
			6	Input IN6 (DI_1_6)
			7	Input IN7 (DI_1_7)
			8	Input/output 8 (DI_1_8 / DQ_1_8)
			9	Input/output 9 (DI_1_9 / DQ_1_9)
			10	Input/output 10 (DI_1_10 / DQ_1_10)
			11	Input/output 11 (DI_1_11 / DQ_1_11)
			12	Input/output 12 (DI_1_12 / DQ_1_12)
			13	Input/output 13 (DI_1_13 / DQ_1_13)
			14	Input/output 14 (DI_1_14 / DQ_1_14)
			15	Input/output 15 (DI_1_15 / DQ_1_15)

Table 5-18 Analog inputs of extension module 1

Name	Address		Bit	Description
	Hex	Bin		
EM_1_ANALOG_6	7426	29734	-	Analog input value IN6 (AI_1_6)
EM_1_ANALOG_7	7427	29735	-	Analog input value IN7 (AI_1_7)

Table 5-19 Status of extension module 2

Name	Address		Bit	Description
	Hex	Bin		
EM_2_STATUS	7428	29736	0	Reserved
			1	Reserved
			2	Internal error
			3	External error
			4	Reserved
			5	Reserved
			6	Reserved
			7	Reserved
			8	Reserved
			9	Reserved
			10	Reserved
			11	Reserved
			12	Reserved
			13	Reserved
			14	Reserved
			15	Reserved

Table 5-20 Digital inputs/outputs of extension module 2

Name	Address		Bit	Description
	Hex	Bin		
EM_2_IN_OUT	7429	29737	0	Input IN0 (DI_2_0)
			1	Input IN1 (DI_2_1)
			2	Input IN2 (DI_2_2)
			3	Input IN3 (DI_2_3)
			4	Input IN4 (DI_2_4)
			5	Input IN5 (DI_2_5)
			6	Input IN6 (DI_2_6)
			7	Input IN7 (DI_2_7)
			8	Input/output 8 (DI_2_8 / DQ_2_8)
			9	Input/output 9 (DI_2_9 / DQ_2_9)
			10	Input/output 10 (DI_2_10 / DQ_2_10)
			11	Input/output 11 (DI_2_11 / DQ_2_11)
			12	Input/output 12 (DI_2_12 / DQ_2_12)
			13	Input/output 13 (DI_2_13 / DQ_2_13)
			14	Input/output 14 (DI_2_14 / DQ_2_14)
			15	Input/output 15 (DI_2_15 / DQ_2_15)

Table 5-21 Analog inputs of extension module 2

Name	Address		Bit	Description
	Hex	Bin		
EM_2_ANALOG_1	742A	29738	-	Analog input value IN6 (AI_2_6)
EM_2_ANALOG_2	742B	29739	-	Analog input value IN7 (AI_2_7)

Table 5-22 Realtime clock

Name	Address		Bit	Description
	Hex	Bin		
RTC_SEC	7700	30464	-	Realtime clock seconds
RTC_MIN	7702	30466	-	Realtime clock minutes
RTC_HOUR	7704	30468	-	Realtime clock hours
RTC_DOM	7706	30470	-	Realtime clock day of the month
RTC_DOW	7708	30472	-	Realtime clock day of the week
RTC_DOY	770A	30474	-	Realtime clock day of the year
RTC_MONTH	770C	30476	-	Realtime clock month
RTC_YEAR	770E	30478	-	Realtime clock year
RTC_DaylightSavingTime	7712	30482	-	Daylight saving time

Table 5-23 Flags 000 ... 015

Name	Address		Bit	Description
	Hex	Bin		
F_000 ... F_015	75D0	30160	0	Flag F_000
			1	Flag F_001
			2	Flag F_002
			3	Flag F_003
			4	Flag F_004
			5	Flag F_005
			6	Flag F_006
			7	Flag F_007
			8	Flag F_008
			9	Flag F_009
			10	Flag F_010
			11	Flag F_011
			12	Flag F_012
			13	Flag F_013
			14	Flag F_014
			15	Flag F_015

Table 5-24 Flags 016 ... 031

Name	Address		Bit	Description
	Hex	Bin		
F_016 ... F_031	75D2	30162	0	Flag F_016
			1	Flag F_017
			2	Flag F_018
			3	Flag F_019
			4	Flag F_020
			5	Flag F_021
			6	Flag F_022
			7	Flag F_023
			8	Flag F_024
			9	Flag F_025
			10	Flag F_026
			11	Flag F_027
			12	Flag F_028
			13	Flag F_029
			14	Flag F_030
			15	Flag F_031

Table 5-25 Flags 032 ... 047

Name	Address		Bit	Description
	Hex	Bin		
F_032 ... F_047	75D4	30164	0	Flag F_032
			1	Flag F_033
			2	Flag F_034
			3	Flag F_035
			4	Flag F_036
			5	Flag F_037
			6	Flag F_038
			7	Flag F_039
			8	Flag F_040
			9	Flag F_041
			10	Flag F_042
			11	Flag F_043
			12	Flag F_044
			13	Flag F_045
			14	Flag F_046
			15	Flag F_047

Table 5-26 Flags 048 ... 063

Name	Address		Bit	Description
	Hex	Bin		
F_048 ... F_063	75D6	30166	0	Flag F_048
			1	Flag F_049
			2	Flag F_050
			3	Flag F_051
			4	Flag F_052
			5	Flag F_053
			6	Flag F_054
			7	Flag F_055
			8	Flag F_056
			9	Flag F_057
			10	Flag F_058
			11	Flag F_059
			12	Flag F_060
			13	Flag F_061
			14	Flag F_062
			15	Flag F_063

Table 5-27 Flags 064 ... 079

Name	Address		Bit	Description
	Hex	Bin		
F_064 ... F_079	75D8	30168	0	Flag F_064
			1	Flag F_065
			2	Flag F_066
			3	Flag F_067
			4	Flag F_068
			5	Flag F_069
			6	Flag F_070
			7	Flag F_071
			8	Flag F_072
			9	Flag F_073
			10	Flag F_074
			11	Flag F_075
			12	Flag F_076
			13	Flag F_077
			14	Flag F_078
			15	Flag F_079

Table 5-28 Flags 080 ... 095

Name	Address		Bit	Description
	Hex	Bin		
F_080 ... F_095	75DA	30170	0	Flag F_080
			1	Flag F_081
			2	Flag F_082
			3	Flag F_083
			4	Flag F_084
			5	Flag F_085
			6	Flag F_086
			7	Flag F_087
			8	Flag F_088
			9	Flag F_089
			10	Flag F_090
			11	Flag F_091
			12	Flag F_092
			13	Flag F_093
			14	Flag F_094
			15	Flag F_095

