

WLAN data transmission

Cordless EC tool



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1 About this document

The original language of this document is German.

This document:

- provides information about using and setting the components up in the manner intended.
- uses two concepts as examples to describe the system setup and fundamental installation of the components needed to operate cordless EC tools in conjunction with a Cleco Production Tools nutrunner control.
- is not sufficient for planning complex network infrastructures.
- does not contain detailed information about the components. Detailed information can be found in the manuals concerned.

Other documents

Number	Designation
P1890E	Instruction Manual for cordless EC tool 17BP...B
P2291BA	Instruction Manual for cordless EC tool 47BP...B
P2390BA	Instruction Manual for cordless EC tool CCBA, CCBP
P2398PM	Programming Manual for cordless EC tool CCBA, CCBP
P2403HW	Hardware description for controller mPro200GC(-AP)
P2402K	Quick reference guide WLAN data transmission CellCore installation
P2309HW	Hardware description for controller mPro400GCD-M
P2300HW	Hardware description for controller mPro400GCD-P
P2280SW	Programming Manual for controller mPro400GCD-(...)
P2372JH	Installation Guide LiveWire Utilities S168688

Symbols in the text

<i>Italic</i>	Identifies menu options (e.g. diagnostics), input fields, control boxes, options fields or dropdown menus.
>	Denotes the selection of a menu option from a menu, e.g. <i>File > Print</i> .
<...>	Denotes switches, pushbuttons or the buttons of an external keyboard, e.g. <F5>.
<code>Courier</code>	Denotes filenames and paths, e.g. <code>setup.exe</code> .
•	Denotes lists, Level 1.
-	Denotes lists, Level 2.
a)	Denotes options.
b)	
→	Denotes results.
1. (...)	Denotes a sequence of handling steps.
2. (...)	
▶	Denotes an individual handling step.

2 Project planning

System layout

The system layout described is based on communication via WLAN dual band: 2.4 GHz / 5 GHz.

Up to 16 cordless EC tools can be controlled. However, the number of tools can vary according to the software installed.

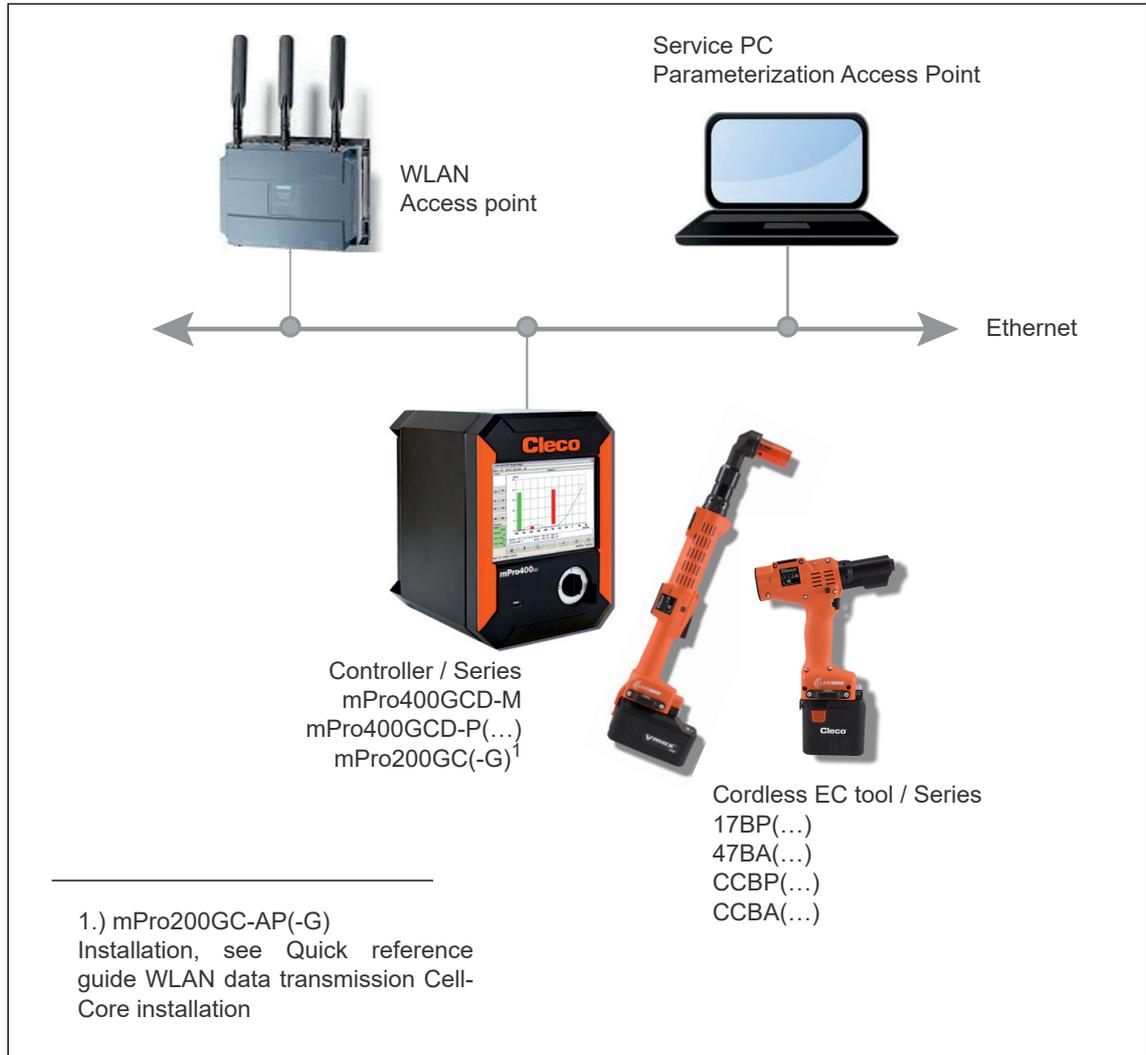


Fig. 2-1: System layout

Concept 1 – Local network Installation of controller + access point

See 5.1 Stand-alone system layout, Page 12

See 5.2 System layout with switch, Page 13

Concept 2 – Existing network

The tools are integrated into an existing network. the infrastructure of the individual customer plants is also used. It is possible that conditions vary between the individual plants.

See 8 Installation – Existing network, Page 29

3 Components

3.1 Cordless EC tool

Series 17BP(...), 47BAY(...)

Features	Data												
Standard	IEEE 802.11a/b/g/n IEEE 802.11d/e/i/h/r/w												
Safety	<ul style="list-style-type: none"> WPA, WPA2 TKIP, AES/CCMP hardware accelerator LEAP, PEAP^a, EAP-TTLS 												
Range	Up to 50 m (typical @ 2.4 GHz) Up to 30 m (typical @ 5 GHz)												
Channels ^b	<ul style="list-style-type: none"> 1 – 13 (2.412 – 2.472 GHz) 36, 40, 44, 48, 52, 56, 60, 64, 100, 104, 108, 112, 116, 120, 124, 128, 132, 136, 140, 149, 153, 157, 161, 165 (5.180 – 5.825 GHz) 												
Transmission power:	18 dBm EIRP (radiated)												
Sensitivity	-95 dBm (typical @ EIRP 2.4 GHz) -90 dBm (typical @ EIRP 5 GHz)												
Modulation	DSSS/OFDM												
Standards	<table> <tbody> <tr> <td>Europe (RED)</td> <td>China (SRRC)</td> </tr> <tr> <td>US (FCC/CFR 47 part 15)</td> <td>China (SRRC)</td> </tr> <tr> <td>Canada (IC RSS)</td> <td>South Korea (KCC)</td> </tr> <tr> <td>Japan (MIC)</td> <td>Australia (ACMA)</td> </tr> <tr> <td>Taiwan (NCC)</td> <td>New Zealand; Brazil (Anatel)</td> </tr> <tr> <td></td> <td>South Africa (ICASA)</td> </tr> </tbody> </table>	Europe (RED)	China (SRRC)	US (FCC/CFR 47 part 15)	China (SRRC)	Canada (IC RSS)	South Korea (KCC)	Japan (MIC)	Australia (ACMA)	Taiwan (NCC)	New Zealand; Brazil (Anatel)		South Africa (ICASA)
Europe (RED)	China (SRRC)												
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Canada (IC RSS)	South Korea (KCC)												
Japan (MIC)	Australia (ACMA)												
Taiwan (NCC)	New Zealand; Brazil (Anatel)												
	South Africa (ICASA)												

a.) PEAP (without client certificates)

b.) Presuming approved by IEEE 802.11d

Series CCBP(...), CCBA(...)(...)

Features	Data
Standard	IEEE 802.11a/b/g/n
Safety	<ul style="list-style-type: none"> WEP 64/128 encryption WPA/WPA2 TKIP/AES 802.1x LEAP, PEAP^a
Range	up to 50 m
Channels ^b	<ul style="list-style-type: none"> 1 – 13 (2.412 – 2.472 GHz) 36, 40, 44, 48, 52, 56, 60, 64, 100, 104, 108, 112, 116, 120, 124, 128, 132, 136, 140, 149, 153, 157, 161, 165 (5.180 – 5.825 GHz)
Transmission power:	20 dBm
Sensitivity	<ul style="list-style-type: none"> 95 dBm (typical @ 1 Mbps DSSS, 2.4 GHz) 66.3 dBm (typical @ 40 MHz MCS7 MM 4K) 92.5 dBm (typical @ 6 Mbps OFDM, 5 GHz) 69.3 dBm (typical @ 40 MHz MCS7 MM 4K, 5 GHz)
Modulation	CCK/DSSS/OFDM

a.) PEAP (without client certificates)

b.) Presuming approved by IEEE 802.11d

Country-specific channel settings – LiveWire Memory Chip (LMC)

The tools operate in a license-free 2.4 GHz / 5 ISM range. The tools can be equipped with different LMCs: World, CE, FCC.

If the channel selection is restricted by the IEEE 802.11d standard, this channel selection will take priority over the LMC settings! The IEEE 802.11d standard is used for all radio modules with FW >6.0.0.

Band	Channel	Frequency in GHz	World	Europe	USA/Canada
			LMC: World	LMC: CE	LMC: FCC
2.4 GHz IEEE802.11b/g	1	2.412	x	x	x
	2	2.417	x	x	x
	3	2.422	x	x	x
	4	2.427	x	x	x
	5	2.432	x	x	x
	6	2.437	x	x	x
	7	2.442	x	x	x
	8	2.447	x	x	x
	9	2.452	x	x	x
	10	2.457	x	x	x
	11	2.462	x	x	x
	12	2.467	–	x	–
	13	2.472	–	x	–
5 GHz IEEE802.11a U-NII-1	36	5.180	x	x	x
	40	5.200	x	x	x
	44	5.220	x	x	x
	48	5.240	x	x	x
5 GHz IEEE802.11a U-NII-2	52	5.260	–	x	x
	56	5.280	–	x	x
	60	5.300	–	x	x
	64	5.320	–	x	x
5 GHz IEEE802.11a U-NII-2 ext	100	5.500	–	x	x
	104	5.520	–	x	x
	108	5.540	–	x	x
	112	5.560	–	x	x
	116	5.580	–	x	x
	120	5.600	–	x	–
	124	5.620	–	x	–
	128	5.640	–	x	–
	132	5.660	–	x	x
	136	5.680	–	x	x
Outdoor channels U-NII-3	140	5.700	–	x	x
	149	5.745	–	–	x
	153	5.765	–	–	x
	157	5.785	–	–	x
	161	5.805	–	–	x
	165	5.825	–	–	x

Key

x	Approved and available
–	Not permissible, blocking necessary

3.2 Controller

Order no.	Designation
mPro400GCD-P(...)	Primary hybrid controller
mPro400GCD-PD(...)	Primary digital controller
mPro400GCD-M	Master controller
mPro200GC mPro200GC-G	Controller

3.3 Access point

A standard access point satisfying the standard IEEE 802.11a/b/g/h/n can be used. The following access points can be ordered from Apex Tool Group:

Type	Siemens SCALANCE W788-1 M12	Phoenix FL WLAN 1100
		
Order No.	961506PT	962070PT
Approval	EU	EU
Items delivered	<ul style="list-style-type: none"> Two detachable aerials ANT795-4MC Terminator 150 ohms Apex Tool Group Default parameters <p>Accessories, see Table: Accessories for Siemens SCALANCE W788-1 M12</p>	<ul style="list-style-type: none"> Ethernet patch cable, CAT5 Retaining angle Adapter M25/M32 <p>Accessories, see Table: Accessories for Phoenix FL WLAN 1100</p>
Dimensions (without aerials)	175 mm × 200 mm × 79 mm	62.8 mm × 36.5 mm × 113.2 mm
Operating temperature	-20 to +60 °C	0 to +60 °C
Humidity	≤95%, non-condensing	≤5% to 95%, non-condensing
Network voltage range	19.2–28.8 V DC 36–57 DC (PoE)	9 V DC–32 V DC (PELV/SELV)
Certificates	FCC Part 15, UL 60950-1, EN, CE	DIN EN 60950
Standards	IEEE 802.11a/b/g/h/n IEEE 802.3af/at	IEEE 802.11a/b/g/n
Frequency range	2.412 GHz – 2.472 GHz (EU) 5.18 GHz – 5.700 GHz (EU)	2.400 GHz – 2.4836 GHz 5.150 GHz – 5.7256 GHz
Safety	WPA WPA2 AES TKIP WPA/WPA2 (radius)	802.11i WPA PSK WPA2 AES TKIP MAC filter

Accessories for Siemens SCALANCE W788-1 M12

	Product	Order No.	Description
Items delivered	Access point	961642PT	Without aerials Without terminator
	Aerial	961643PT	
	Terminator	961644PT	
	Network cable, M12 connector	S981511	Length: 2 m
	Cable, Access point power supply	S133463-020	Length: 2 m
Optional	C plug (configuration plug)	961507PT	Removable disk on which the project planning and configuration data are automatically saved. Allows a defective assembly to be exchanged more easily. Better "mean time to repair".

