

Communication module

# E65C CU-XE

User manual





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# **Revision history**

Version	Date	Comments
а	10.07.2018	First edition. Release 1.
b	27.08.2018	Second edition. Updated Landis+Gyr Root Certificate Authority link.
с	06.12.2018	Third edition.
d	06.08.2019	Updated section 5.1 "Installation in a meter".
e	31.03.2020	Adaptations for Release 2.
		Sections 2.4.1, 2.4.2, 5.1, 5.3, 5.4, and 9 updated. Sections 5.4 "Updating the CU-XE from release 1 to release 2", and 10 "Third-party software used and open source (OS) software licenses" added.
f	15.03.2022	Adaptations for release 2.3.1.
		Manual structure and layout updated. Event log, data log, protocol conversion and routing added.

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# **1** About this document

#### Range of validity

This User Manual applies to E65C CU-XE communication modules hereinafter referred to as "CU-XE".

#### Purpose

This User Manual supplements the operating instructions of the electricity meter and is incomplete without the data contained therein. Together with the meter operating instructions, the User Manual contains all the information necessary for the operation of the CU-XE communication module for its intended purpose. This includes:

- Provision of knowledge concerning the characteristics, construction and function of the CU-XE communication module
- Information about possible dangers, their consequences and measures to prevent any danger
- Details concerning the performance of all work throughout the service life of the CU-XE communication module (installation, commissioning, operation, maintenance, decommissioning and disposal)

#### Target group

The contents of this User Manual are intended for technically qualified personnel of energy supply companies responsible for system planning, installation and commissioning, as well as the operation, maintenance, decommissioning and disposal of the communication modules.

#### **Reference documents**

The Technical Data and the Functional Description of the CU-XE communication module can be found in the following documents:

- D000062527 E65C CU-XE Technical data en
- D000062529 E65C CU-XE Functional description en

#### Terms and abbreviations

A list of terms and abbreviations used in this User Manual is available at the end of this document.

# 2 Safety

This section describes the safety information used in this manual, outlines the responsibilities and lists the safety regulations to be observed.

### 2.1 Safety information

The following symbols are used to draw your attention to the relevant danger level, i.e. the severity and probability of any danger, in the individual sections of this document.



Warning Used to indicate a dangerous situation that could cause bodily injury or death.



**Caution** Used to indicate a situation/action that could result in material damage or loss of data.



Used to indicate general guidelines and other useful information.

In addition to the danger level, safety information also describes the type and source of the danger, its possible consequences and measures for avoiding the danger.

### 2.2 Responsibilities

The owner of the communication modules – usually the utility company – is responsible for assuring that all persons engaged in working with meters and communication modules:

- Have read and understood the relevant sections of the user manual.
- Are appropriately qualified for the work to be performed in accordance with national regulations (see ISSA "Guideline for Assessing the Competence of Electrically Skilled Persons").
- Strictly observe the safety regulations (laid down in section <u>Safety regulations</u> and the
  operating instructions as specified in the individual sections.

In particular, the owner of the meters and communication modules bears responsibility for the protection of persons, prevention of material damage and the training of personnel.

For this purpose, Landis+Gyr provides training on a variety of products and solutions. Contact your local Landis+Gyr representative for more information.

### 2.3 Safety regulations

The following safety regulations must be observed at all times:

- Only appropriate tools shall be used for the job. This means, e.g. that the screwdriver must be of the correct size for the screws, and the handle of the screwdriver must be insulated.
- Devices that have been dropped must not be installed even if no damage is apparent, but must be returned to an authorised service and repair centre (or the manufacturer) for testing. Internal damage may result in malfunctions or short-circuits.

• Communication modules must not be cleaned under running water or with compressed air. Water ingress can cause short-circuits or damage components.

In addition, the safety instructions given in the User Manuals for the meter are also applicable.

Landis+Gyr hereby declares that the radio equipment type CU-XE is in compliance with Directive 2014/53/EU. The full text of the EU Declaration of Conformity is available at the following internet address: <u>https://www.landisgyr.eu/product/landisgyr.e65c-cu-series/</u>.

# **3** Device description

### 3.1 Field of application

The CU-XE communication module can be installed in and uninstalled from the following Landis+Gyr meters without opening the calibration seal:

- E650 ZxD300/400xT industrial and commercial meters
- E850 ZxQ high-precision meters
- S650 SxA300/400xT and SMA500 Smart Grid Terminals
- E65C CU-ADPx adapters

#### **3.2 Characteristics**

The CU-XE communication module contains two independent Ethernet interfaces, one RS-232 serial interface and one RS-422/RS-485 serial interface. The device also contains a powerful application processor for networking, security and data processing functionalities.

