



Feed-in management

We bring your electricity to the market

Accelerate the energy revolution

In the All Electric Society, distributed generation plants make a significant contribution to a reliable power supply. Certified feed-in controllers from Phoenix Contact enable fast and unbureaucratic grid connection of new systems – without having to wait a long time for the certificate of grid conformity. In this way, they not only simplify the path to the energy revolution – they actually accelerate it.

Our feed-in management provides excellent continuity of data and energy flows, which is helping to make the All Electric Society a reality. The intelligent networking of power-generating and energy-consuming sectors enables an efficient and balanced overall system.



Implemented with success

In 2020 and 2021, Phoenix Contact equipped six Portuguese photovoltaic systems with the integrated photovoltaic park management system.

We successfully implemented 2086 string combiner boxes, nine weather stations, 78 data loggers, and park controllers. The combined capacity of all six photovoltaic field systems is 195 MWp.



From fossil fuels to renewable energies

Focusing on solar power

From a technical point of view, a complete global energy revolution is considered to be possible. The concepts for the energy revolution and the technologies required for this are already known.

The energy revolution is focusing on photovoltaics due to its high availability and high level of acceptance. The targeted expansion of photovoltaic systems in Germany is 200 GW of installed photovoltaic capacity by 2030. To achieve this goal, new

photovoltaic systems with a capacity of around 150 GW will be needed over the next eight years. This is roughly equivalent to an area of 170,000 ha of photovoltaic systems. To put this in perspective, this could vastly cover an area the size of the city of London.

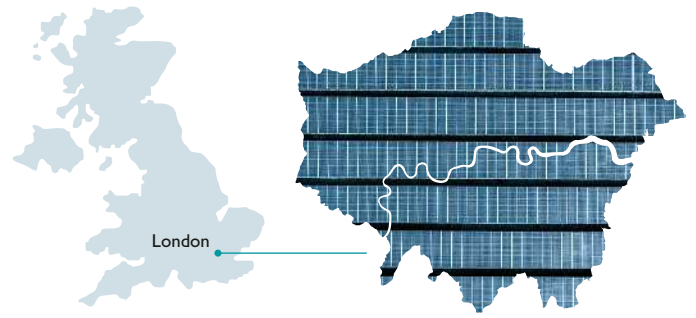
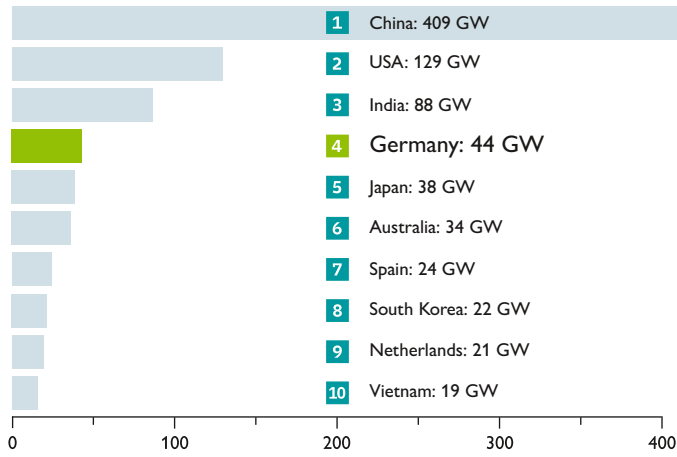
In Europe as a whole and worldwide, there are also ambitious expansion targets for renewable energies. The goal is to accelerate the reduction of climate damage caused by conventional energy sources and, above all, to produce electricity at low cost.