Accessories for Phoenix FL WLAN 1100

	Product	Order No.	Description
Items delivered	Access point	962071PT	
	Network cable	See Chapter 3.4, Page 10	Network: controller, access point, ethernet switch
	Cable, Access point power supply	962073PT	Length: 2 m
	Retaining angle	962074PT	
	Access point adapter	962075PT	M25/M32
	Multiple seal insert for M25	962072PT	2 × 5 mm
	Cable gland	S964918	M25 × 1.5



Both Cleco Production Tools access points have EU certification. Ask the manufacturer about use in other regions.

3.4 Ethernet patch cable, CAT5 (Phoenix access point)

Order no.	Length	Order no.	Length
S965412	2 m	S965416	26 m
S961365	4 m	S965417	34 m
S961568	5 m	543445-7	2.1 m
S965413	10 m	543445-25	7.6 m
S965414	14 m	543445-50	15.2 m
S965415	22 m	543445-100	30.4 m

Maximum length = 100 m.

The cables comply with the UTP/STP Category 5 (EIA 568B, Cat 5) standards or better.

3.5 Ethernet switch

A standard ethernet switch can be used. Commissioning takes place according to the instruction manual provided by the manufacturer. No installation settings have to be configured on the Ethernet switch. If an ethernet switch with PoE (Power over Ethernet) is used, no additional power supply is necessary.

4 Cell planning for access point

Each channel operates with a frequency range of 22 MHz. To avoid overlapping the frequency ranges, the channels must be chosen so that they do not overlap. In other words, a maximum of 3 independent channels (1, 6 and 11) are available in the 2.4 GHz frequency band.

In theory, up to 21 independent channels are available for the 5 GHz frequency band depending on the LiveWire memory chip used.

To minimize interference between different radio cells that share the same RF channel, it is advisable to physically separate them. Note that for multistory buildings, it is necessary to consider both higher and lower floors.

The following overview shows the basic channel assignment.

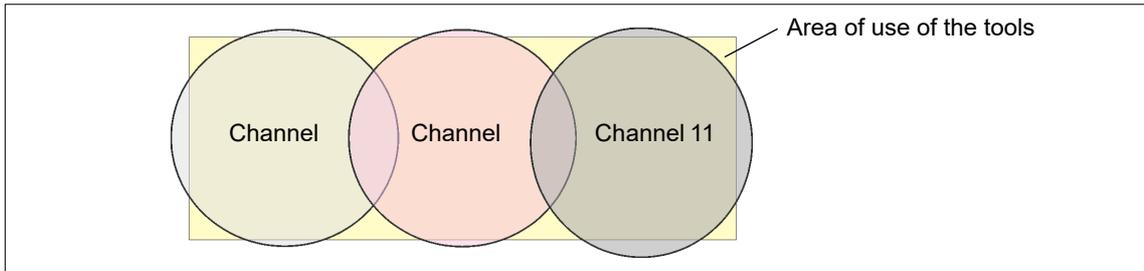


Fig. 4-1: Idealized radio cells

The physical circumference of a radio cell depends primarily on the access point used, the antennas and the type of construction in the surrounding area. The limit of a radio cell is reached when the signal-to-noise ratio (SNR) falls below 15 dB. If the ratio falls below this value, a new radio cell should be started. The typical circumference of a radio cell in a building is up to 50 m.

For the tool to be able to connect to different access points automatically (roaming), the SSID and encryption must be set identically at the corresponding access points.



If wide-area coverage with controlled emission from multiple access points is required, corresponding planning and evaluation must be carried out for the specific case.

Example installation: 5 GHz, concept 1

- Several overlapping radio cells are possible, even if only one free channel is used.
- Up to 200 tools are then possible within the radio range with a limited volume of data.
- The range of the radio cells is limited by the minimal transmission power.

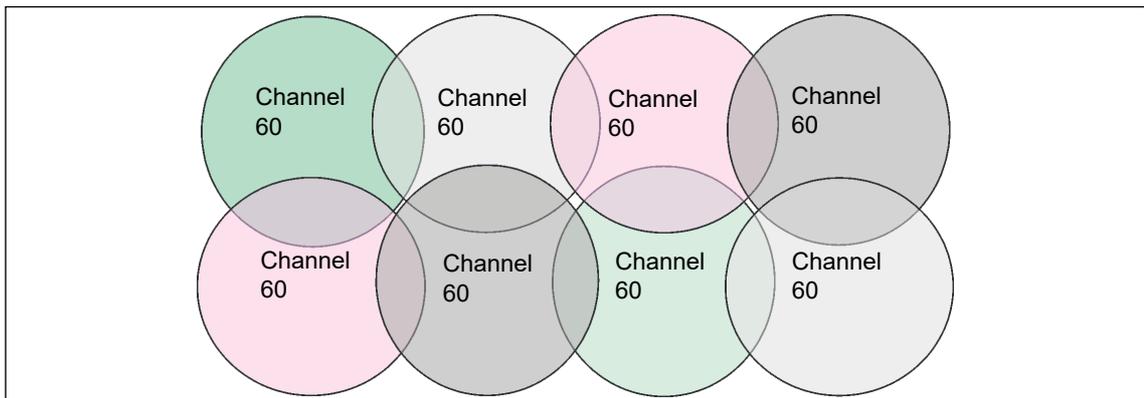


Fig. 4-2: Idealized radio cells = Range of use of the tools

5 Concept 1 – Local network

5.1 Stand-alone system layout

- Access point can be directly connected to the controller.
- The network settings of the access point and controller can be selected as desired.
- The tool's WLAN settings are parameterized via the infrared interface.
- The access point is parameterized via a service PC.

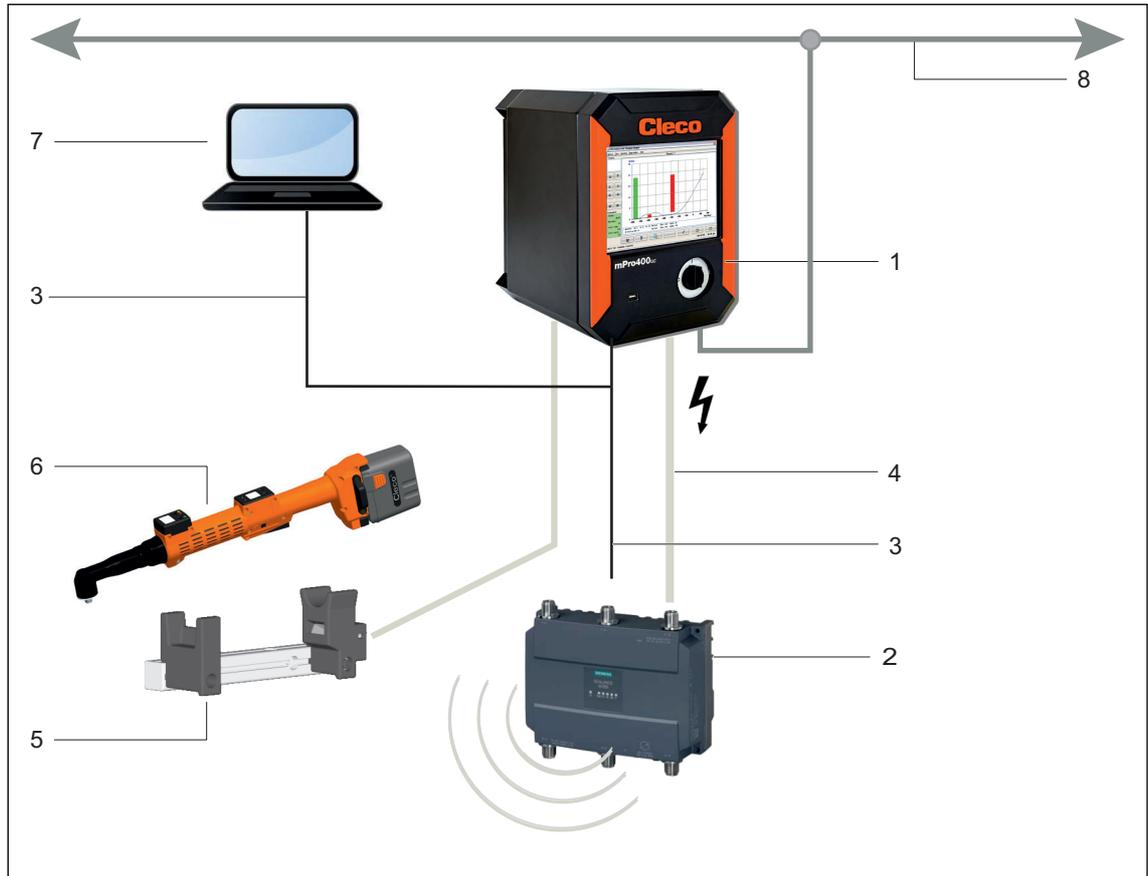


Fig. 5-1: Stand-alone system layout

Item	Component ^a
1	Controller
2	Access point
3	Network cable
4	Access point power supply cable
5	Tool deposit with infrared interface
6	Cordless EC tool
7	Service PC, access point parameterization
8	Ethernet TCP/IP

a.) For detailed description, see 3 Components, page 7

5.2 System layout with switch

- A switch is required for an installation with several controls.
- The network settings of the access point and controller can be selected as desired.
- The tool's WLAN settings are parameterized via the infrared interface.
- The access point is parameterized via a service PC.

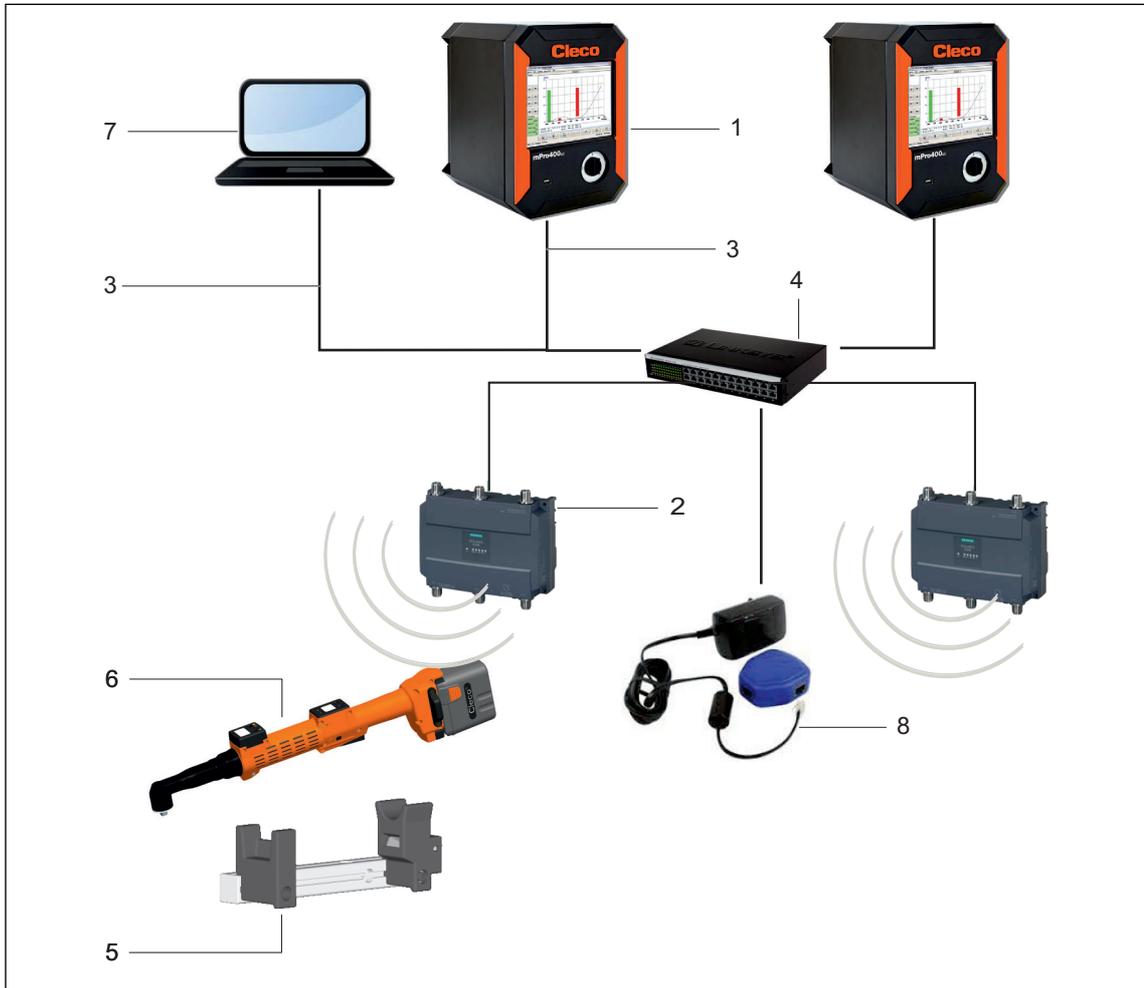


Fig. 5-2: System layout with switch

Item	Component ^a
1	Controller
2	Access point
3	Network cable
4	Ethernet switch
5	Tool deposit with infrared interface
6	Cordless EC tool
7	Service PC: access point parameterization
8	PoE mains power supply

a.) For detailed description, see 3 Components, page 7

6 Installation – Local network



It is essential that national, state and local regulations and standards be followed.