Table 5-29 Flags 096 ... 111

Name	Address		Bit	Description
	Hex	Bin		
F_096 ... F_111	75DC	30172	0	Flag F_096
			1	Flag F_097
			2	Flag F_098
			3	Flag F_099
			4	Flag F_100
			5	Flag F_101
			6	Flag F_102
			7	Flag F_103
			8	Flag F_104
			9	Flag F_105
			10	Flag F_106
			11	Flag F_107
			12	Flag F_108
			13	Flag F_109
			14	Flag F_110
			15	Flag F_111

Table 5-30 Flags 112 ... 127

Name	Address		Bit	Description
	Hex	Bin		
F_112 ... F_127	75DE	30174	0	Flag F_112
			1	Flag F_113
			2	Flag F_114
			3	Flag F_115
			4	Flag F_116
			5	Flag F_117
			6	Flag F_118
			7	Flag F_119
			8	Flag F_120
			9	Flag F_121
			10	Flag F_122
			11	Flag F_123
			12	Flag F_124
			13	Flag F_125
			14	Flag F_126
			15	Flag F_127

Table 5-31 Time registers 000 ... 015

Name	Address		Bit	Description
	Hex	Bin		
T_000	75B0	30128	-	Time register T_000
T_001	75B2	30130	-	Time register T_001
T_002	75B4	30132	-	Time register T_002
T_003	75B6	30134	-	Time register T_003
T_004	75B8	30136	-	Time register T_004
T_005	75BA	30138	-	Time register T_005
T_006	75BC	30140	-	Time register T_006
T_007	75BE	30142	-	Time register T_007
T_008	75C0	30144	-	Time register T_008
T_009	75C2	30146	-	Time register T_009
T_010	75C4	30148	-	Time register T_010
T_011	75C6	30150	-	Time register T_011
T_012	75C8	30152	-	Time register T_012
T_013	75CA	30154	-	Time register T_013
T_014	75CC	30156	-	Time register T_014
T_015	75CE	30158	-	Time register T_015

Table 5-32 Registers 000 ... 023

Name	Address		Bit	Description
	Hex	Bin		
R_000	7580	30080	-	Register R_000
R_001	7582	30082	-	Register R_001
R_002	7584	30084	-	Register R_002
R_003	7586	30086	-	Register R_003
R_004	7588	30088	-	Register R_004
R_005	758A	30090	-	Register R_005
R_006	758C	30092	-	Register R_006
R_007	758E	30094	-	Register R_007
R_008	7590	30096	-	Register R_008
R_009	7592	30098	-	Register R_009
R_010	7594	30100	-	Register R_010
R_011	7596	30102	-	Register R_011
R_012	7598	30104	-	Register R_012
R_013	759A	30106	-	Register R_013
R_014	759C	30108	-	Register R_014
R_015	759E	30110	-	Register R_015
R_016	75A0	30112	-	Register R_016
R_017	75A2	30114	-	Register R_017
R_018	75A4	30116	-	Register R_018
R_019	75A6	30118	-	Register R_019
R_020	75A8	30120	-	Register R_020
R_021	75AA	30122	-	Register R_021
R_022	75AC	30124	-	Register R_022
R_023	75AE	30126	-	Register R_023

Table 5-33 INTERFACE system input 0 ... 15

Name	Address		Bit	Description
	Hex	Bin		
IFS_Input_0	7400	29696	-	INTERFACE system input 0
IFS_Input_1	7401	29697	-	INTERFACE system input 1
IFS_Input_2	7402	29698	-	INTERFACE system input 2
IFS_Input_3	7403	29699	-	INTERFACE system input 3
IFS_Input_4	7404	29700	-	INTERFACE system input 4
IFS_Input_5	7405	29701	-	INTERFACE system input 5
IFS_Input_6	7406	29702	-	INTERFACE system input 6
IFS_Input_7	7407	29703	-	INTERFACE system input 7
IFS_Input_8	7408	29704	-	INTERFACE system input 8
IFS_Input_9	7409	29705	-	INTERFACE system input 9
IFS_Input_10	740A	29706	-	INTERFACE system input 10
IFS_Input_11	740B	29707	-	INTERFACE system input 11
IFS_Input_12	740C	29708	-	INTERFACE system input 12
IFS_Input_13	740D	29709	-	INTERFACE system input 13
IFS_Input_14	740E	29710	-	INTERFACE system input 14
IFS_Input_15	740F	29711	-	INTERFACE system input 15

Table 5-34 INTERFACE system output 0 ... 15

Name	Address		Bit	Description
	Hex	Bin		
IFS_Output_0	7410	29712	-	INTERFACE system output 0
IFS_Output_1	7411	29713	-	INTERFACE system output 1
IFS_Output_2	7412	29714	-	INTERFACE system output 2
IFS_Output_3	7413	29715	-	INTERFACE system output 3
IFS_Output_4	7414	29716	-	INTERFACE system output 4
IFS_Output_5	7415	29717	-	INTERFACE system output 5
IFS_Output_6	7416	29718	-	INTERFACE system output 6
IFS_Output_7	7417	29719	-	INTERFACE system output 7
IFS_Output_8	7418	29720	-	INTERFACE system output 8
IFS_Output_9	7419	29721	-	INTERFACE system output 9
IFS_Output_10	741A	29722	-	INTERFACE system output 10
IFS_Output_11	741B	29723	-	INTERFACE system output 11
IFS_Output_12	741C	29724	-	INTERFACE system output 12
IFS_Output_13	741D	29725	-	INTERFACE system output 13
IFS_Output_14	741E	29726	-	INTERFACE system output 14
IFS_Output_15	741F	29727	-	INTERFACE system output 15

6 Function examples

In this section, the software programming environment is illustrated with the aid of a few examples. The examples are intended to assist the user, however the user is still responsible for checking the respective programming, in particular with regard to its suitability in specific applications. It is your responsibility as the user to conduct a risk and functional analysis of the relevant program logic in relation to current standards and to assess the validity of these for your activities. The analysis should extend to the system in which the logic modules are to be used. An overall validation and regression testing must be carried out in particular.

The program examples are solely for explanation purposes and do not claim to be complete. They must therefore not be generalized or used without being checked.

Please observe the notes provided in the packing slip for the logic module and in the software, especially any safety notes and installation instructions.