#### 3.3 Type designation

The type designation of the CU-XE communication module is added to that of the meter (see meter User Manual), but is not shown on the main faceplate of the meter. The type designation is inscribed on the case of the communication module and can be seen through the front door of the meter through an opening in the tariff faceplate.

The CU-XE communication module is available in the following versions:

Type Ethernet		RS-485/RS-422	RS-232
E65C CU-XE	•	•	•

#### **3.4 Functions**

The Functional Description of the CU-XE communication module is provided separately. The main functions are briefly summarised below.

#### 3.4.1 Ethernet interfaces

The communication module offers two Ethernet interfaces supporting 100BASE-TX and 10BASE-TX. Depending on the Ethernet interface used, the communication module offers various services. The two Ethernet interfaces can be configured independently. This configuration is defined during the ordering process and can be changed during operation.

#### 3.4.2 RS-485/RS-422 interface

The RS-485/RS-422 interface is a serial, bi-directional, differential interface. The interface includes user configurable bias and termination resistors. A typical application is to create a multi-drop bus, where multiple devices can share the communication channel. For example, up to 31 E650 meters can be connected to the RS-485 bus configured as the bus master, and they can be read remotely using the Ethernet interface.

To configure the RS-485/RS-422 operational mode as well as the bias and termination resistors, DIP switches on the backside of the PCB can be used. The DIP switches are accessible only when the CM is removed from the meter.

Legends for the scenarios below:

DIP switch	Function
Position 1	ON = rx termination enabled, 120 $\Omega$
Position 2	ON = tx termination enabled, 120 $\Omega$
Position 3	ON = bias enabled
Position 4	ON = bias enabled
Position 5	ON = Manufacturer access
Position 6	ON = used as RS485 (half-duplex); OFF = used as RS422 (full-duplex)
Position 7	ON = used as RS485 (half-duplex); OFF = used as RS422 (full-duplex)
Position 8	ON = used as RS485 (half-duplex); OFF = used as RS422 (full-duplex)

RS-485 Half-duplex not terminated:

	OFF		ON	
1				
2				
3				
4				
5				
6				
		_		
7				
-		_		
8				

RS-422 Full-duplex not terminated:

	OFF	ON	
1			
2			
3			
4			
5			
6			
7			
8			

RS-485 Half-duplex terminated:

	OFF	ON	
1			
2			
3			
4			
5			
6			
7			
0			
0			

RS-422 Full duplex terminated:

	OFF	ON	
1			
2			
3			
4			
5			
6			
7			
8			

#### 3.4.3 RS-232 interface

The RS232 interface is a serial, bi-directional, full-duplex interface.

#### 3.4.4 Base meter interface

The communication module has a two-channel interface to connect to the base meter that is hosting the communication module.

### 3.5 Security features

The communication module is configured from production with certificates from the Landis+Gyr root certificate authority. The Landis+Gyr Root CA is available under the Landis+Gyr EMEA Root Certificate RSA-4096 at:

https://www.landisgyr.com/webfoo/wp-content/uploads/2013/12/rsa4096-root-ca-cert.pem

Add this certificate to the root certificates of your system to be able to verify the server in a TLS connection to the communication module.



# 4 Mechanical construction

# 4.1 Overview

The CU-XE communication module is a complete unit with its own plastic case.



## Figure 1: Front and back of the communication module

The faceplate of the communication module installed in the meter is visible when the meter front door is open.

External connections are situated underneath the unit, while a 10-pin connecting plug at the rear provides a connection to the meter electronics.

Four LEDs on the circuit board indicate when the communication module is booting or ready, when it is connected, when there is an error and when the communication module is running properly.

The communication module has no seal of its own. It is secured by the utility seal of the meter.

# 4.2 Antenna and interface connections

# 4.2.1 CU-XE connections

The CU-XE communication module has the following four interface connections:

#1: Ethernet port 1#2: Ethernet port 0#3 RS-485/RS-422#4: RS-232



#### Figure 2: CU-XE interface connections

The RJ45 sockets of Ethernet ports 1 and 0 have the following pin assignment:



The orange led shows the speed of the connection and if it is on then it is indicating the 100Mbit connection, otherwise it is referring to 10Mbit connection.

The green led is showing the link activity on the RJ45 socket. On status indicates the link is on and is blinking when data transmitted or received.

The RJ45 socket of the RS485/RS422 interface has the following pin assignment:



The RJ45 socket of the RS232 interface has the following pin assignment:

	1	1	DSR
		2	DCD
		3	DTR
		4	GND
		5	RxD
		6	TxD
		7	CTS
8 1		8	RTS
		orange	speed
		green	link

# 4.3 Faceplate

The faceplate of the E65C CU-XE communication module:



#### Figure 3: Faceplate of the CU-XE communication module

- 1. Warning plate (country-specific)
- 2. Type designation
- 3. Type designation (property information
- 4. Insulation class and CE mark
- 5. Interface inscriptions
- 6. Serial number
- 7. Year of manufacture
- 8. LEDs and LED inscriptions
- 9. Certification information

The faceplate may also contain customer-specific and country-specific data, e.g. warnings.