Caution

Risk of injury due to electric shock.

Direct contact with mains voltage can cause injury due to electric shock.

► Before exchanging components or supplementary equipment, isolate the power supply.

The following inputs are needed for the installation described below (example here Apex Tool Group standard settings):

Local network

Device	Static IP address, e.g.	SSID	Subnet mask
Tool	192.168.0.1	LiveWire001	255.255.255.0
Controller	192.168.0.110		
Access point	192.168.0.50	LiveWire001	
Service PC	192.168.0.55		

Local network with switch

Device	Static IP address, e.g.	SSID	Subnet mask
Tool 1	192.168.0.1	LiveWire001	255.255.255.0
Tool 2	192.168.0.2	LiveWire001	
Controller 1	192.168.0.110		
Controller 2	192.168.0.111		
Access point 1	192.168.0.51	LiveWire001	
Access point 2	192.168.0.52	LiveWire001	
Service PC	192.168.0.55		

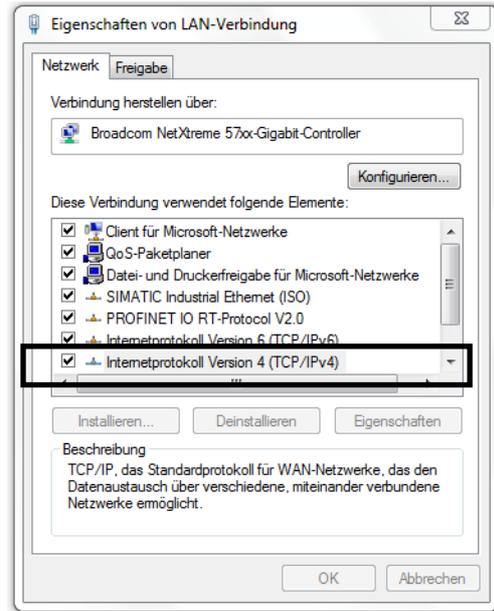
6.1 Setting up access point

The operating range of the wireless transmission can vary considerably depending on the installation location of the access point. Note the following points when positioning:

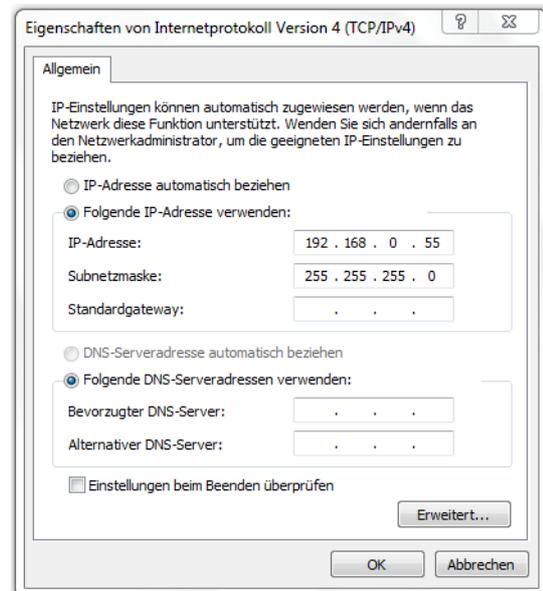
- Position the access point in the center of the tool being used.
 - Avoid any walls or corners of buildings between the access point and the tool. You will have the best range if there is a clear line of sight between the access point and tool. If this cannot be realized, the wall or ceiling should be penetrated at as acute an angle as possible to enable the signal to go directly through the wall or ceiling.
 - Maintain a minimum clearance of 3 m to 6 m from devices that generate high-frequency interference, such as microwaves.
1. Connect the access point to the service PX with an ethernet cable.
 2. Connect the access point to the power supply.
 3. Access point booting. Note indicator LEDs.

Settings on service PC

1. Select *Control panel > Network and Sharing Center > LAN Connection > Properties > Network > Network Card > Properties.*



2. Define IP address *192.168.0.XXX*. For *XXX*, DO NOT select *50* (IP address of access point).
Suggestion:
 - IP address *192.168.0.55*
 - Select subnet mask *255.255.255.0*.



How to set up the different access points is described below. Please continue with the relevant chapter:

- 6.1.1 Setting up Siemens SCALANCE W788-1 access point (pre-configured), page 15
- 6.1.2 Setting up Phoenix FL WLAN 1100 access point, page 19
- 6.1.3 Setting up Siemens access point with unknown IP address, page 22. If an access point is to be re-commissioned after a factory reset or with an unknown configuration.

6.1.1 Setting up Siemens SCALANCE W788-1 access point (pre-configured)

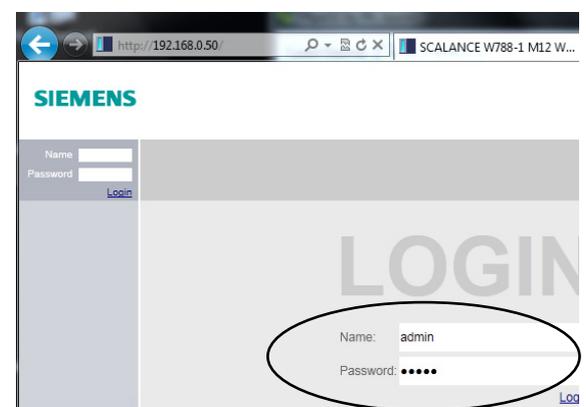
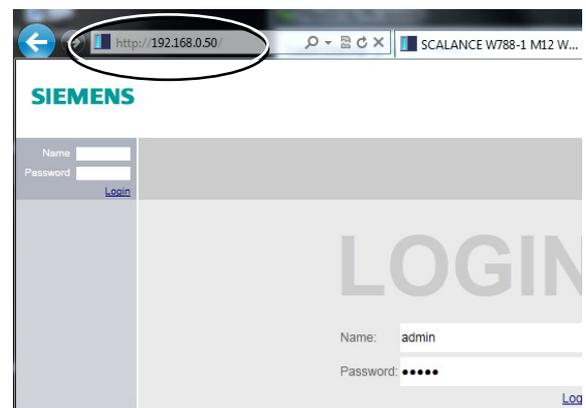
Please refer to the description in the scope of and the online help.

Minimum parameter setting

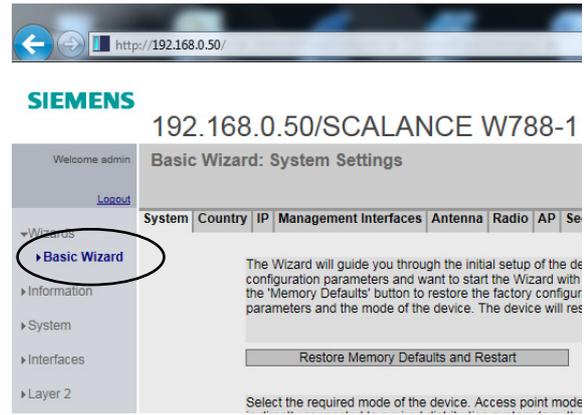
Parameter	Value	Comments
Country code	Country (e.g. Germany)	▶ Select country in which the access point is in use.
IP address	Example: 192.168.0.50	The IP addresses for the access point, the controller and all tools must be in the same subnet. a) Either use the Apex Tool Group standard settings (IP 192.168.0.50) or enter an unassigned address. b) For your own local networks, use the intended IP range 192.168.XXX.XXX.
Frequency band	2.4 GHz or 5 GHz	▶ Depending on the network structure, select a 2.4 GHz or a 5 GHz network.
SSID	LiveWire001	▶ Choose the network name so that it can be unambiguously assigned. Note upper and lower case.
Channel	1–13 or 36–140	<i>Auto</i> is not recommended. Please refer to 6 Installation – Local network, page 14 for the assignment of channels. Not regional regulations when choosing the channel!
Security		Various security systems are available for use. ▶ Choose a system according to your own requirements.
Admin password		The Apex Tool Group default password for logging in to the access point is: 123456. ▶ Change this password to protect the access point against unauthorized access.

Setting individual parameters

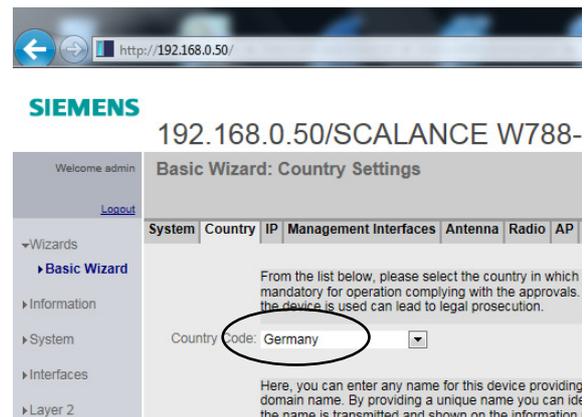
1. First refer to Settings on service PC, page 15.
2. Select the address `http://192.168.0.50` in the browser of the service PC.
→ The login mask for the access point opens.
3. Enter login:
 - *Name:* admin
 - *Password:* 123456



4. Start the *Basic Wizard*.
5. Select the individual menu with <Next>.



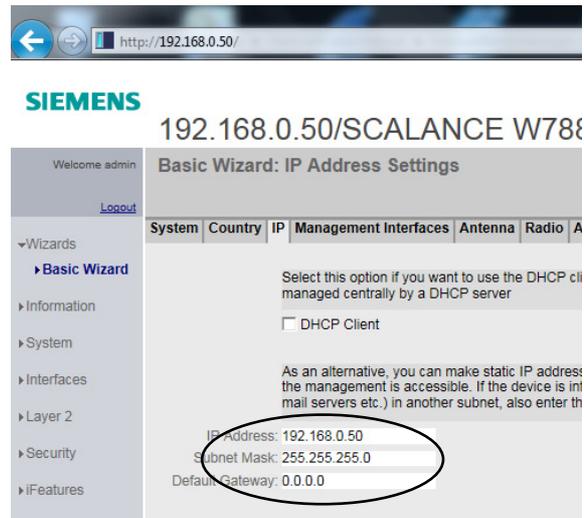
6. Select country in which the access point is in use: *Country > Country code*.



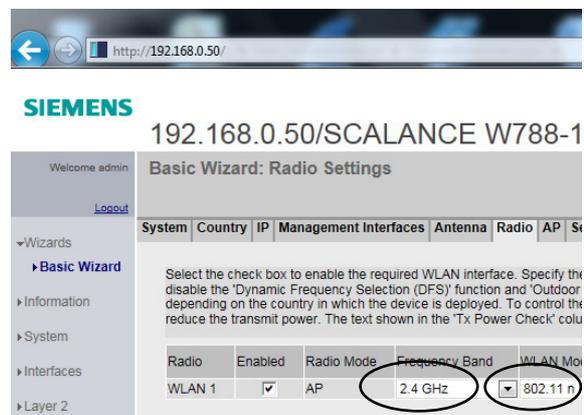
7. Define the IP address:
Enter *IP > IP address / Subnet mask*.

It may be necessary to change the IP address to guarantee communications between the controller and the tool:

- The IP addresses for the access point, controller, tool and service PC must be in the same subnet.
- Each IP address may only be assigned once.



8. Define frequency band:
Select *Radio > Frequency band / WLAN mode*.



9. Define channel and SSID:
Select *AP > Channel/SSID*.

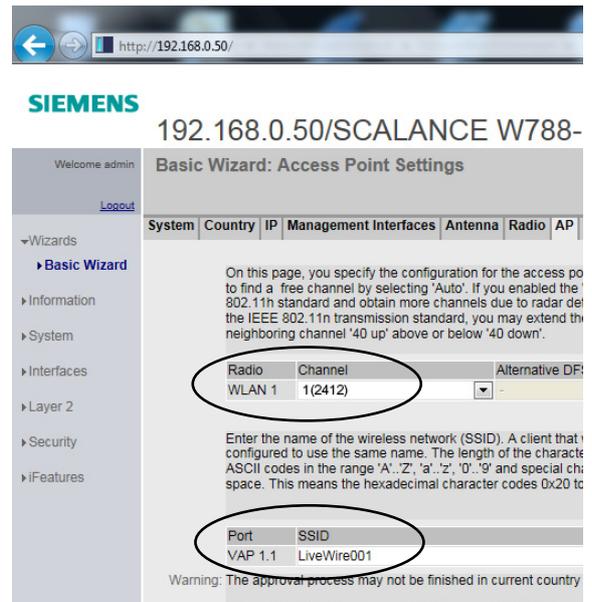
Auto is not recommended. To select the channel, please refer to 5 Concept 1 – Local network, page 12.

10. Choose the network name so that it can be unambiguously assigned. Note upper and lower case.

Security settings:

Adjust the security settings according to the requirements on the network.