6.1 Analog differential threshold value switch

The output is switched on and off according to a parameterizable threshold and differential value.

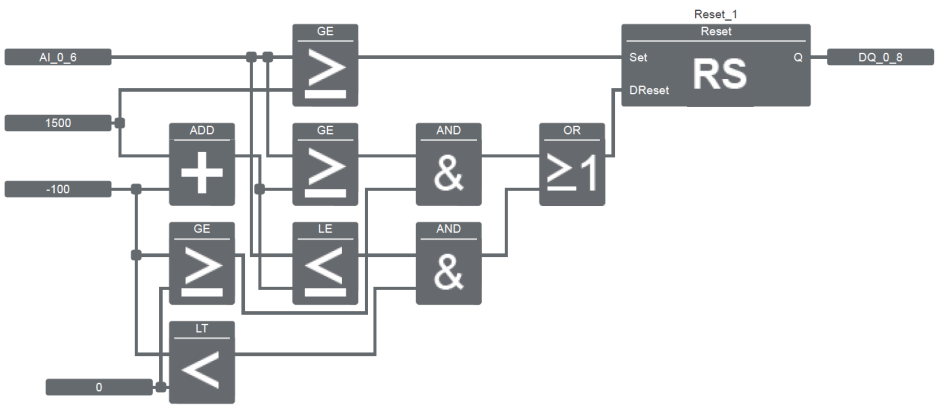


Figure 6-1 Analog differential threshold value switch code

6.2 Analog threshold value switch

The output is switched on and off according to two parameterizable threshold values (hysteresis).

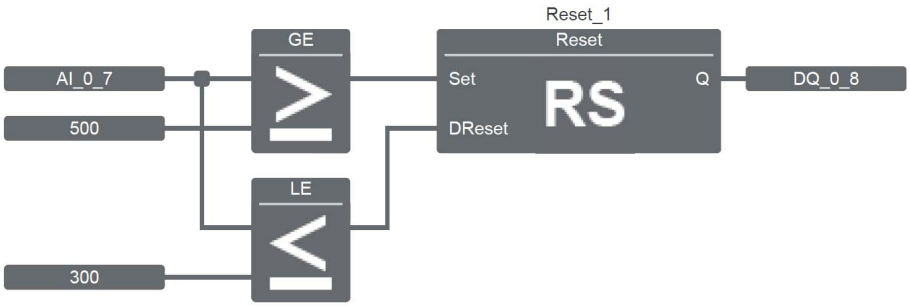


Figure 6-2 Analog threshold value switch code

6.3 Analog comparator

The output is switched on and off according to the difference between Ax - Ay and two parameterizable threshold values.

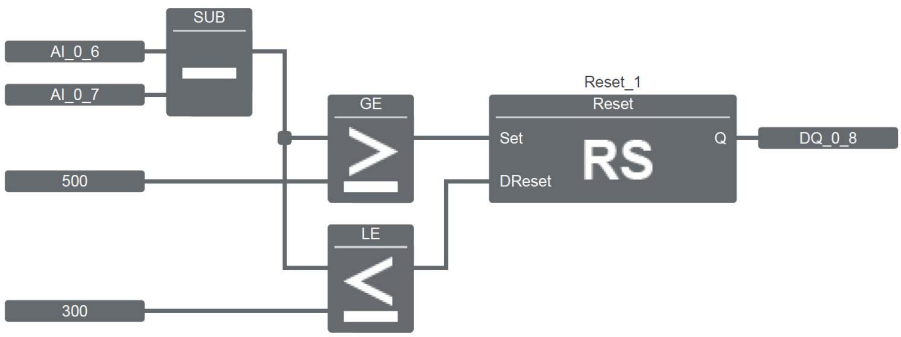


Figure 6-3 Analog comparator code

6.4 Pulse relay

The output is switched on or off by an input pulse.

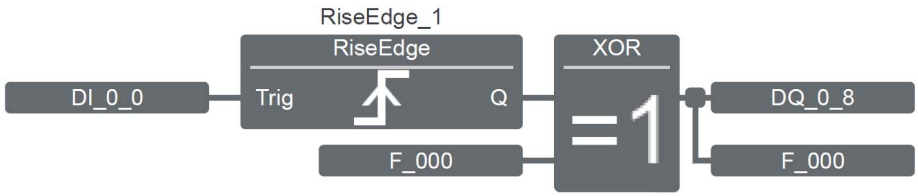


Figure 6-4 Pulse relay code

6.5 Interval time-delay relay with pulse output

An input signal switches the output to the TRUE state. The output is reset after a parameterizable time or after the input changes from FALSE to TRUE.

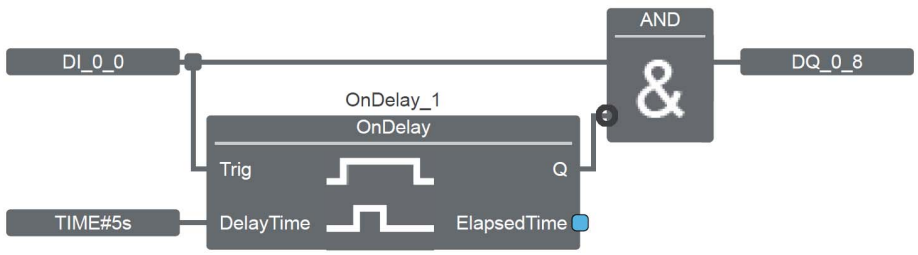


Figure 6-5 Interval time-delay relay with pulse output code

6.6 Edge-triggered interval time-delay relay

An input pulse generates a number of signals at the output after an adjustable time (can be retriggered).

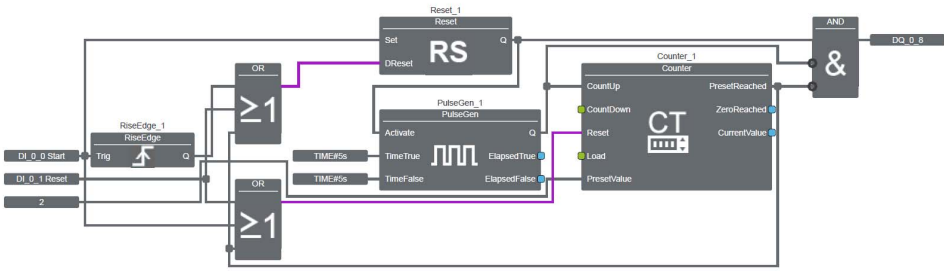


Figure 6-6 Edge-triggered interval time-delay relay

7 Application examples

In this section, the software programming environment is illustrated with the aid of a few examples. The examples are intended to assist the user, however the user is still responsible for checking the respective programming, in particular with regard to its suitability in specific applications. It is your responsibility as the user to conduct a risk and functional analysis of the relevant program logic in relation to current standards and to assess the validity of these for your activities. The analysis should extend to the system in which the logic modules are to be used. An overall validation and regression testing must be carried out in particular.