Menteroda solar park, Germany

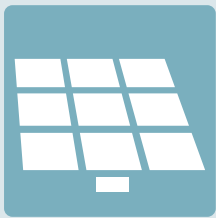
Facts and figures

Top 10 photovoltaic market growth, 2022 to 2025



Approx. 170,000 ha

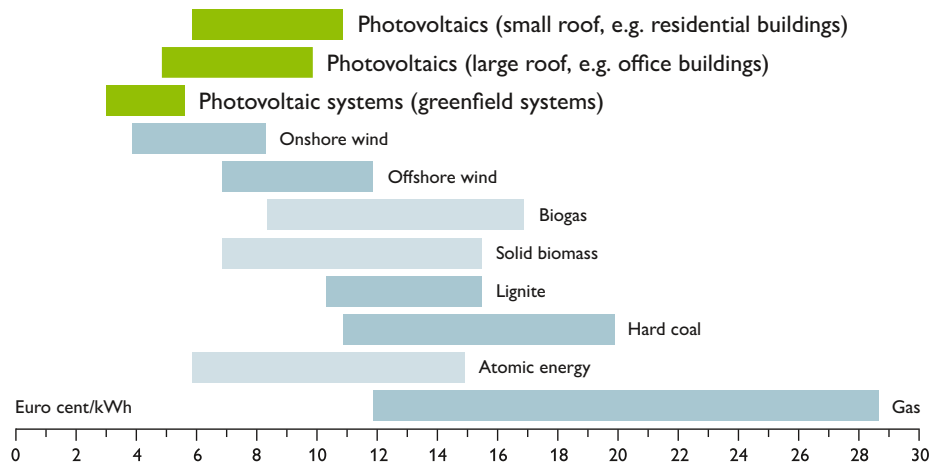
of systems will be added in Germany by 2030 – a surface area larger than London.



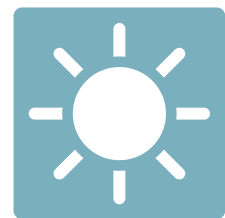
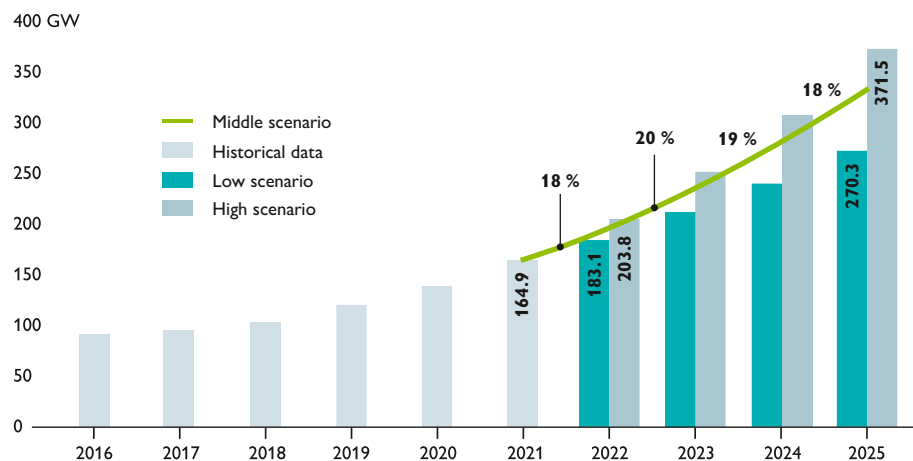
>1 GWp

In 2021, Phoenix Contact technology was used to successfully equip more than 1 GWp of system capacity.

Electricity production costs in Germany



Overall PV market scenario in Europe, 2022 to 2025



$1.5 \cdot 10^{18}$ kWh

The potential of solar energy is more than 10,000 times the world's energy needs.