11. Select *Security*.
12. Use the Apex Tool Group standard settings:
 - *Authentication type*: WPA2-PSK AES
 - *Pass phrase*: 0736381254
13. Select *Summary*.
14. Save the changes with <Set Value> and end the *Basic Wizard*.



192.168.0.50/SCALANCE W788-

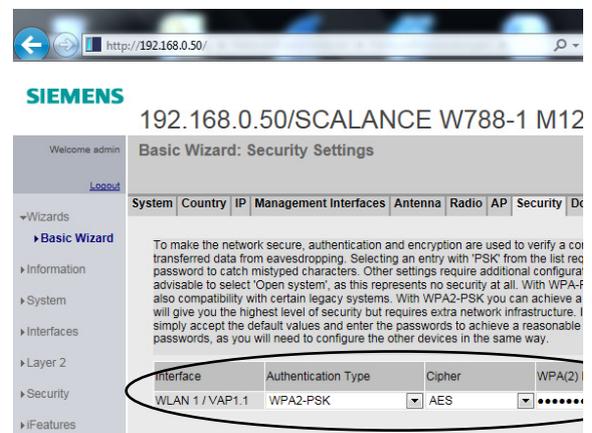
Basic Wizard: Access Point Settings

System	Country	IP	Management Interfaces	Antenna	Radio	AP
On this page, you specify the configuration for the access point to find a free channel by selecting 'Auto'. If you enabled the 802.11n standard and obtain more channels due to radar detection of the IEEE 802.11n transmission standard, you may extend the neighboring channel '40 up' above or below '40 down'.						
Radio	Channel	Alternative DF				
WLAN 1	1(2412)	-				

Enter the name of the wireless network (SSID). A client that is configured to use the same name. The length of the character set is limited to 32 characters. Only ASCII codes in the range 'A'..'Z', 'a'..'z', '0'..'9' and special characters are allowed. This means the hexadecimal character codes 0x20 to 0x7F.

Port	SSID
VAP 1.1	LiveWire001

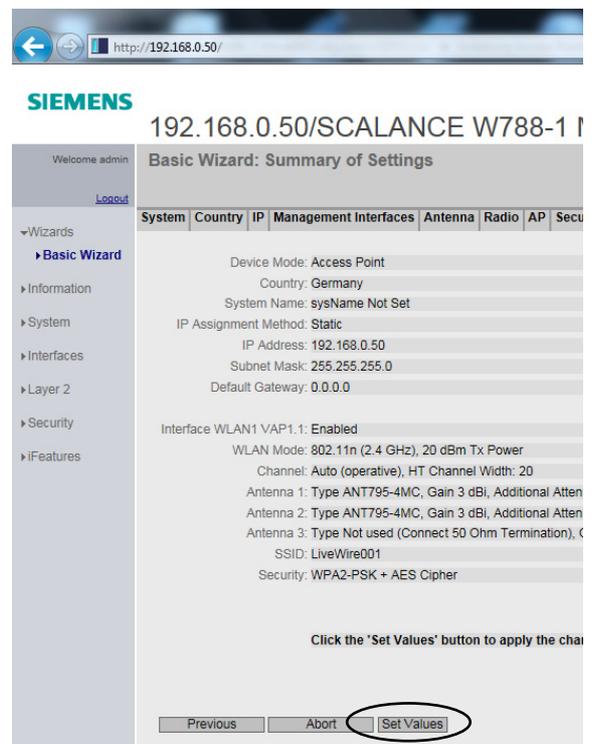
Warning: The approval process may not be finished in current country.



192.168.0.50/SCALANCE W788-1 M12

Basic Wizard: Security Settings

System	Country	IP	Management Interfaces	Antenna	Radio	AP	Security	Device
To make the network secure, authentication and encryption are used to verify a copy of transferred data from eavesdropping. Selecting an entry with 'PSK' from the list requires a password to catch mistyped characters. Other settings require additional configuration. It is advisable to select 'Open system', as this represents no security at all. With WPA2-PSK you can achieve a high level of security. With WPA2-PSK you can achieve a high level of security. It will give you the highest level of security but requires extra network infrastructure. I simply accept the default values and enter the passwords to achieve a reasonable level of security, as you will need to configure the other devices in the same way.								
Interface	Authentication Type	Cipher	WPA(2)					
WLAN 1 / VAP1.1	WPA2-PSK	AES	*****					



192.168.0.50/SCALANCE W788-1 M12

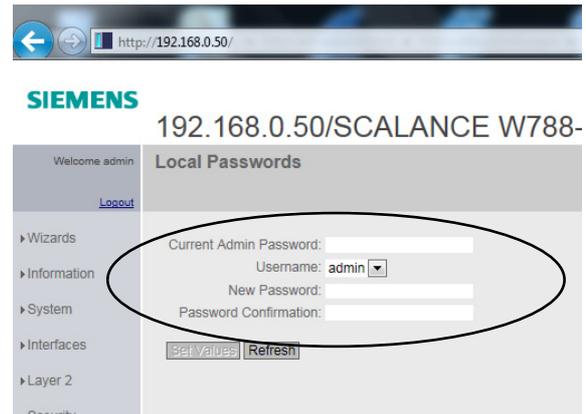
Basic Wizard: Summary of Settings

System	Country	IP	Management Interfaces	Antenna	Radio	AP	Security	Device
Device Mode: Access Point								
Country: Germany								
System Name: sysName Not Set								
IP Assignment Method: Static								
IP Address: 192.168.0.50								
Subnet Mask: 255.255.255.0								
Default Gateway: 0.0.0.0								
Interface WLAN1 VAP1.1: Enabled								
WLAN Mode: 802.11n (2.4 GHz), 20 dBm Tx Power								
Channel: Auto (operative), HT Channel Width: 20								
Antenna 1: Type ANT795-4MC, Gain 3 dBi, Additional Attenuation: 0 dB								
Antenna 2: Type ANT795-4MC, Gain 3 dBi, Additional Attenuation: 0 dB								
Antenna 3: Type Not used (Connect 50 Ohm Termination), Gain: 0 dB								
SSID: LiveWire001								
Security: WPA2-PSK + AES Cipher								

Click the 'Set Values' button to apply the changes.

Previous Abort **Set Values**

15. Define Admin password:
Change the login password to present unauthorized access to the access point.
- Username: admin
 - New password: ...
- (Apex Tool Group standard password: 123456)



- ▶ After changing the IP address and the admin password, enter the new values for subsequent logins.

6.1.2 Setting up Phoenix FL WLAN 1100 access point

Please refer to the description in the scope of and the online help.

Minimum parameter setting

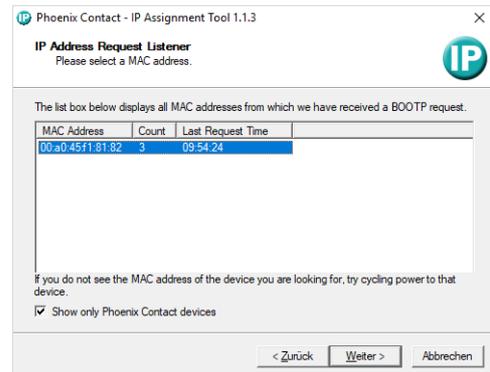
Parameter	Value	Comments
Country code	Country (e.g. Germany)	▶ Select country in which the access point is in use.
IP address	Example: 192.168.0.50	The IP addresses for the access point, controller, tool and service PC must be in the same subnet. a) Either use the Apex Tool Group standard settings (IP 192.168.0.50) or enter an unassigned address. b) For your own local networks, use the intended IP range 192.168.XXX.XXX.
Frequency band	2.4 GHz or 5 GHz	▶ Depending on the network structure, select a 2.4 GHz or a 5 GHz network.
SSID	LiveWire001	▶ Choose the network name so that it can be unambiguously assigned. Note upper and lower case.
Channel	1–13 or 36–140	<i>Auto</i> is not recommended. Please refer to 6 Installation – Local network, page 14 for the assignment of channels. Not regional regulations when choosing the channel!
Security		Various security systems are available for use. ▶ Choose a system according to your own requirements.
Admin password		The Apex Tool Group default password for logging in to the access point is: 12345678. ▶ Change this password to protect the access point against unauthorized access.

Setting the IP address with IP Assign

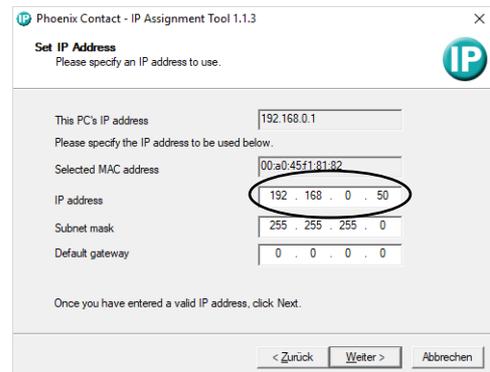
1. Download the program *IPAssign* (see Phoenix Download Center)
2. Start the program *IPAssign*.
3. Press <Continue>.
4. Activate *Show only Phoenix Contact devices* to search the network for the MAC address of the access point.



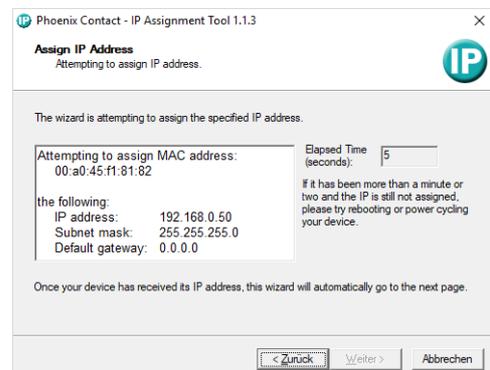
5. Select the MAC address of the access point (printed on cover).
6. Confirm selection with <Continue>.



7. Overwrite the IP address assigned by the plant with your own. Apex Tool Group standard settings: 192.168.0.50

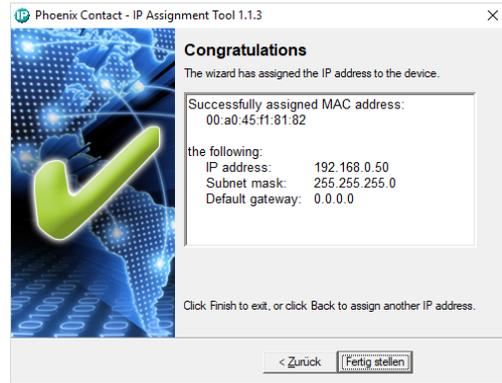


8. Confirm the new IP address with <Continue>. → The IP address is accepted.



The change of IP address was successful, the following dialog appears:

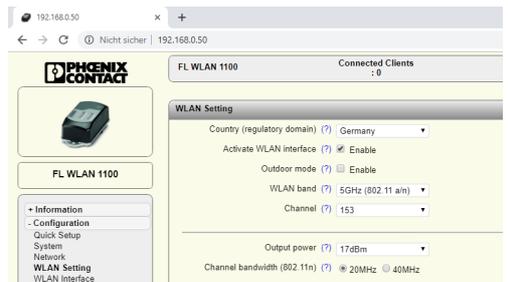
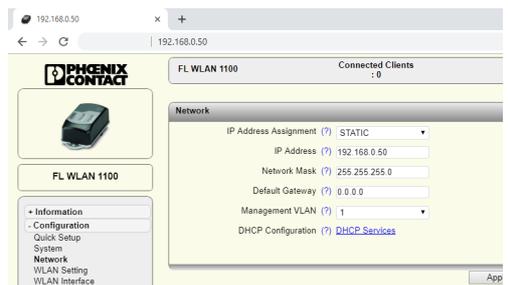
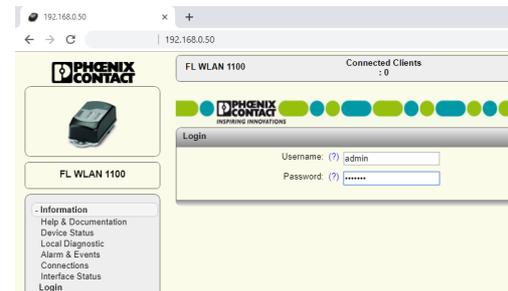
The IP address is only temporarily stored in the access point. The IP address still has to be permanently stored in the access point.



Setting the access point via the integrated web interface

The configuration can be accessed via the integrated web interface using the IP address set above.