The program examples are solely for explanation purposes and do not claim to be complete. They must therefore not be generalized or used without being checked.

Please observe the notes provided in the packing slip for the logic module and in the software, especially any safety notes and installation instructions.

Further application examples can be downloaded online at phoenixcontact.net/products.

7.1 Underground parking garage ventilation

Fans in an underground parking garage are to be controlled with PLC logic.

The carbon monoxide concentration in an underground parking garage is detected using a CO sensor and made available to PLC logic as a 0 V .... 10 V standard signal via an analog signal conditioner. PLC logic acquires the standard signal at analog input IN6. In this example, there are three fans available in the underground parking garage. At a CO concentration > 30 ppm, fan 1 (DQ_0_11) starts up, at > 60 ppm fans 1 and 2 (DQ_0_12) run and the yellow light (DQ_0_8) indicates a warning. At a concentration > 90 ppm, all three fans (DQ_0_13) run, the red warning light (DQ_0_9) and the horn (DQ_0_10) indicate danger.

The CO sensor and signal conditioner convert the 0 ppm ... 300 ppm measuring range into 0 V ... 10 V. The LOGIC+ software processes the standard signal as values from 0 ... 1000, therefore 30 ppm corresponds to a value of 100 in LOGIC+, 60 ppm corresponds to 200, and 90 ppm corresponds to 300.

All three fans can be switched on and off manually via button 1 (IN0) and button 0 (IN1).

7.1.1 Hardware structure

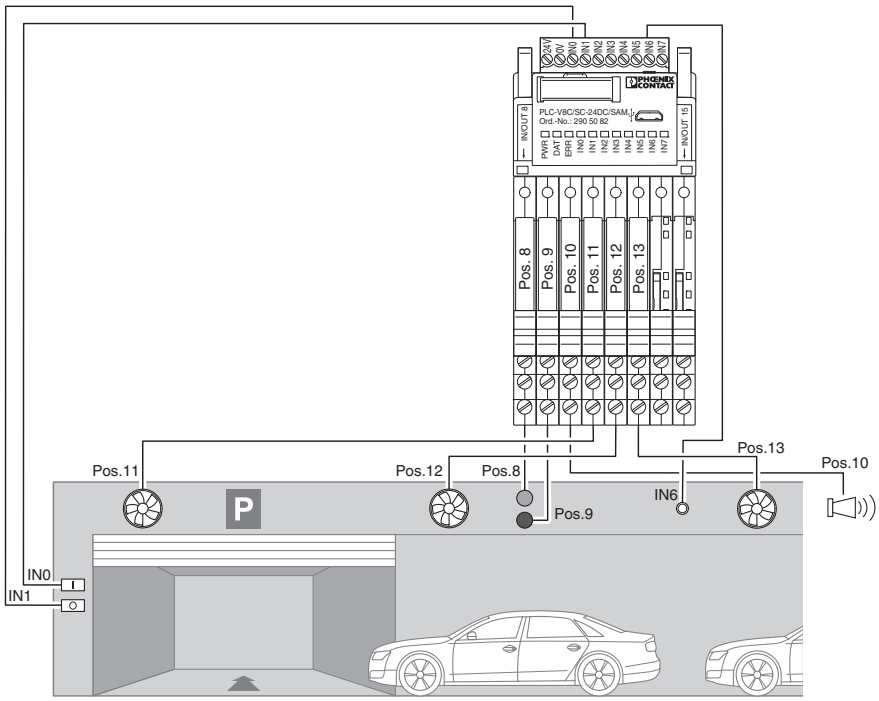


Figure 7-1 Structure for underground parking garage ventilation

Quantity	Description	Order designation	Order number
1	Stand-alone module	PLC-V8C/SC-24DC/SAM	2905082
6	Relay module	PLC-RSC-24DC/1/ACT	2966171
2	Empty socket	PLC-BSC-24DC/21	2966016

7.1.2 LOGIC+ program

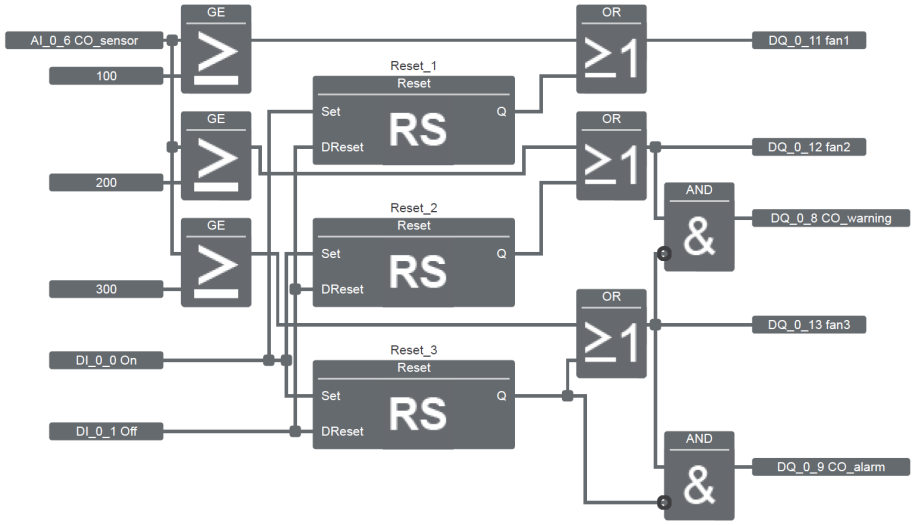


Figure 7-2 Underground parking garage ventilation code

7.1.3 Inputs and outputs used

Table 7-1 Inputs

Item	ID	Label	Description
IN0	DI_0_0	On	Manual activation of all fans
IN1	DI_0_1	Off	Switches manual activation off again
IN6	AI_0_6	CO_sensor	CO sensor

Table 7-2 Outputs

Item	ID	Label	Description
8	DQ_0_8	CO_warning	Control of warning light
9	DQ_0_9	CO_alarm	Control of alarm light
10	DQ_0_10	alarm_horn	Control of horn
11	DQ_0_11	fan1	Control of fan 1
12	DQ_0_12	fan2	Control of fan 2
13	DQ_0_13	fan3	Control of fan 3

7.2 Sliding door system

A sliding door system is to be controlled with PLC logic.