Connect distributed generation plants to the grid faster

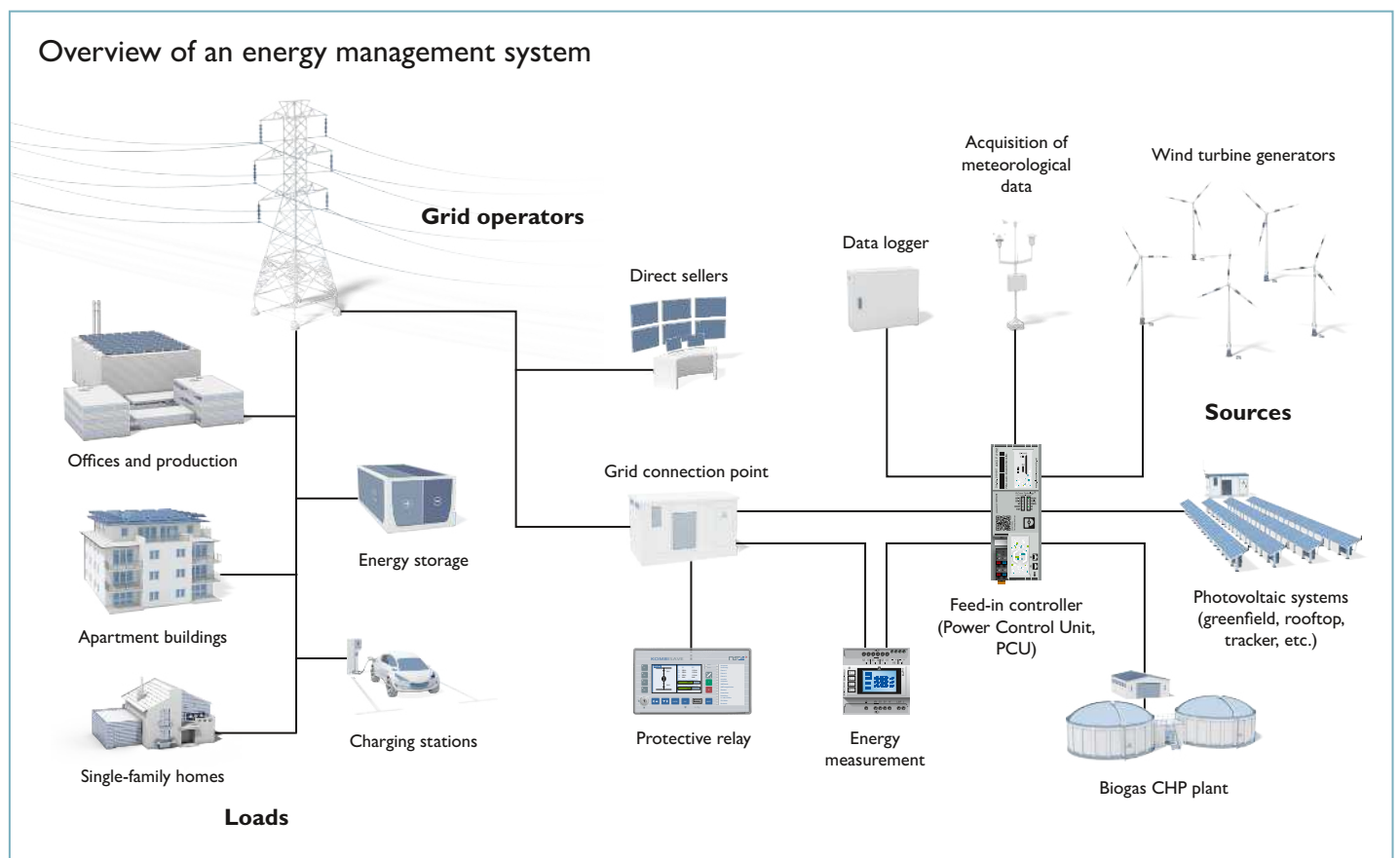
The challenges facing feed-in management

Decentral power generation plants need to play their part in ensuring high grid stability. The system yield, storage, and self-consumption must be regulated and monitored. Linking various energy sources, using types of storage, and shifting loads to meet the peak generation are the major tasks for meeting the energy needs in the near future.

The accelerated expansion of renewable energy is creating increasing challenges for grid and system operators, electricity marketers, and consumers alike. This includes limited grid capacities, poor grid compatibility, inadequate grid security management, an increased bidirectional power flow, and cybersecurity.



Grid connection point of the photovoltaic system in Moura, Portugal, with the feed-in control from Phoenix Contact



Solutions for feed-in management and stable power grids

Feed-in management can handle a large portion of these challenges. The controllers at the grid connection points record the existing voltage and the reactive power.

With the Power Control Unit (PCU) from Phoenix Contact, you can implement reliable feed-in management. We offer freely programmable interfaces and function blocks and constantly work towards meeting the requirements for comprehensive energy management systems.

PLCnext Security

The PCU is based on our PLCnext Technology and was designed in line with security-by-design criteria. The development processes are certified in accordance with IEC 62443-4-1. Some of the key security measures include the use of a Trusted Platform Module (TPM), a configurable Linux kernel, and the use of the Linux firewall, plus the implementation of a crypto store for certificates and keys.