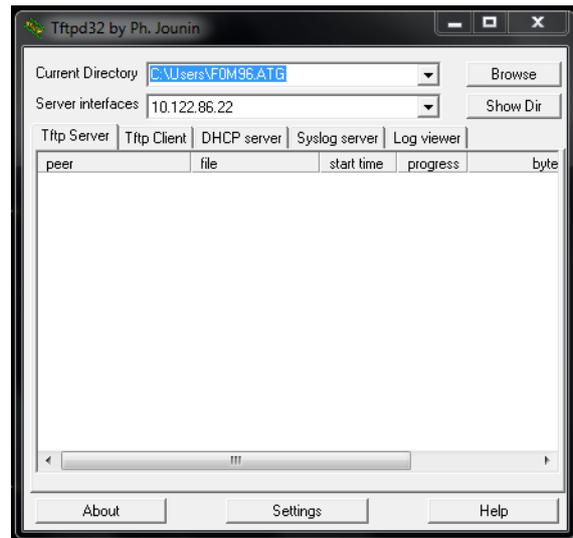
1. Start a web browser with the URL:
Apex Tool Group standard settings: http://192.168.0.50
2. Log in:
 - *User name:* admin
 - *Password:* private
3. Select *Configuration > Network* and enter the following data:
 - *IP Address Assignment:* STATIC
 - *IP Address:* 192.168.0.50
 - *Network Mask:* 255.255.255.0
4. Confirm entry with <Apply&Save>.
5. Select *Configuration > WLAN Setting* and enter the following data:
 - *Country (regulatory domain):* Germany
 - *Activate WLAN Interface:* Enable
 - *Outdoor mode:* Not Enable
 - *WLAN band:* 5 Ghz (802.11 a/n)
 - *Channel:* Channel will be assigned
6. Confirm entry with <Apply&Save>.
7. Select *Configuration > WLAN Interface* and enter the following data:
 - *Operation Mode:* Access Point
 - *Network SSID:* Enter the network SSID
 - *Security mode:* WPA2 PSK AES
 - *Passkey:* Enter the password
8. Confirm entry with <Apply&Save>.



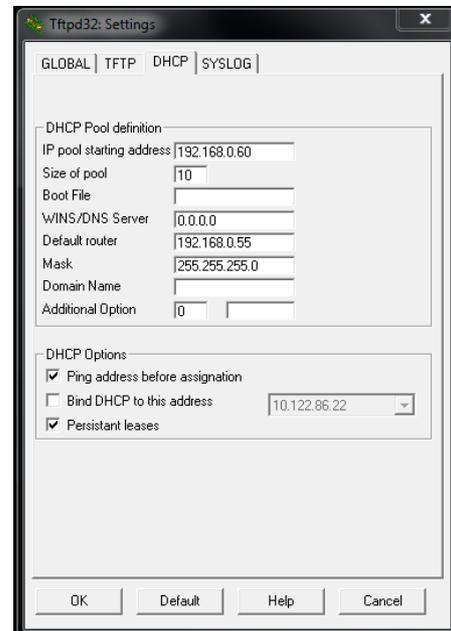
The settings made can be checked with a WLAN channel scanner, e.g. *NetSpot*.

6.1.3 Setting up Siemens access point with unknown IP address

1. Install DHCP (Dynamic Host Configuration Protocol) software to assign an IP address, e.g. *Tftpd32* (freeware).
2. Start program *Tftpd32*.

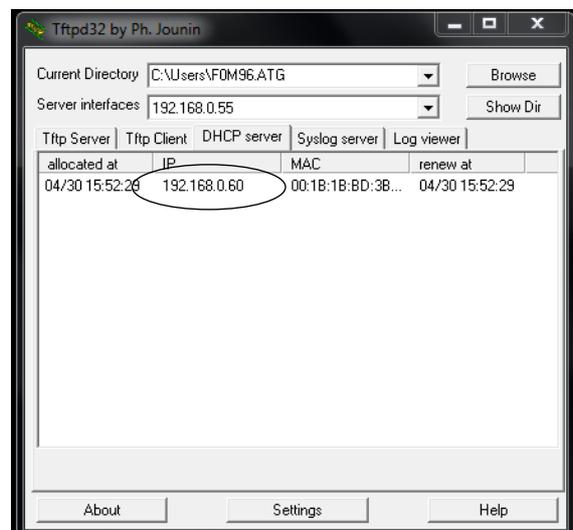


3. Make the following settings
 - *IP pool starting address*: 192.168.0.XXX
For XXX DO NOT select 50.
Suggestion: 192.168.0.60
 - *Size of pool*: 10
 - *Default router*: 192.168.0.XXX, where XXX represents the number of the service PC (in the example 55)
 - *Mask*: 255.255.255.0

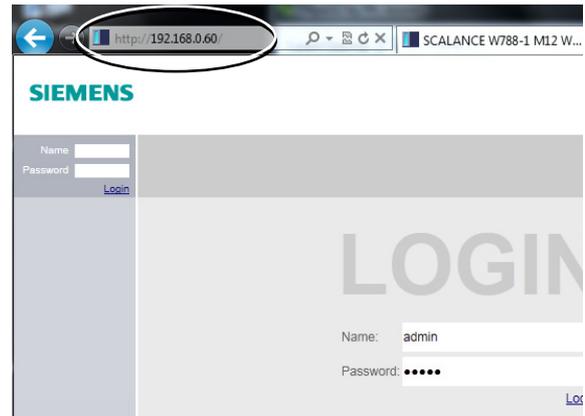


Define IP address

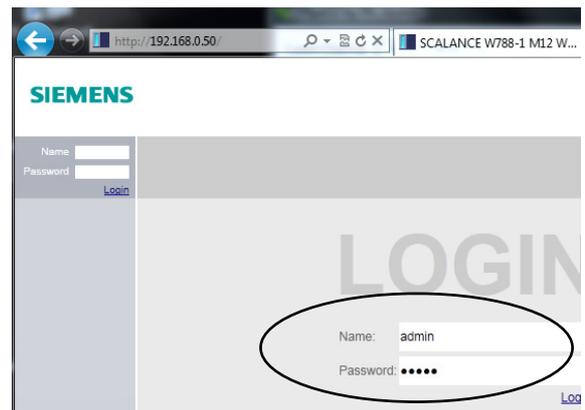
4. Deactivate any additional network cards (e.g. WLAN cards on the service PC).
5. Close program *Tftpd32*.
6. Switch off access point power supply.
7. Connect the access point to the service PC with a LAN cable.
8. Start program *Tftpd32*.
9. Click on *DHCP server*.
10. Switch on access point power supply.
 - The IP address assigned by the program *Tftpd32* is displayed in the window.
The IP address should be entered under the setting *IP pool starting address* (in the example 192.168.0.60).



11. Select the address `http://192.168.0.60` in the browser of the service PC.
→ The login mask for the access point opens.

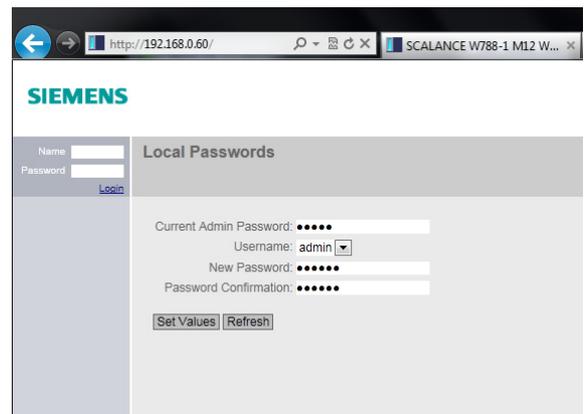


12. Enter login:
 - *Name:* admin
 - *Password:* admin



You will be prompted to change the password after the first login.

13. Use the following entries as standard:
 - *Current Admin Password:* admin
 - *Username:* admin
 - *New Password:* 123456
 - *Password Confirmation:* 123456
14. Continue as described in chapter 6.1.1 Setting up Siemens SCALANCE W788-1 access point (pre-configured), page 15.



6.2 Setting up controller

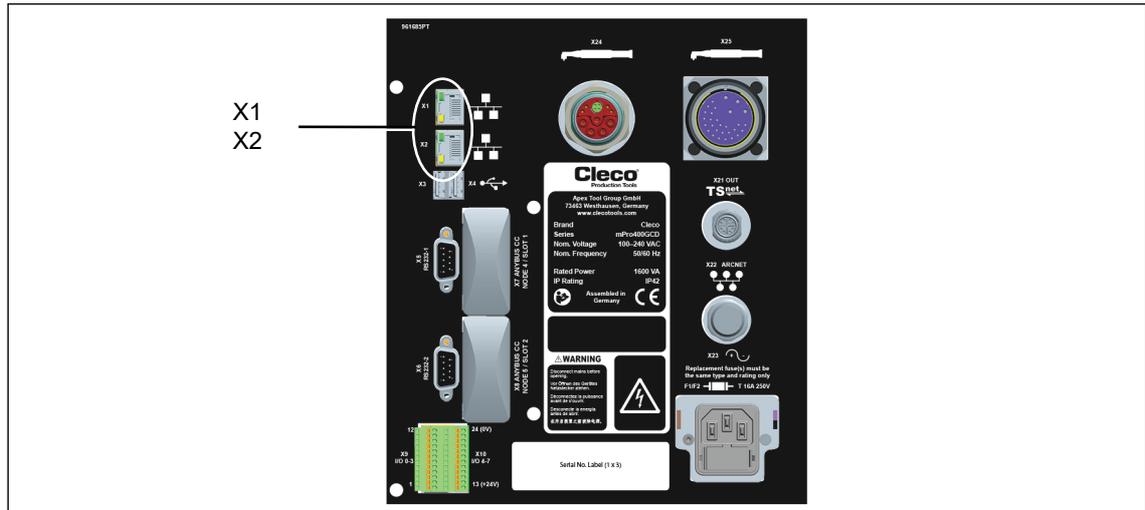


Fig. 6-1: Connections illustrated on the mPro400GCD-P underside

- ▶ Connect the network cable to X1 (or X2) Ethernet port and connect the access point to the controller.
- ▶ Switch on the access point.

6.2.1 Configuring network settings

Enter IP address for controller (example here at ethernet port 1)

1. Select *Navigator* > *Communication* > *Network settings*.

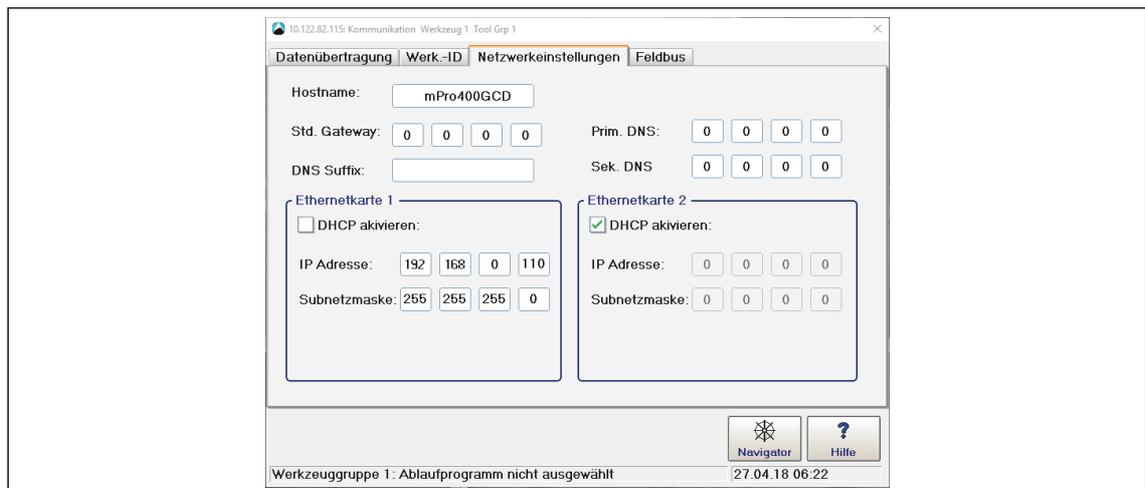


Fig. 6-2: Network settings (existing network)

2. *Enable DHCP*: Remove tick.
3. Enter the *IP address and subnet mask* for the controller.
 - Each IP address must only be assigned once.
 - The IP addresses for the access point, controller, tool and service PC must be in the same subnet.
4. Enter the *Std. gateway* if a gateway is used.
5. Select <Navigator> and save the settings with <Accept>.
6. The *Navigator Menu* is displayed.
7. Restart the controller.

6.2.2 Configuring tool RF settings

1. Connect the tool holder to the serial port XS4 (or XS5) with the infrared interface.
2. Switch the tool on and place it in the tool holder.
3. Select *Navigator* > *Utilities* > *System settings* > *LiveWire/CellCore RF configuration*.

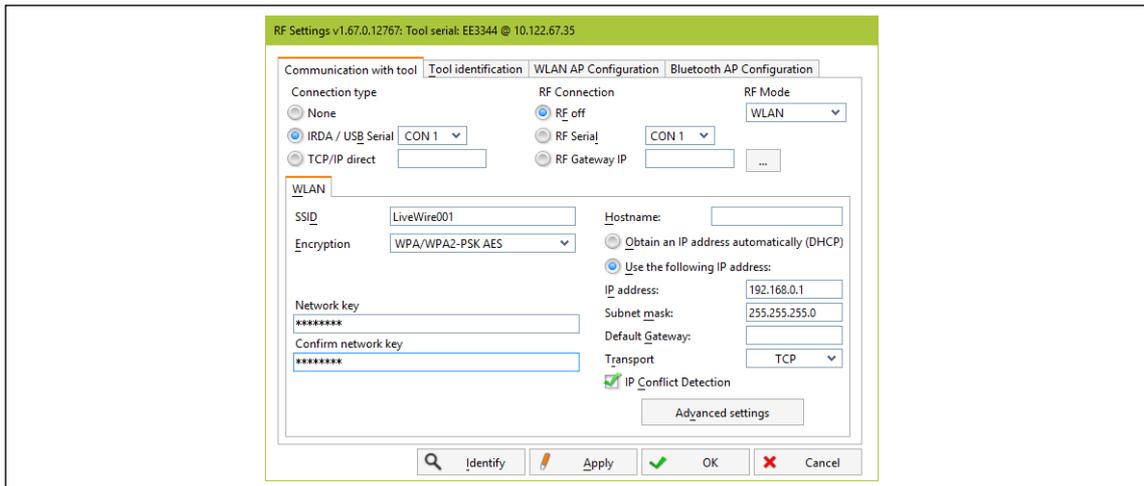


Fig. 6-3: RF settings (local network)

4. *IRDA Connection*: Select port to match the port on the tool holder.
5. XS4 = CON 1 (XS5 = CON 2).
6. Select <Identify> to read out the specific data of the WLAN module.
7. Enter the value for *SSID*.
→ SSID must be identical to the access point.
8. Select value for *Encryption* (see access point *Authentication type*).
9. *Confirm network key*: Enter the network key and confirm by entering it again underneath (see Access point *Pass phrase*).
10. *Use the following IP address*: Enter the value for the *IP address*, *subnet mask* and if necessary *Default gateway*.
11. Select <Advanced settings>.
12. Select *Wireless mode* and confirm with <OK>.