In this application example, an electrically powered sliding door system is to be controlled with PLC logic. The door is to be actuated by two buttons in the building, button T1 (Open) and button T2 (Close), induction loops in the floor (loop) on exit or a key switch at the door.

The door system is to be opened and closed as per the functional sequence below.

Opening and closing the door via buttons T1 and T2 in the building

When button T1 is actuated, the door opens and moves to the end position which is sensed via a limit switch. If button T1 or T2 is actuated while the door is being opened, the operation is stopped. The door can now be opened by actuating button T1 or closed by actuating button T2 (limit switch).

Opening the door by means of the induction loop

When the induction loop gives a signal, the door opens to the end position, regardless of whether the door is completely closed or partially open. If button T1 or T2 is actuated while the door is being opened, the operation is stopped. The door can now be opened by actuating button T1 or closed by actuating button T2. The induction loop only responds again if the door has been completely closed or opened by actuating the button or the key switch. If the door opens or closes by actuating the button or the key switch, the function of the induction loop is blocked.

Opening and closing the door via the key switch at the door

The key switch has three positions: Open, Automatic, Close. If the key switch is set to the “Open” position, the door opens and moves to the end position which is sensed via a limit switch. If the key switch is set to the “Automatic” position while the door is being opened, the operation is stopped. The door can now be opened or closed by setting the key switch to the “Open” or “Close” position. The key switch only responds if it remains in the relevant position for at least two seconds. The key switch has priority over the induction loop and the buttons in the building. When the key switch is permanently set to the “Close” position, the door cannot be opened, likewise when the door is set to the “Open” position the door cannot be closed. The induction loop and the button only respond when the key switch is in the “Automatic” position.

Safety rail

The door is monitored by a safety rail when it is being closed. If the safety rail has detected a fault, the operation is stopped or cannot be started. The button in the building only responds if no fault is indicated by the safety rail. The key switch must first be returned to the “Automatic” position after a fault.

An optical signal light warns when the sliding door system is being opened and closed and makes people in the vicinity aware of the operation.

7.2.1 Hardware structure

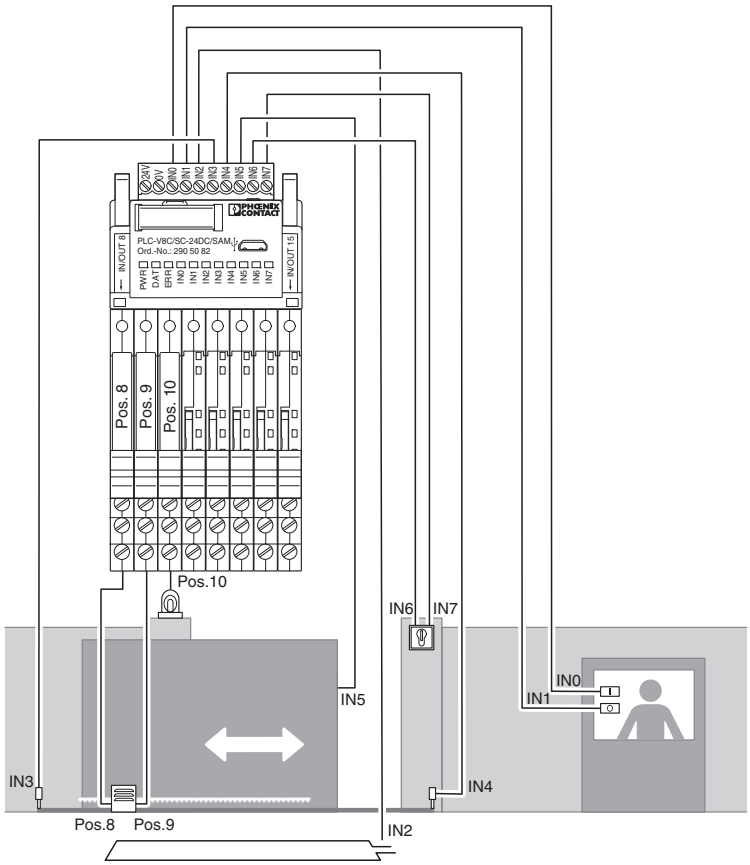


Figure 7-3 Structure for sliding door system

Quantity	Description	Order designation	Order number
1	Stand-alone module	PLC V8C/SC-24DC/SAM	2905082
3	Relay modules	PLC-RSC-24DC/1/ACT	2966171
5	Empty socket	PLC-BSC-24DC/21	2966016