PLCnext Technology
Designed by Phoenix Contact

- Certified in four EU countries
- Continuously extended compatibilities
- High availability
- Maximum flexibility
- Multi-instancing
- Q@Night control
- Industrial quality

Multi-instancing

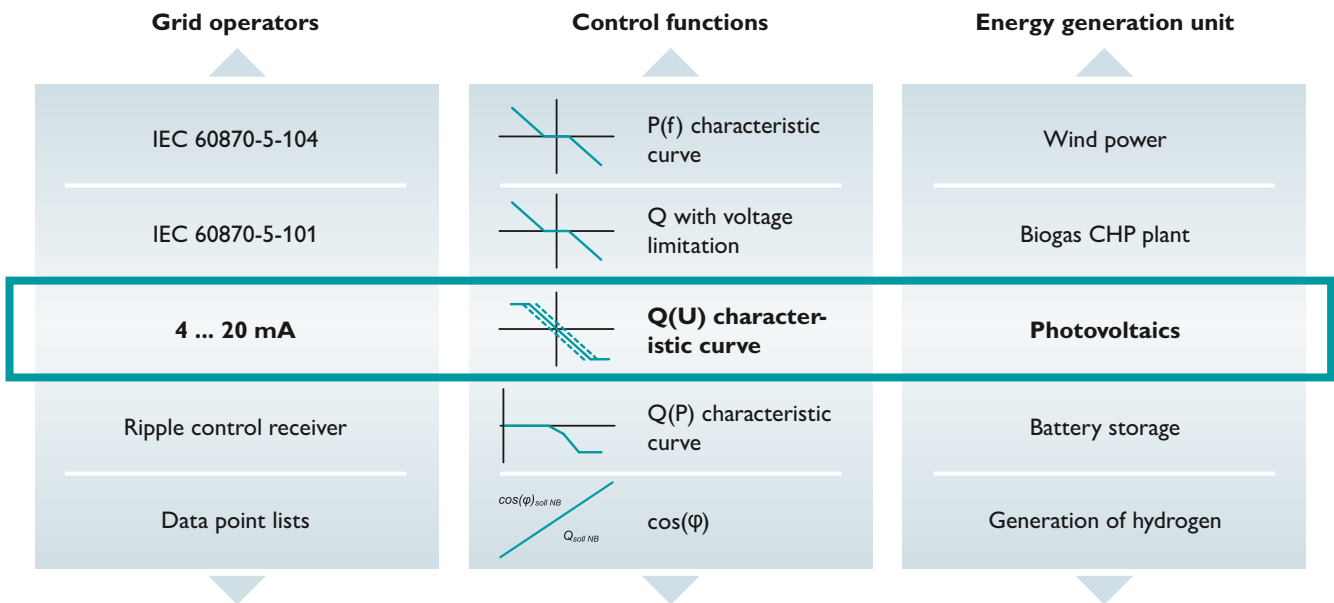
Multi-instancing of the PCU makes it possible to control different power generation plants independently and simultaneously at one grid connection point, for example a combination of a photovoltaic system and a CHP plant. Currently, up to three different types of plants can be controlled with one PCU.

Open control technology and pre-programmed PCU functions

Our PCU can be customized specifically to your application. The interfaces to the grid operators, power providers, direct

seillers, and energy measuring devices are to be connected by the user on the basis of the specific project. In addition, we offer

a wide variety of controller functions for controlling all kinds of distributed power generation plants.



Product overview

AXC F controllers and modular I/O systems

The core component of the switchgear and controlgear assembly designed for use in industrial environments is PLCnext Control from the Axioline F series, programmable with high-level languages or classically in IEC 61131-3. The controller can be expanded on the right with modules for the Axioline I/O system and on the left with hardware functions, such as an additional Ethernet port.