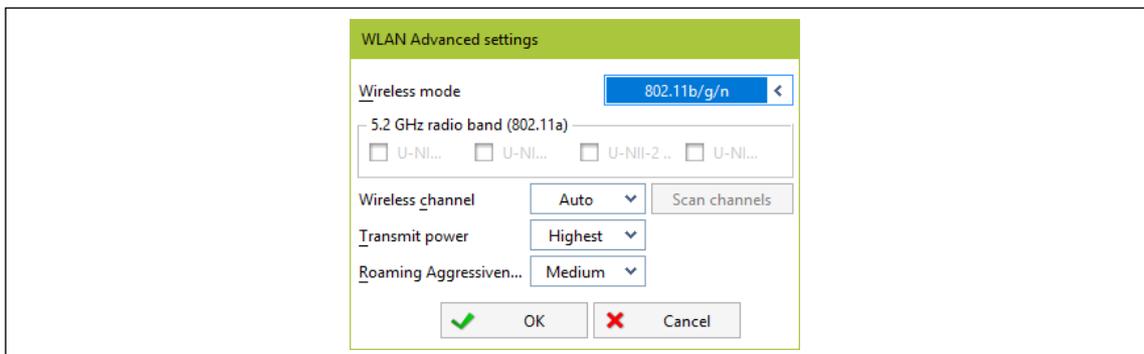


Fig. 6-4: WLAN advanced settings

13. Press <Apply>.
→ Settings are written onto the tool.
14. Confirm the following message with <Yes>:
Toolserial: xxxxxxxx
Builddate: xx.xx.xx
Configure Tool?
15. Confirm the following message with <OK>:
Configuration done!

6.2.3 Installing tool

1. Select *Navigator* > *Tool setup*.
We... 1 (Tool 1) is reserved for a corded tool with a *Primary* controller.
2. Mark the next free line by touching it.
3. Press on <+ Install> and select the option *LiveWire w/WLAN*.
4. Enter the relevant IP address.

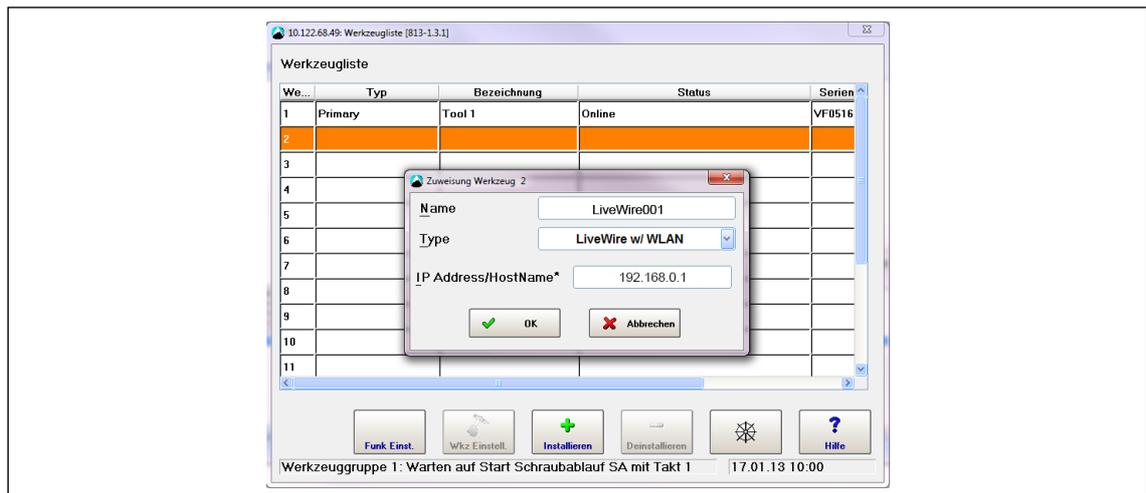


Fig. 6-5: Tool list – Install

5. Press <OK> and save the settings.
6. The *Tool list* is displayed.
7. Status of tool is now *Needs user acceptance*.
8. Select <Tool settings>.

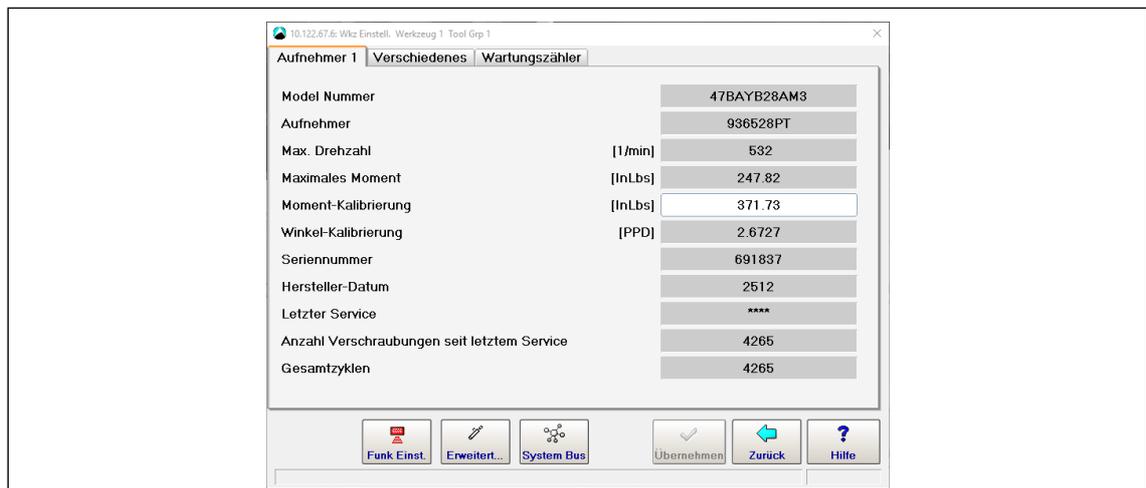


Fig. 6-6: Tool settings

9. Check the *Model number* and *Serial number* and confirm that the tool displayed corresponds to the tool connected.
10. Save the settings with <Accept>.
11. The *Tool list* is displayed. Status of tool is now *online*.
12. Select <Navigator>.

6.3 Configuring RF Settings with PC

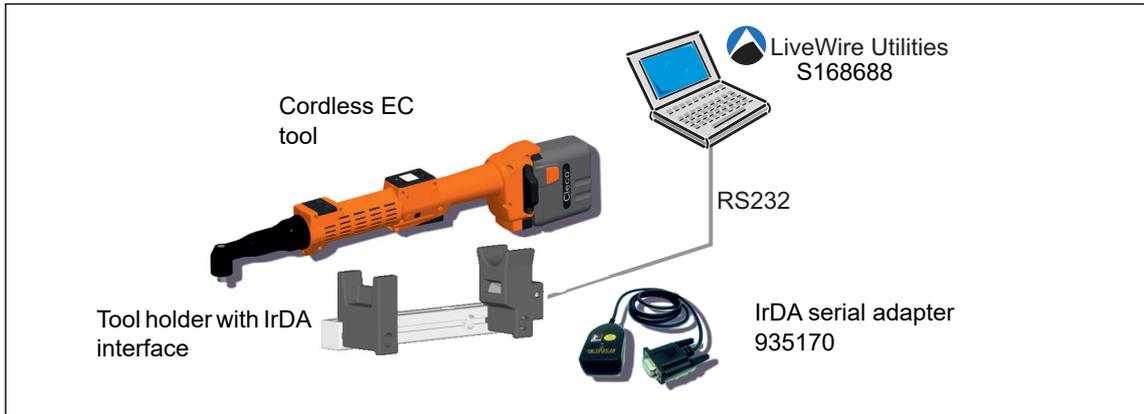


Fig. 6-7: : LiveWire Utilities

1. Download the *LiveWire Utilities* software at:
<http://software.apextoolgroup.com/current-software-packages/pc-software/>
2. Install the software.
3. Start the program *LiveWire RF Configuration* under *Apex Tool Group*.

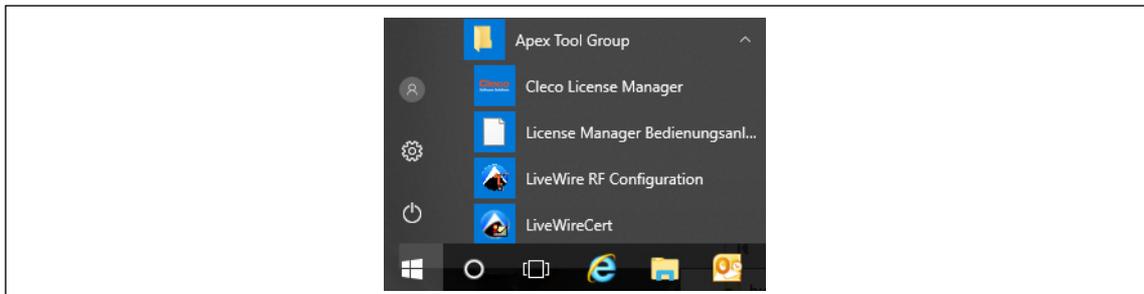


Fig. 6-8: Starting the LiveWire RF Configuration program

4. Make the RF settings as described in 6.2.2 *Configuring tool RF settings*, page 24.

7 Concept 2 – Existing network

7.1 System layout

- The tools can be incorporated into an existing network according to standard IEEE 802.11a/b/g/h/n.
- The network settings depend on the existing network.
- The tool's WLAN settings are parameterized via the infrared interface.

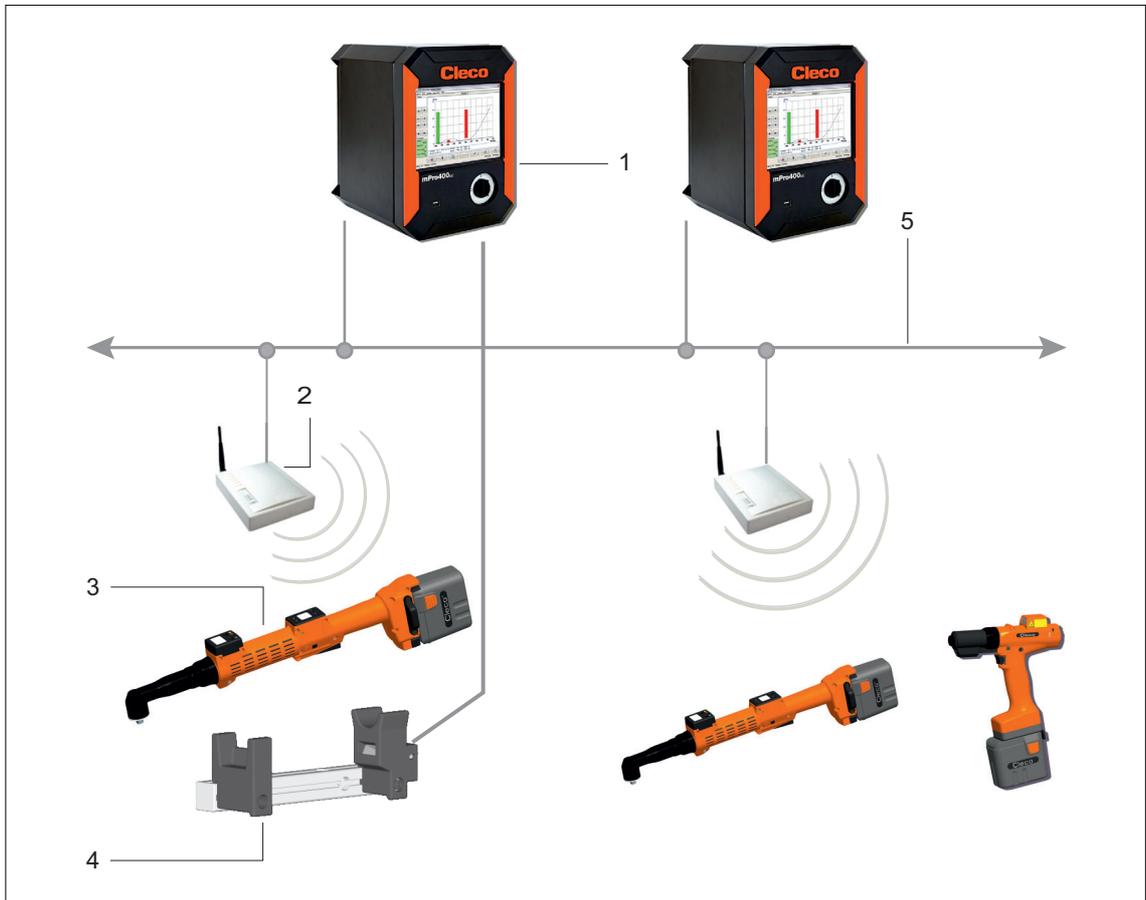


Fig. 7-1: System layout – Existing network

Item	Component ^a
1	Controller
2	Access point IEEE 802.11a/b/g/h/n
3	Cordless EC tool
4	Tool deposit with infrared interface
5	Ethernet TCP/IP

a.) For detailed description, see 3 Components, page 7

8 Installation – Existing network



► It is essential that national, state and local regulations and standards be followed.