7.2.2 LOGIC+ program

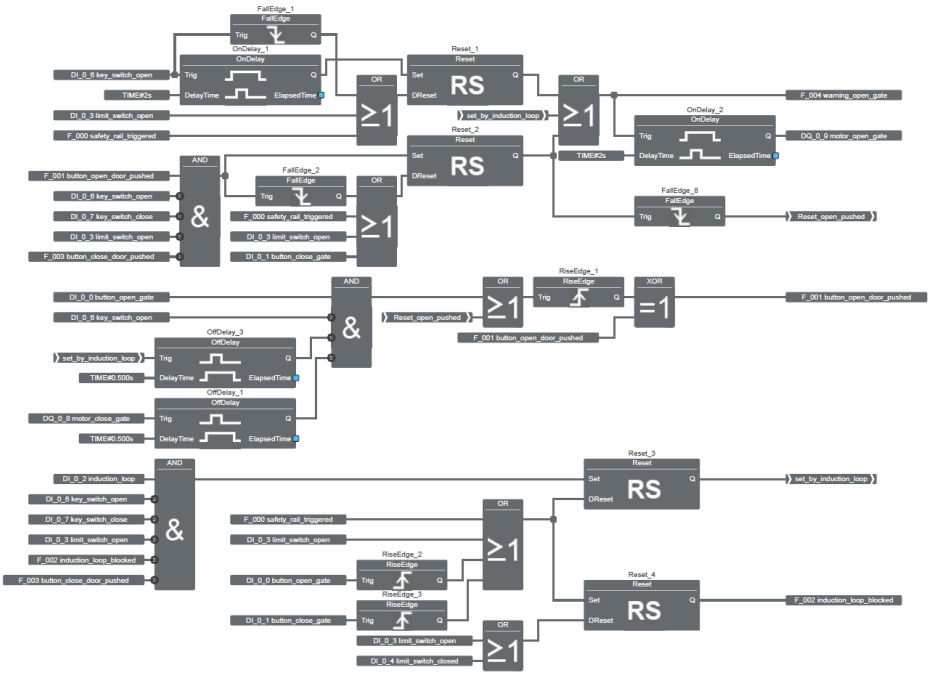


Figure 7-4 Sliding door system open_gate code

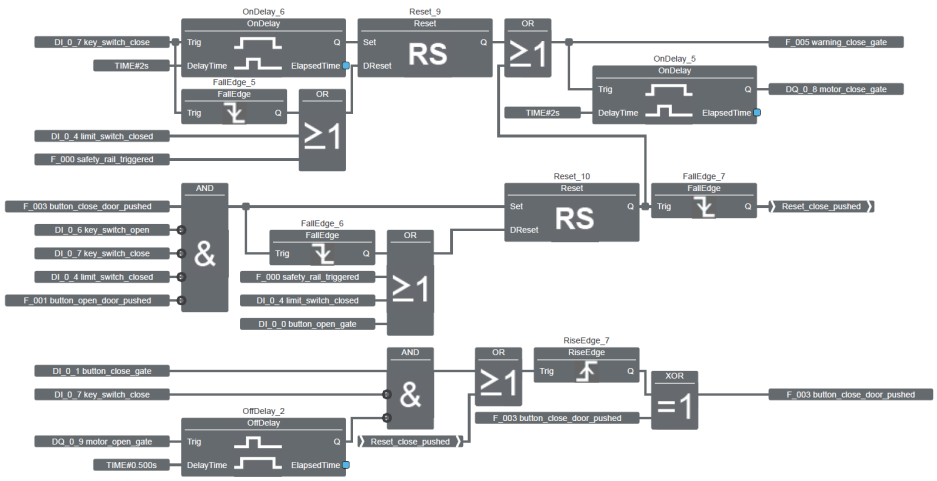


Figure 7-5 Sliding door system close_gate code

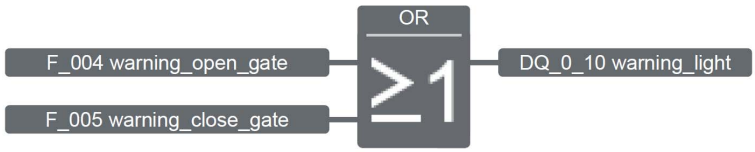


Figure 7-6 Sliding door system warning_light code

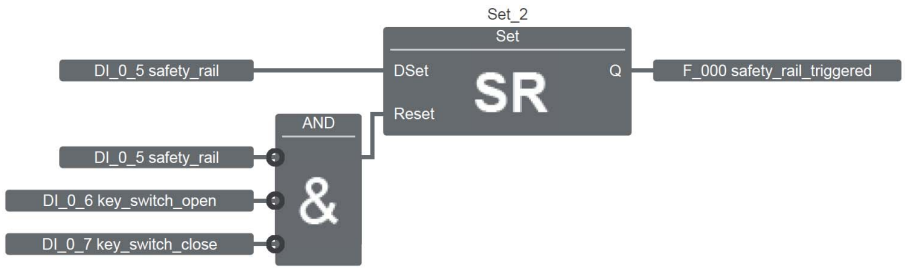


Figure 7-7 Sliding door system safety_rail code

7.2.3 Inputs and outputs used

Table 7-3 Inputs

Item	ID	Label	Description
IN0	DI_0_0	button_open_gate	Button T1 (open door)
IN1	DI_0_1	button_close_gate	Button T2 (close door)
IN2	DI_0_2	induction_loop	Induction loop
IN3	DI_0_3	limit_switch_open	Limit switch: door closed
IN4	DI_0_4	limit_switch_closed	Limit switch: door open
IN5	DI_0_5	safety_rail	Safety rail
IN6	DI_0_6	key_switch_open	Key switch in “Open” position
IN7	DI_0_7	key_switch_close	Key switch in “Close” position

Table 7-4 Outputs

Item	ID	Label	Description
8	DQ_0_8	motor_close_gate	Motor control to open door
9	DQ_0_9	motor_open_gate	Motor control to close door
10	DQ_0_10	warning_light	Orange warning light

Table 7-5 Flags

ID	Label	Description
F_000	safety_rail_triggered	The safety rail has been triggered
F_001	button_open_door_pushed	Button T1 “Open door” has been pushed
F_002	induction_loop_blocked	Flag to block the induction loop
F_003	button_close_door_pushed	Button T2 “Close door” has been pushed
F_004	warning_open_gate	Warning flag for “Door opening”
F_005	warning_close_gate	Warning flag for “Door closing”

7.3 Temperature monitoring with adjustable switching hysteresis

A medium is to be kept within a temperature range with PLC logic.

Switching hystereses are already used for temperature monitoring in many applications, e.g., on heating coils or when switching on fans. In this example, a heated medium is kept within a temperature range of 40°C ... 80°C. The current temperature is detected via a Pt 100 sensor and is converted to a 0 V ... 10 V standard signal via a temperature transducer. PLC logic reads this value at input AI_0_6. If the value is less than or equal to 40°C, the heating coil is switched on via output DQ_0_8. As soon as a temperature of 80°C is reached, the heating coil is switched off and is not switched on again until the temperature of the medium has dropped to 40°C.

The temperature transducer is configured to a measuring range span of 0°C ... 200°C (corresponds to 0 V ... 10 V). LOGIC+ converts the standard voltage into values from 0 ... 1000. 40°C therefore corresponds to a set point of 200 and 80°C to a set point of 400. The specifications are selected in LOGIC+ accordingly.

In this example, PLC logic monitors two heating vessels. PLC logic reads the temperature of the second medium at input AI_0_7 and switches the heating coil via output DQ_0_9.