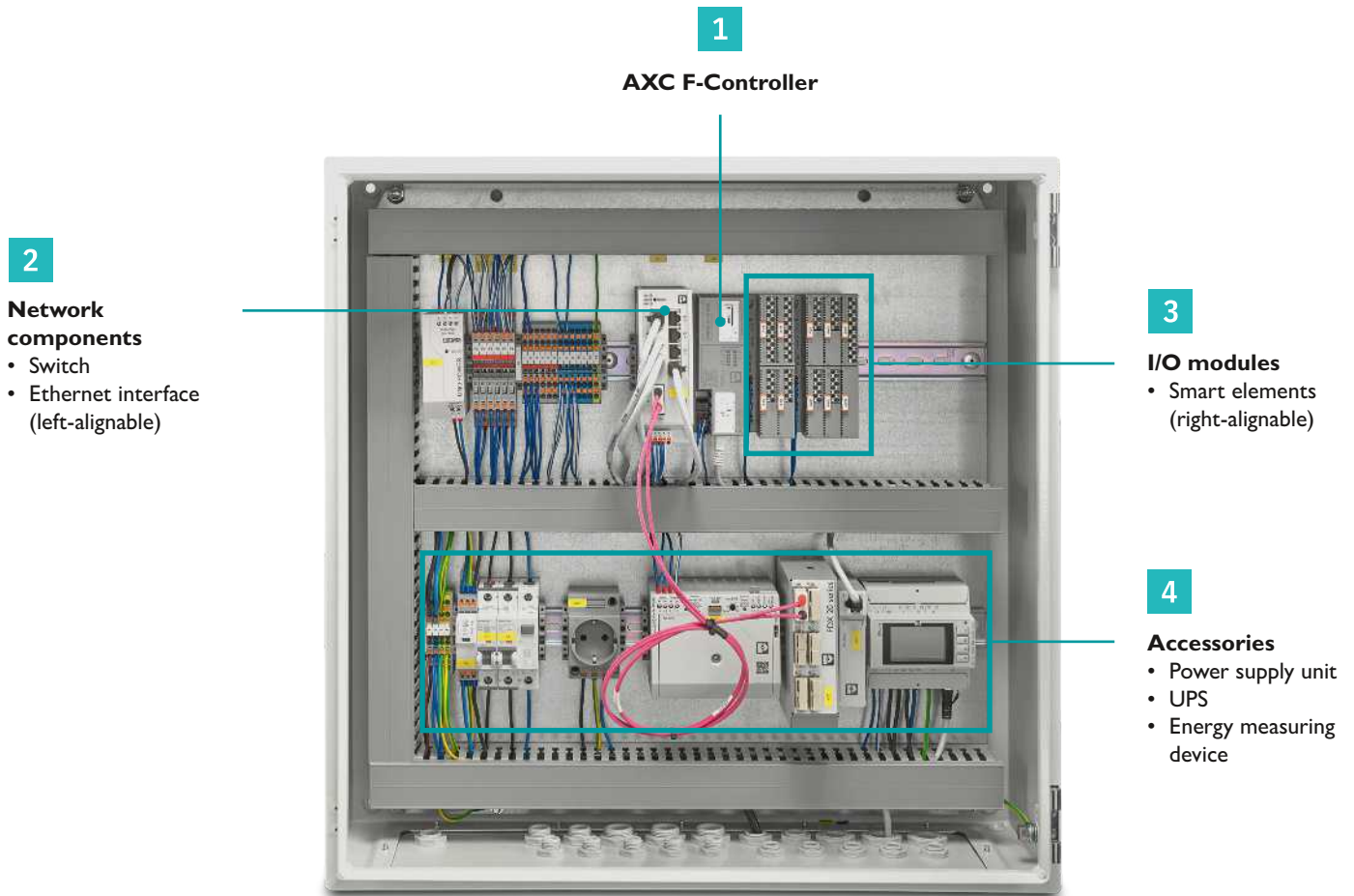
The modular system with all the necessary peripheral devices is based on the wide product range from Phoenix Contact.

Solarworx for efficient engineering

The Solarworx software libraries feature drivers for data loggers, interfaces for inverters, and complex blocks for calculating the sun's position and monitoring solar trackers.