Caution

Risk of injury due to electric shock.

Direct contact with mains voltage can cause injury due to electric shock.

► Before exchanging components or supplementary equipment, isolate the power supply.

The following inputs are needed for the installation described below (example specifications):

Existing network, according to existing infrastructure

The settings must be defined by the person responsible for the IT infrastructure (example specifications).

Device	IP address	SSID	Subnet mask	Std. gateway
Tool 1	10.122.77.101	Hall 6	255.255.0.0	10.122.77.1
Tool 2	10.122.77.102	Hall 6	255.255.0.0	10.122.77.1
Controller	10.122.77.110		255.255.0.0	10.122.77.1

8.1 Setting up controller

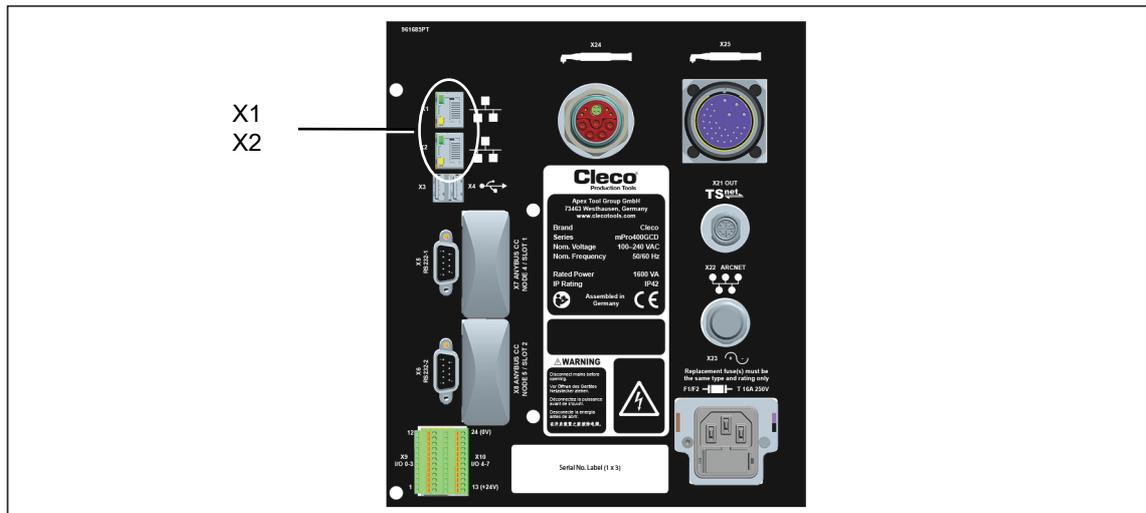


Fig. 8-1: Connections illustrated on the mPro400GCD-P underside

- Connect the network cable to X1 (or X2) Ethernet port and connect the access point to the controller.
- Switch on the access point.

8.1.1 Configuring network settings

Enter IP address for controller (example here at ethernet port 1)

- Select Navigator > Communication > *Network settings*.

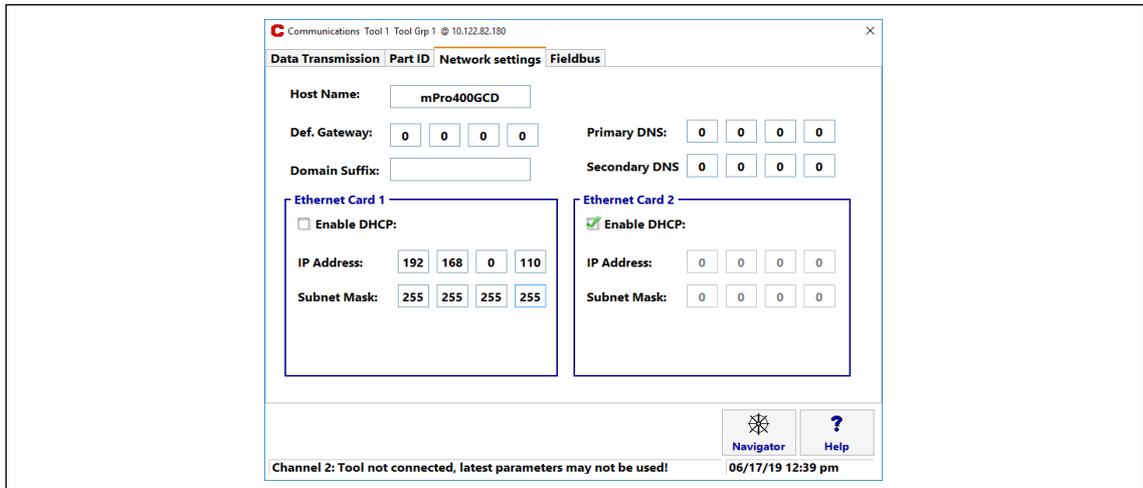


Fig. 8-2: Network settings (existing network)

If required, work with DHCP (IP address is automatically assigned).

1. *Enable DHCP* : Set tick.

If DHCP is enabled:

- See assigned IP address at *Diagnostics > Net/Proc > Network*.
- Scroll down to *Network statistics*.

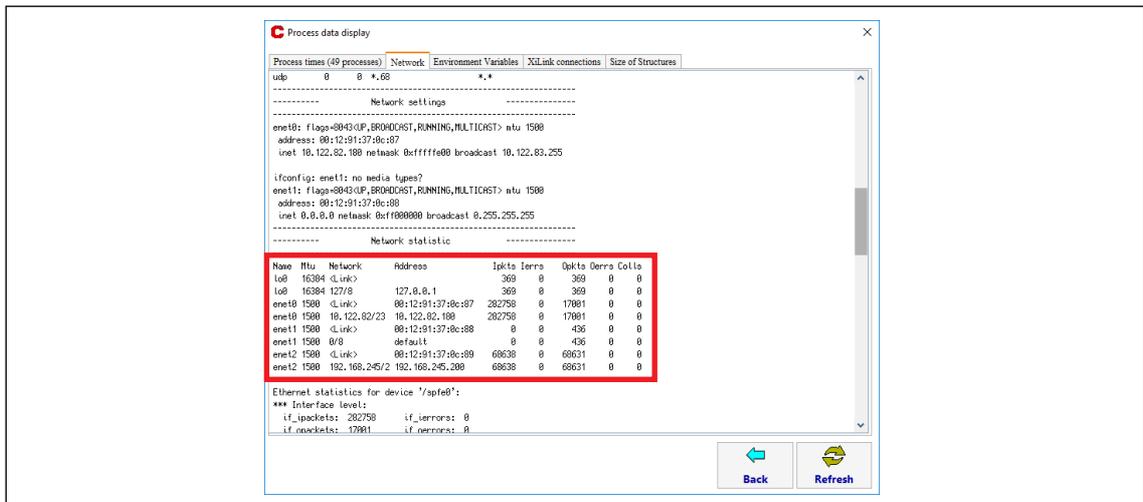


Fig. 8-3: Network statistics

2. Enter the *IP address* and *subnet mask* for the controller.
3. Each IP address must only be assigned once.
4. The IP addresses for the access point, controller, tool and service PC must be in the same subnet.
5. Enter the *Std. gateway* if a gateway is used.
6. Select <Navigator> and save the settings with <Accept>.
7. The *Navigator menu* is displayed.
8. Restart the controller.

8.1.2 Configuring tool RF settings

1. Connect the tool holder to the serial port XS4 (or XS5) with the infrared interface.
2. Switch the tool on and place it in the tool holder.
3. Select *Navigator > Utilities > System settings > LiveWireCellCore RF configuration*.

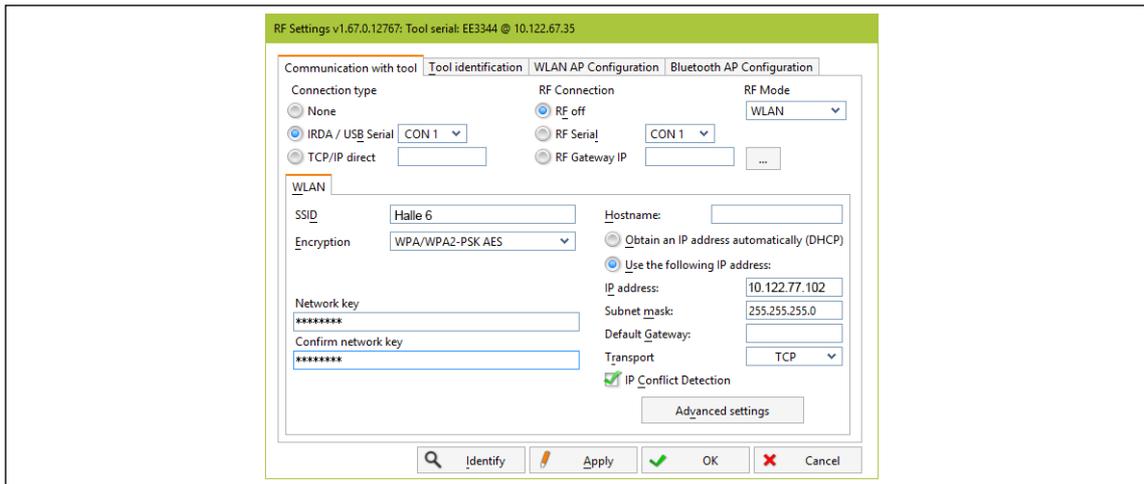


Fig. 8-4: RF settings (local network)

4. *IRDA connection*: Select port to match the port on the tool holder.
5. XS4 = CON 1 (XS5 = CON 2).
6. Select <Identify> to read out the specific data of the WLAN module.
7. Enter the value for *SSID*.
8. SSID must be identical to the access point.
9. Select value for *Encryption* (see access point *Authentication type*).
10. *Confirm network key*: Enter the network key and confirm by entering it again underneath (see access point *Pass phrase*).
11. If required, work with DHCP (IP address is automatically assigned). The DHCP Address must be static (linked to tool MAC address):
12. *Obtain an IP address automatically (DHCP)*: >Set tick.
13. View assigned IP address in submenu for tool WLAN radio transmission.
14. If you are not working with DHCP:
15. *Use the following IP address*: Value for *IP address*, *subnet mask*.
16. If necessary, enter *Default gateway*.
17. Select <Advanced settings>.
18. Select *Wireless mode* and confirm with <OK>.

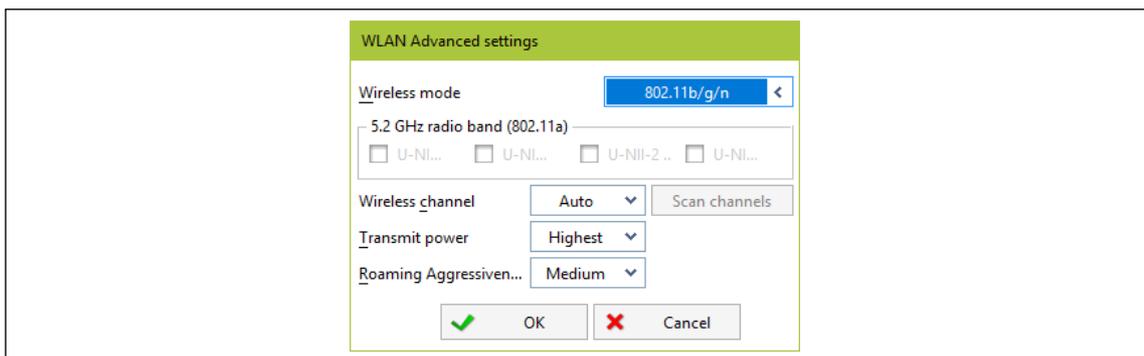


Fig. 8-5: WLAN advanced settings

19. Press <Apply>.
 - Settings are written onto the tool.
20. Confirm the following message with <Yes>:

Toolserial: xxxxxxxx
Builddate: xx.xx.xx
Configure Tool?
21. Confirm the following message with <OK>:

Configuration done!

8.1.3 Installing tool

1. Select <Navigator> <Tool Setup>.
 - We... 1 (Tool 1) is reserved for a corded tool with a *Primary* controller .
2. Mark the next free line by touching it.
3. Press on <+ Install> and select the option *LiveWire w/WLAN*.
4. Enter the relevant IP address.