7.3.1 Hardware structure

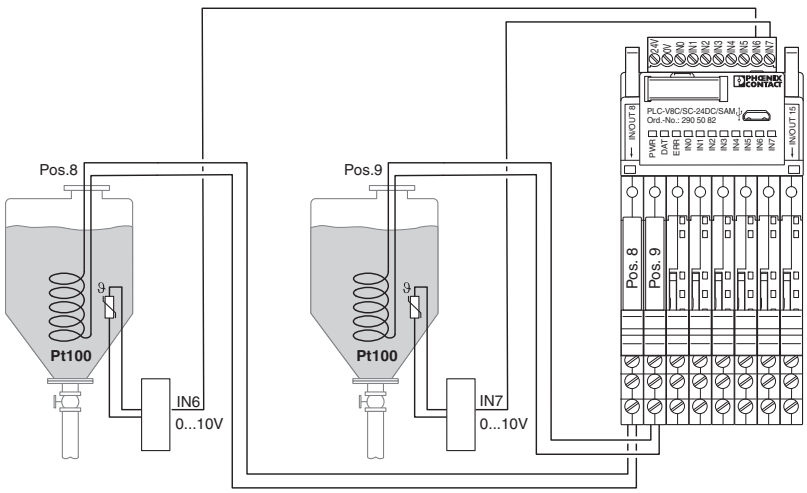


Figure 7-8 Structure for temperature monitoring with adjustable switching hysteresis

Quantity	Description	Order designation	Order number
1	Stand-alone module	PLC V8C/SC-24DC/SAM	2905082
2	Relay modules	PLC-RSC-24DC/21	2966171
6	Empty socket	PLC-BSC-24DC/21	2966016

7.3.2 LOGIC+ program

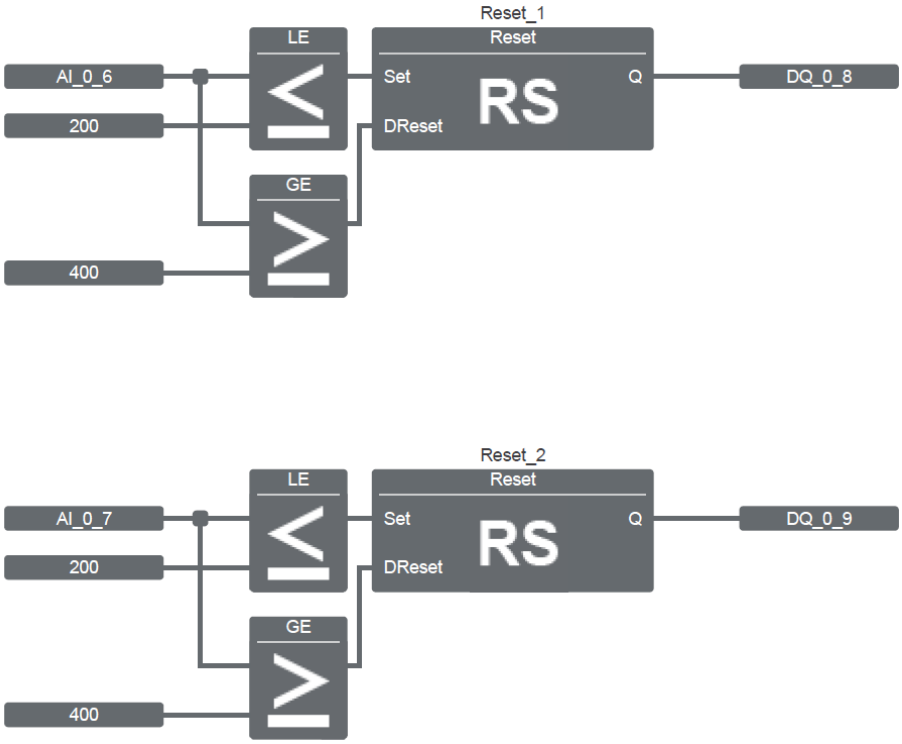


Figure 7-9 Temperature monitoring with adjustable switching hysteresis code

7.3.3 Inputs and outputs used

Table 7-6 Inputs

Item	ID	Label	Description
IN6	AI_0_6	-	Analog input for temperature measurement in medium 1
IN7	AI_0_7	-	Analog input for temperature measurement in medium 2

Table 7-7 Outputs

Item	ID	Label	Description
8	DQ_0_8	-	Output to switch on the heating coil in medium 1
9	DQ_0_9	-	Output to switch on the heating coil in medium 2

7.4 Conveyor belt system

A conveyor belt system with three belts is to be controlled with PLC logic. The conveyor belts should not be overloaded as a result of incorrect startup.

The system is switched on and off via two buttons (IN0, IN1). The conveyor belts only start up if a container is detected behind the last conveyor belt (limit switch at IN2).

The conveyor belts start up in the following order: first the last conveyor belt (Motor3, DQ_10), then in 5 s intervals the second conveyor belt (Motor2, DQ_09) and then the first conveyor belt (Motor1, DQ_08). This ensures that a conveyor belt is not overloaded. When the Off button is actuated, the same procedure is performed in reverse order. First conveyor belt 1 stops, followed by conveyor belt 2 and then conveyor belt 3.

7.4.1 Hardware structure

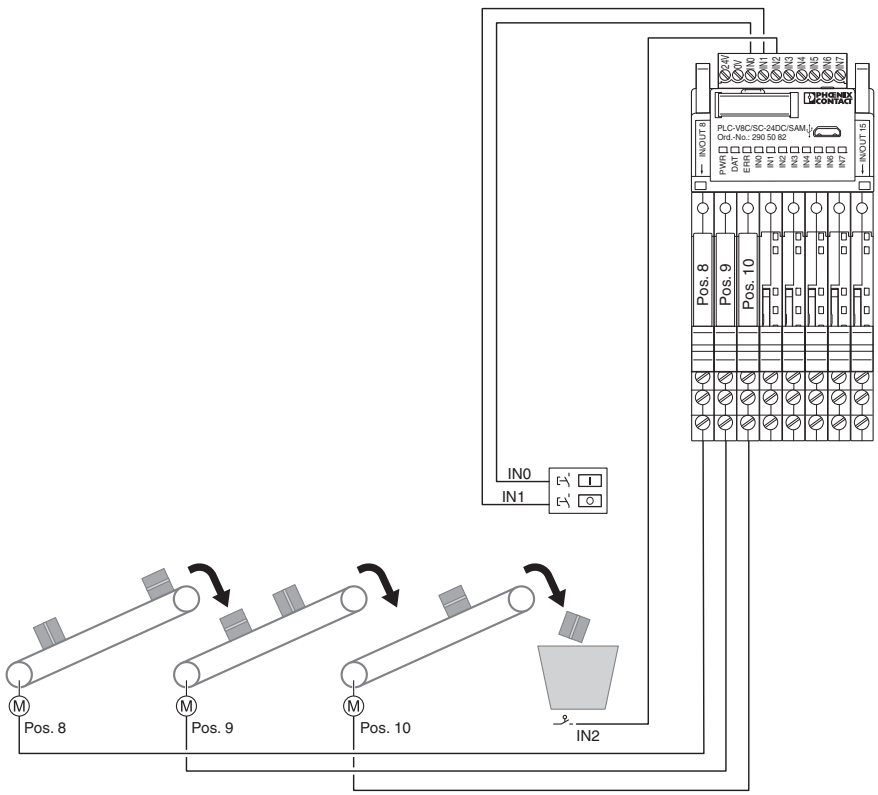


Figure 7-10 Structure for conveyor belt system

Quantity	Description	Order designation	Order number
1	Stand-alone module	PLC V8C/SC-24DC/SAM	2905082
3	Relay modules	PLC-RSC-24DC/1/ACT	2966171
5	Empty socket	PLC-BSC-24DC/21	2966016