PCU licenses up to maximum system performance

System performance in megawatts (MW)	<0.25	<1	<5	<10	<50	>50
APP-LIC-93-PCU-250KW	●					
APP-LIC-94-PCU-1MW		●				
APP-LIC-95-PCU-5MW			●			
APP-LIC-96-PCU-10MW				●		
APP-LIC-97-PCU-50MW					●	
APP-LIC-98-PCU-UNLIMITED						●
APP-LIC-92-SOLARWORX	●	●	●	●	●	●
APP-LIC-RESY10X-Remote	Required in order to enable operation in accordance with IEC 60870-5-101 and IEC 60870-5-104.					
SD FLASH 8GB PLCNEXT MEMORY LIC	Program/configuration memory					



1

AXC F-Controller

2

Network components

- Switch
- Ethernet interface (left-alignable)

3

I/O modules



- Smart elements (right-alignable)

4

Accessories

- Power supply unit
- UPS
- Energy measuring device




1 AXC F controllers

		
Description	PLCnext Control incl. 2 GB memory card	PLCnext Control incl. 2 GB memory card
Type	SOL-SA-PCU-41XX (2152)	SOL-SA-PCU-PRO-41XX (3152)
Item number	1114234	1262480







2 Network components

			
Description	Ethernet interface	Bus base module	Industrial Ethernet Switch
Type	AXC F XT ETH 1TX	AXC BS L 2	FL SWITCH 2205
Item number	2403115	1064312	2702326

3 I/O modules

						
Description	I/O module	I/O module	I/O module	I/O module	I/O module	Communication module
Type	AXL SE DI16/1	AXL SE DO16/1	AXL SE AI4 I 4-20	AXL SE AO4 I 4-20	AXL SE RTD4 PT100	AXL SE RS485
Item number	1088127	1088129	1088062	1088123	1088106	1088128
						
Description	Cover	Module carrier	Module carrier	I/O module	I/O module	Communication module
Type	AXL SE SC-A	AXL F BP SE4	AXL F BP SE6	AXL F DI8/1 DO8/1 1H	AXL F AI2 AO2 1H	AXL F RS UNI 1H
Item number	1088134	1088135	1088136	2701916	2702072	2688666

4 Accessories

						
Description	Power supply unit	UPS	Energy measuring device	Energy measuring device without display	Energy measuring device	Socket
Type	TRIO-UPS-2G/1AC/24DC/5	UPS-BAT/VRLA/24DC/12AH	EEM-MA370	EEM-MB370	EEM-MA370-24DC	EO-CF/UT
Item number	2907160	2320322	2907983	2907954	1127059	0804024

Certified solution

In April 2016, the Network Code on the Requirements for Generators (NC RfG) became effective in Europe. This network code regulates the conditions for connecting electricity generators at all voltage levels. Mandatory throughout all of Europe, it focuses on trading electricity across borders and regulations including, for example, capabilities for frequency support and the provision of reactive power. Each European country defines this directive in more detail in order to apply it in its own national context. Since May 2018, the NC RfG has been applied at the national level in Germany. Phoenix Contact is one of the first manufacturers to have certified its PCU for the German market since 2019. Since then, this certificate in accordance with VDE-AR-N 4110/20 has been applied successfully in Germany for systems above 135 KW.

The strong growth in the solar market has spread to all of Europe. Phoenix Contact is aiming for PCU certification for countries where a certified solution is possible. The first three European countries where this is the case are Spain, Poland, and the Netherlands. Starting in May 2022, Phoenix Contact will provide component certificates for the PCU for these countries. This will make commissioning and connection to the grid much easier and mark a new milestone in accelerating the expansion of renewable energies in Europe.