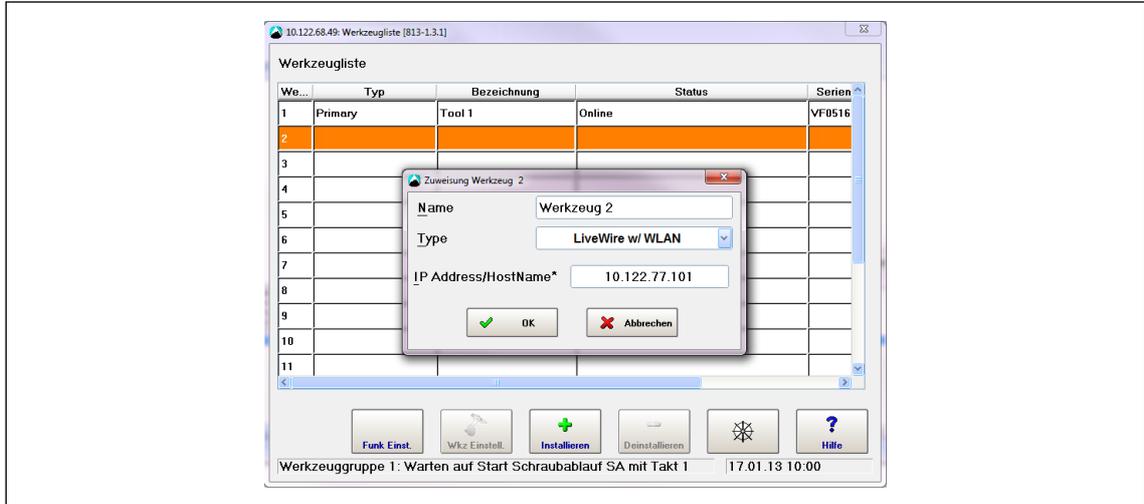


Fig. 8-6: Tool list – Install

5. Press <OK> and save the settings.
6. The *Tool list* is displayed.
7. Status of tool is now *Needs user acceptance*.
8. Select <Tool settings>.

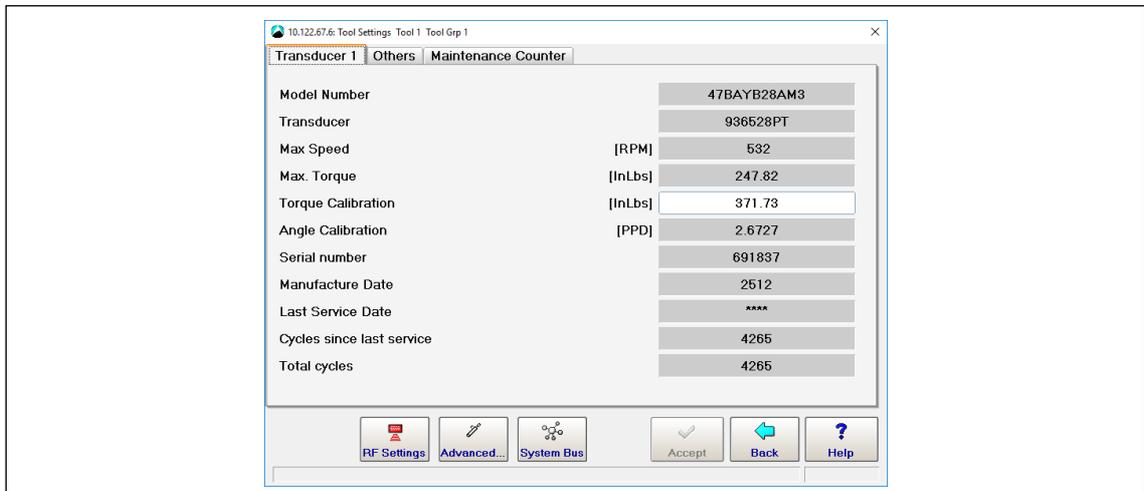


Fig. 8-7: Tool settings

9. Check the *Model number* and *Serial number* and confirm that the tool displayed corresponds to the tool connected.
10. Save the settings with <Accept>.
11. The *Tool list* is displayed. Status of tool is now *online*.
12. Select <Navigator>.

8.2 Prepare EAP-TLS certificate with LiveWireCert for installation on tool

LiveWireCert converts PEM, PFX and P12 files into EAP (Extensible Authentication Protocol) files. The EAP file contains the certificate and the key in a form that can be uploaded by LiveWire tools.

8.2.1 Installing LiveWireCert

1. Download the *LiveWire Utilities* software at: <http://software.apextoolgroup.com/current-software-packages/pc-software/>
2. Install the software.
3. Start the *LiveWireCert* software under *Apex Tool Group*.

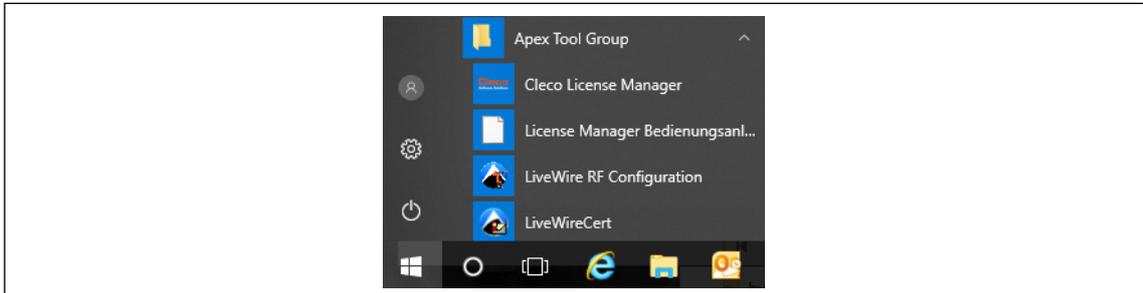


Fig. 8-8: Starting the LiveWire RF Configuration program

8.2.2 Using LiveWireCert

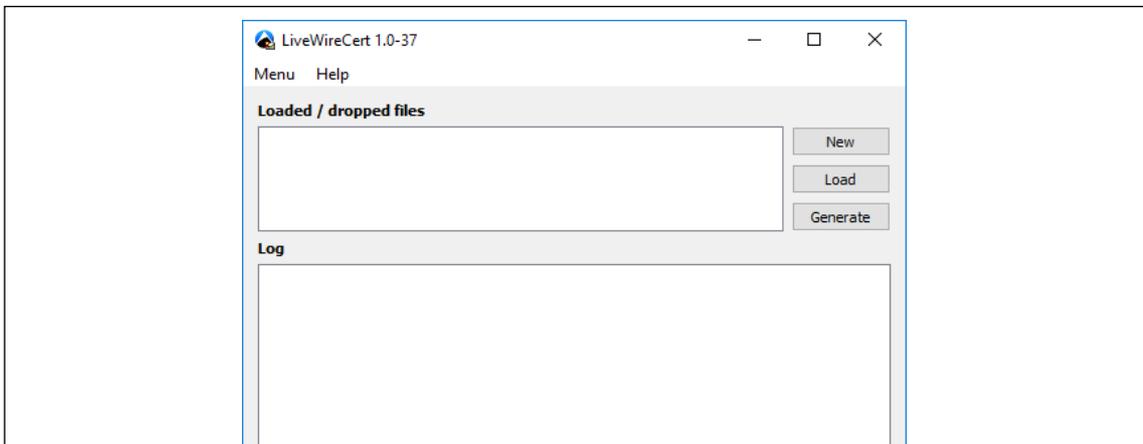


Fig. 8-9: Main screen

Parameter	Explanation
<New>	Start new certification conversion
<Load>	Opens file manager to select certificate and key
<Generate>	Converts selected certificate and key for EAP file
Log	Shows information about the conversion of the task

1. Select files with <Load> or by way of "drag & drop".
2. Select <Generate>. A new EAP file is created.
3. Assign the certificate a password, if necessary.
4. Close the dialog. The EAP file is saved.

8.2.3 Supported files

- Certificate and key files end with **PEM**, **P12** or **PFX**.
- Keys can be encrypted with either **DES** (**DES-CBC**) or **3DES** (**DES-EDE3-CBC**).
- Encrypted keys are within
----- **BEGIN RSA PRIVATE KEY** ----- and ----- **END RSA PRIVATE KEY** -----
- Plain text keys are within
----- **BEGIN PRIVATE KEY** ----- and ----- **END PRIVATE KEY** -----
- Certificates are within
----- **BEGIN CERTIFICATE** ----- and ----- **END CERTIFICATE** -----
- There should only be one certificate and one key in any one PEM file.

9 Troubleshooting

Problem	Possible cause	Measure
No communication between the controller/service PC and access point.	IP address and subnet mask are not in the same range.	The IP addresses for the access point, controller, tool and service PC must be in the same subnet. 1. Use the same subnet mask for both. Subnet mask: 255.255.255.0 2. For the IP address, use the first three identical numbers, e.g.: IP address of controller: 192.168.1.xxx IP address of base station: 192.168.1.xxx
Settings for IP address of access point unknown.	New delivery or earlier settings needed for other application.	Reset access point to default settings: 1. Press the <Reset> button on the back of the (Siemens) access point for at least 10 seconds. 2. Continue as described in chapter 6.1.3 Setting up Siemens access point with unknown IP address, page 22
The tool can not connect with the access point. Indicator: Signal strength at tool is always 0. The tool does not appear in the list of connected clients.	Encryption settings are not correct or selected encryption level too high for older WLAN tools.	▶ Check that encryption settings agree. - Please refer to Access point: Security settings - Please refer to LiveWire tool: Encryption value
	Incorrect WLAN channel	▶ Select another channel.

Problem	Possible cause	MeasuremPro400GCD (SW S168813)	Measure for mPro400S... (e.g. SW S168841) ^a
WLAN data communication between controller and tool			
No WLAN data communication between the controller and the tool.	The IP address of the tool is not correctly entered in the controller.	<ol style="list-style-type: none"> On the controller screen <i>Tool setup</i>, check whether the IP address of the tool has been entered in the <i>Type</i> box. Otherwise, mark the line and <Edit>. <p>IP address of tool – see Tool in <i>RF settings</i> submenu.</p>	<ol style="list-style-type: none"> Press <F4> on the controller. Select the required tool under <i>Station # > Tool assignment</i>. Press <F5>. Enter the IP address under <i>Tool address</i>. <p>IP address of tool – see Tool in <i>RF settings</i> submenu.</p>
	Tool not yet parameterized with the correct WLAN settings.	<ul style="list-style-type: none"> On the controller screen <i>Navigator > Utilities > System settings > LiveWire/CellCore RF configuration</i>, use the infrared interface to parameterize the tool with the correct WLAN settings. 	<ol style="list-style-type: none"> On the controller screen <i>Main menu > System programming > Service > TMA configuration > Communication with tool</i>, select > <i>RF mode WLAN</i>. Parameterize the tool with the correct settings via the infrared interface.
	WLAN settings are different for controller and access point.	<ul style="list-style-type: none"> On the controller screen <i>Navigator > Utilities > System settings > LiveWire/CellCore RF configuration</i>, check whether the tool's WLAN settings agree with the settings of the access point (network name, encryption, network key). 	<ul style="list-style-type: none"> On the controller screen <i>Main menu > System programming > Service > TMA configuration > Communication with tool</i>, check whether the WLAN settings for the tool agree with the settings for the access point (network name, encryption, network key).
	A filter for MAC addresses is activated at the access point.	<ul style="list-style-type: none"> Add the MAC address for the tool to the list of approved addresses at the access point. <p>MAC address of tool – see</p> <ul style="list-style-type: none"> Label above the battery On the tool in the <i>RF settings</i> submenu. 	
	Port 4001 is disabled by a firewall.	<ul style="list-style-type: none"> Configure the firewall such that the required IP/MAC addresses can use port 4001. 	
	The wireless channel at the access point is outside the range supported by the tool.	<ul style="list-style-type: none"> To change the wireless channel setting at the access point to the right wireless channel with respect to country code: EU 1–13; World 1–11 (see Installation Manual P1894E). 	
	Tool is already assigned to another controller.	<ul style="list-style-type: none"> Check whether another controller already has a connection to this tool. In other words, another controller is using the same IP address. 	
IP address cannot be pinged.	IP address already exists in network. In this case, the tool will not establish a connection.	<ul style="list-style-type: none"> Check the physical connection (RSSI values). Check the assigned IP address. 	

Problem	Possible cause	MeasuremPro400GCD (SW S168813)	Measure for mPro400S... (e.g. SW S168841) ^a
WLAN data communication between controller and tool			
Occasional interruptions in WLAN data communication.	Distance between the access point and the tool is too great.	<ol style="list-style-type: none"> 1. Check the signal strength at the tool in the <i>RF settings</i> sub-menu. 2. If necessary, reduce the distance between the access point and the tool. 	
	The tool is already assigned to another controller.	<ol style="list-style-type: none"> 1. Check whether the tool (IP address) is also assigned to another controller. 2. If yes, delete the assignment in the other controller. <p>A tool can only be assigned to one controller.</p>	
	Excessive data traffic on WLAN Network.	<p>Reduce data traffic on WLAN network.</p> <ol style="list-style-type: none"> 1. On the <i>Basic</i> controller screen, increase the <i>trigger torque</i>. 2. On the controller screen <i>Navigator > Advanced > Controller > Trace recording</i>, deactivate the data transmission graphs. 	<p>Reduce data traffic on WLAN network.</p> <ol style="list-style-type: none"> 1. On the controller screen <i>Main menu > Process programming > Settings > Fastening stages > Fastening stage # > Sequences</i>, increase the <i>Trigger torque</i>. 2. On the controller screen <i>Main menu > System programming > Special functions > MWF</i>, disable the torque graph data transmission.

a.) Software-dependent measure. Discrepancy possible when using Custom Tool Software.

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