7.4.2 LOGIC+ program

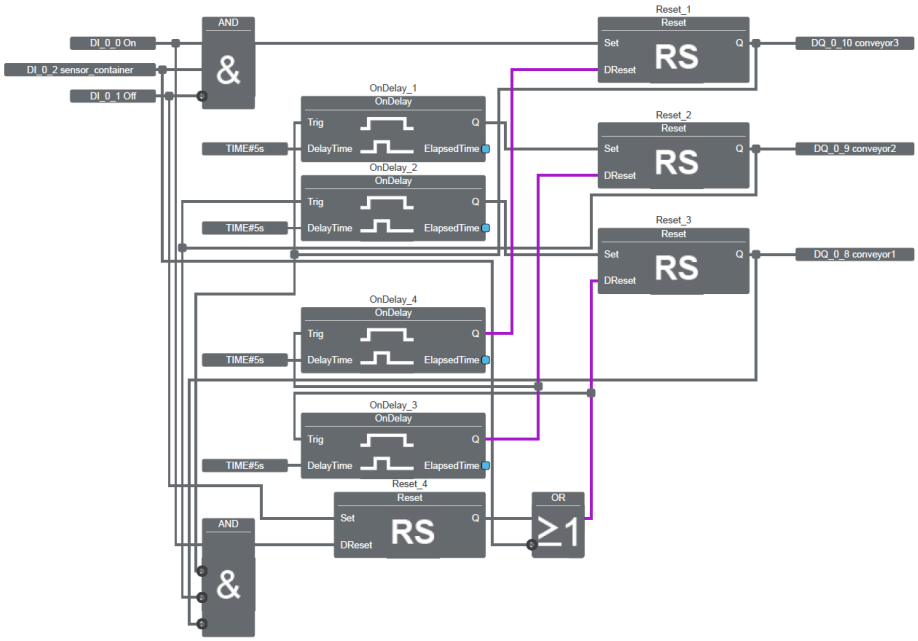


Figure 7-11 Conveyor belt system code

7.4.3 Inputs and outputs used

Table 7-8 Inputs

Item	ID	Label	Description
IN0	DI_0_0	On	Switches the conveyor belt system on
IN1	DI_0_1	Off	Switches the conveyor belt system off
IN2	DI_0_2	sensor_container	Sensor for detecting the container

Table 7-9 Outputs

Item	ID	Label	Description
8	DQ_0_8	conveyor1	Motor control for conveyor belt 1
9	DQ_0_9	conveyor2	Motor control for conveyor belt 2
10	DQ_0_10	conveyor3	Motor control for conveyor belt 3

A Technical data

Criterion	Value
Supply	
Supply voltage	24 V DC
Supply voltage range	19.2 V DC ... 26.4 V DC
Maximum input current at U_N PLC-V8C/...-24DC/SAM PLC-V8C/...-24DC/BM PLC-V8C/...-24DC/EM	 120 mA 120 mA 65 mA
Input data	**Digital inputs**
Number of inputs	8 (2 configurable as analog)
Description of the input	EN 61131-2 type 3
Input voltage	24 V DC
Input current “0” signal	< 1 mA
Input current “1” signal	2.5 mA, typical
Delay time	3 ms, maximum (basic module, stand-alone module) 50 ms, maximum (extension module)
Switching frequency	200 Hz, maximum (basic module, stand-alone module) 20 Hz, maximum (extension module)
Input data	**Analog inputs**
Number of inputs	2 (IN6 and IN7 are configurable as analog)
Input voltage range	0 V ... 10 V
Input resistance	> 3.5 kΩ
Measured value deviation	±3%, 0.15 V, minimum
Delay time	10 ms, maximum (basic module, stand-alone module) 50 ms, maximum (extension module)
Input data	**Contacts for PLC-INTERFACE**
Number of inputs	≤ 8
Description of the input	Technical data depends on the PLC used
Output data	
Number of outputs	≤ 8
Nominal output voltage	24 V DC
Nominal current	9 mA
Switching frequency	10 Hz, maximum (basic module, stand-alone module) 10 Hz, maximum (extension module)
Realtime clock	
Realtime clock accuracy	±2 s/d
Buffer time	24 h (capacitor)
General data	
Ambient temperature range Operation	-20°C ... 45°C
Ambient temperature range Storage/transport	-20°C ... 70°C
Humidity according to DIN EN 61131-2	10% ... 95%

Criterion	Value
Air pressure	86 kPa ... 106 kPa (2000 m, maximum)
Sinusoidal vibrations according to IEC 60068-2-6	2g load, 2.5 hours in each space direction
Shock according to IEC 60068-2-27	15g load for 11 ms, three shocks in each space direction
Startup time when supply voltage on	< 6 s
Maximum supply voltage interruption	< 4.5 ms
Assembly instruction	Can be plugged onto 8 x PLC-INTERFACE
Degree of protection	IP20
COMBICON connection Screw connection Solid / stranded / AWG	 0.14 ... 1.5 mm^2 / 0.14 ... 1.5 mm^2 / 28 - 16
COMBICON connection Push-in connection Solid / stranded / AWG	 0.14 ... 1.5 mm^2 / 0.14 ... 1.5 mm^2 / 26 - 16
Air clearances and creepage distances between the circuits	DIN EN 50178
Rated insulation voltage	50 V
Rated surge voltage	0.8 kV
Insulation	Basic insulation
Conformance	CE-compliant

Table A-1 Electromagnetic compatibility (EMC)

Criterion	Test according to	Value
Noise emission	EN 55016-2-3	-
Electrostatic discharge	EN 61000-4-2	6 kV contact discharge 8 kV air discharge
Electromagnetic fields	EN 61000-4-3	10 V/m
Conducted high frequency	EN 61000-4-6	10 V
Burst	EN 61000-4-4	2 kV supply and signal lines
Surge	EN 61000-4-5	0.5 kV symmetrical to supply lines 1 kV asymmetrical to supply lines 1 kV asymmetrical to signal lines

B Appendix for document lists

B 1 List of figures

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Section 6

Section 7

B 2 List of tables

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Appendix A