Your advantages

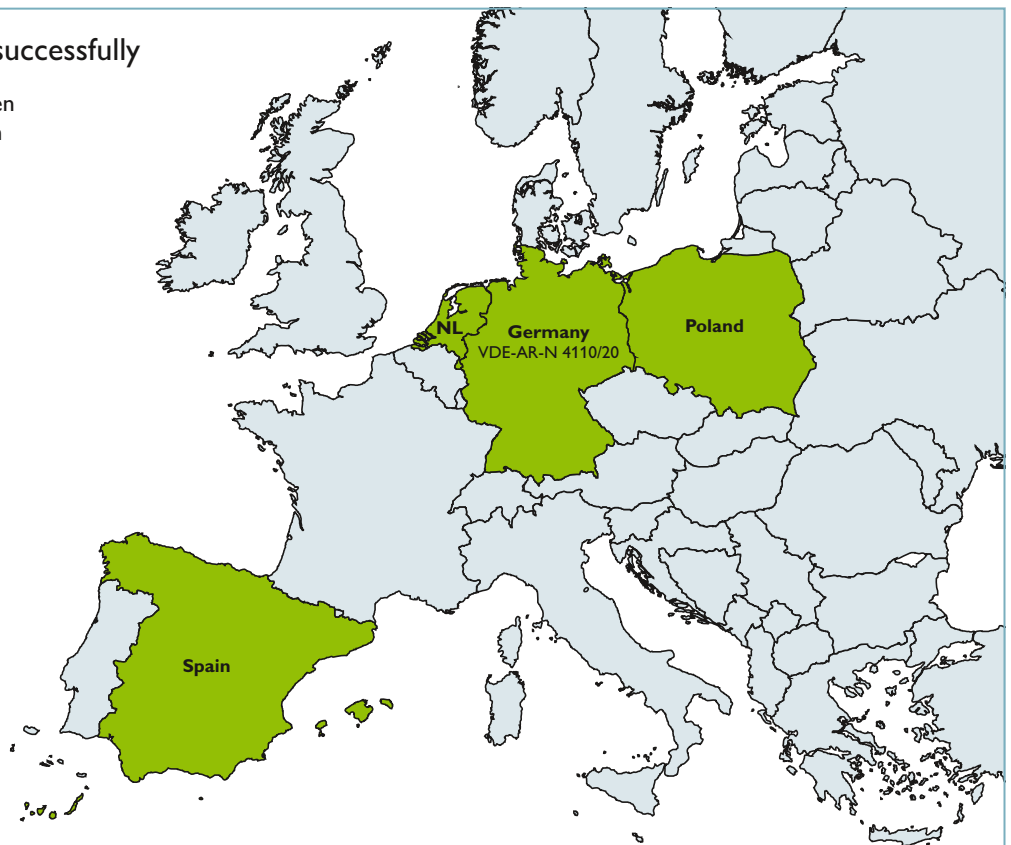
- ✓ Certified in four European countries
- ✓ Simple grid connection due to compliance with all technical connection requirements
- ✓ Low engineering and operating costs with intelligent automation solutions
- ✓ Rapid commissioning with preprogrammed software
- ✓ Open interfaces allow customer-specific extensions

Network code implemented successfully

The Power Control Unit (PCU) has been successfully certified in accordance with NC RfG for the following countries:

- Germany
- Netherlands
- Poland
- Spain

 Network code implemented successfully



References and services



Agrivoltaics, Germany

The agrivoltaic system protects the berries underneath from adverse weather conditions. Our feed-in controller not only handles the grid-compliant feed-in but also receives weather data, such as the intensity of the sun's rays.



Q@Night control, Germany

Together with ASG Engineering GmbH, we implemented the Q@Night control function in a 10 MW photovoltaic system in the Dessora Industrial Park in Germany. Our intelligent feed-in controller regulates the reactive power of the photovoltaic system even at night.



PV park management, Portugal

Phoenix Contact has equipped 195 MWp in six Portuguese photovoltaic systems with its integrated park management. Our solution not only acquires data, performs monitoring, and collects weather data. It also regulates the feed-in at the grid connection point.

Your Energy Solution Partner wherever you are

Phoenix Contact works with selected partners from all over the world that have extensive expertise in our products and systems. This ensures that our solutions for renewable energies are optimally adapted to meet individual customer requirements worldwide.

Get comprehensive advice from our Energy Solution Partners.



Scan the QR code to find your Energy Solution Partner



Open communication with customers and partners worldwide

Phoenix Contact is a global market leader based in Germany. We are known for producing forward-thinking products and solutions for the comprehensive electrification, networking, and automation of all sectors of the economy and infrastructure. With a global network, we maintain close relationships with our customers, something we believe is essential for our common success.

You can find your local partner at
phoenixcontact.com