#### 4.4 LED status descriptions



#### Figure 4: LEDs on the communication module

#### 4.4.1 Power-up

During power-up, all LEDs are switched on. If the system is running, the LEDs display the behaviour described in sections below.

#### 4.4.2 Connect LED

The Connect LED can be viewed by the user with meter cover closed. It is switched on when one or more application level TCP connections are established. This applies to all components that are used for transporting process data (SCADA protocols and the passthrough mechanism are examples) but excludes transient TCP connections like the main or management connections and VPN tunnels.

#### 4.4.3 Boot LED

The Boot LED is the red part of the bi-colour Ready/Boot LED. It is switched on when the CU is booting and switched off during normal operation

#### 4.4.4 Ready LED

The Ready LED is the green part of the bi-colour Ready/Boot LED. It is switched off during startup and blinks in pulses once the application has fully started.

#### 4.4.5 Ethernet LEDs

The orange and green Ethernet LEDs indicate speed and link state.

# 5.1 Installation in a meter

#### Warning

#### No voltage to the meter during installation



In order to avoid hazardous electric shocks, make sure that there is no voltage applied to the meter when installing the communication module. Contact with live parts is dangerous to life. Disconnect the meter from the power supply as described in the meter User Manual.

#### Note

#### Excessive number of power failures reduces life of product



The CM writes to its internal flash memory every time there is a power failure. This type of memory has a life expectancy of approximately 100,000 write cycles. This is not a guaranteed value. During a lifespan of 15 years this would amount to approximately 15 power failures per day. Exceeding this number may shorten the useful life of the product.

#### Note



E65C CU-XE communication modules can be used in E650 (from Series 3 FW version B30 upwards), S650 and E850 electricity meters or in CU-ADPx adapters

The CM is designed to be operable with meters mentioned above. The CM should not be operated with other devices even if it can be inserted to the device. Compatibility with other devices cannot be guaranteed.

Install the communication module in a meter as follows:

- 1. Make sure that no voltage is applied to the meter.
- 2. Remove the utility seals on the front door and terminal block cover.
- 3. Open the front door and remove the terminal block cover.



#### Figure 5: Preparing the meter for the installation of the communication module

- 4. Remove the built-in dummy communication module.
- 5. Insert the communication module carefully into the space provided in the meter. Ensure correct fitting of the connector.



### Figure 6: Installing the communication module in the meter

- 6. Close and seal the front door.
- 7. Connect to the Web UI, see section <u>Accessing the Web UI</u> on page 19 for more information.

8. Change the initial password that was specified prior to order confirmation. See section My <u>settings / password</u> on page 52.

### 5.2 Connecting the communication module

#### 5.2.1 Connecting the RS-485 interface

- 1. Insert the connecting cable with the RJ12 connector to the socket labelled RS-485/RS-422 in the communication module until the connector engages.
- Connect the other end of the cable to the nearest unit of the RS-485 multiple connection. The RS-485 interface of the CU-XE is provided with one RJ12 socket. Extensions for the RS-485 must therefore be formed with an external splitter.



#### Figure 7: Connecting multiple communication modules

# Caution External In order

#### External wiring of RS-485

In order to function correctly, all 3 wires (data a, data b and common GND) must be connected. RS-485 operation with only 2 wires (without common GND) is forbidden as the RS-485 interface may not function correctly or may even get damaged.

#### 5.2.2 Resealing the meter

After all connections have been made and the device is properly configured, you can replace the covers and reseal the meter with a utility seal.

### 5.3 Commissioning and functional check

The CU-XE communication module should be taken into operation as follows (see also section <u>Operation</u> on page 19 for a detailed description of LED states):

- 1. After switching on the mains voltage, a red boot LED is blinking. When the communication module is ready for operation, the LED switches to green. When the Ethernet connection is made, the running LED is illuminated.
- 2. A remote readout of meter data via Ethernet should be performed as a functional check if the CU has been appropriately configured.
- 3. If a multiple connection to further devices is used, check that they are working as expected.

# 5.4 Removal or exchange of communication module

The communication module is exchanged or removed from the meter in reverse order of the installation (see sections <u>Installation in a meter</u> on page 15 and <u>Connecting the communication</u> <u>module</u> on page 17).

# 6 Operation

The CU-XE communication module features four LEDs to display operational status information. These LEDs are visible through the transparent plastic housing on the right side of the faceplate. Refer to <u>LED status descriptions</u> on page 14 for more information.



Note

Note

After configuration change the power cannot be cut off for 10 seconds, otherwise the CM can be damaged.

### 6.1 Accessing the Web UI

To ease installation and maintenance, the communication module features a Web UI. The Web UI is accessible on the ethernet interface ETH1 and/or ETH0 and modem, depending on the configuration, using a standard, up-to-date web browser (e.g. Chrome, Firefox or Edge).



The Web UI is not accessible over the optical port nor the RS485 interface

The Web UI is only accessible over ethernet interfaces.

The ethernet interfce ETHO and ETH1 can be configured in multiple ways, refer to <u>Ethernet</u> <u>ports</u> on page 32 for more information.

#### 6.1.1 Management port on ETH1

If the management port is enabled, it is accessible on the ETH1 interface at IP address 172.16.0.1 or at https://hostname.landis. The management port features a DHCP and DNS server. Establishing the connection is easier if the ethernet interface of the PC is set in DHCP mode. See the example below from Windows 10 settings (click **Start > Settings > Network & Internet > Ethernet > Change adapter options**).

	rnet Properties		×
Vetwork	king Sharing		
Conne	ct using:		
	Intel/R) Ethemet Connection	n 1218-1 M	
	Intel(ity Ethemet Connection	11210-EM	
		C	onfigure
This co	onnection uses the following	; items:	
	Client for Microsoft Netwo	orks Mississe Allahuuda	^
	VirtualBox NDIS6 Bridge	d Networking Driver	5
<b>I</b>	QoS Packet Scheduler	-	
₽ -	Internet Protocol Version	4 (TCP/IPv4)	
	Microsoft LLDP Protocol	Driver	~
<	-		>
	Install Unin	stall Pr	operties
Desc	cription		
Tra	nsmission Control Protocol/I	nternet Protocol. The	e default
acro	e area network protocol that oss diverse interconnected r	t provides communic networks.	ation
		012	
		UK	Cancel
ternet f	Protocol Version 4 (TCP/IPv4 Alternate Configuration	4) Properties	Cancel X
ternet l eneral You car this cap for the	Protocol Version 4 (TCP/IPv4 Alternate Configuration n get IP settings assigned auto bability. Otherwise, you need to appropriate IP settings.	4) Properties omatically if your network ac	Cancel X
ternet l eneral You car for the Ol	Protocol Version 4 (TCP/IPv4 Alternate Configuration In get IP settings assigned auto pability. Otherwise, you need to appropriate IP settings.	4) Properties omatically if your netw to ask your network ad	Cancel X
ternet l eneral You car this cap for the O Us	Protocol Version 4 (TCP/IPv4 Alternate Configuration n get IP settings assigned auto pability. Otherwise, you need to appropriate IP settings. btain an IP address automatica se the following IP address: —	4) Properties	Cancel X
ternet l General You car this cap for the O Us IP ac	Protocol Version 4 (TCP/IPv4 Alternate Configuration In get IP settings assigned auto ability. Otherwise, you need to appropriate IP settings. btain an IP address automatica se the following IP address: — ddress:	4) Properties  matically if your network acceleration of the second seco	Cancel X
ternet l General You car this cap for the O Us IP ac Subr	Protocol Version 4 (TCP/IPv4 Alternate Configuration n get IP settings assigned auto pability. Otherwise, you need to appropriate IP settings. btain an IP address automatica se the following IP address: — ddress: het mask:	4) Properties	Cancel X
ternet l ieneral You car this cap for the O Us IP ac Subr Defa	Protocol Version 4 (TCP/IPv4 Alternate Configuration In get IP settings assigned auto ability. Otherwise, you need to appropriate IP settings. btain an IP address automatica se the following IP address: — ddress: met mask: ault gateway:	4) Properties  matically if your network action ally	Cancel ×
ternet l seneral You car this cap for the O Us IP ac Subr Defa	Protocol Version 4 (TCP/IPv4 Alternate Configuration n get IP settings assigned auto pability. Otherwise, you need to appropriate IP settings. btain an IP address automatica se the following IP address: — ddress: het mask: ault gateway: btain DNS server address auto	4) Properties  amatically if your network acceleration ally	Cancel ×
ternet I General You car this car for the O Us IP ac Subr Defa	Protocol Version 4 (TCP/IPv4 Alternate Configuration In get IP settings assigned auto abbility. Otherwise, you need to appropriate IP settings. btain an IP address automatics se the following IP address: — ddress: het mask: ault gateway: btain DNS server address auto se the following DNS server address auto	4) Properties  amatically if your network accession of the second	Cancel ×
ternet l seneral You car this cap for the O Us IP ac Subr Defa	Protocol Version 4 (TCP/IPv4 Alternate Configuration n get IP settings assigned auto pability. Otherwise, you need to pability. Otherwise, you need to pability. Otherwise, you need to pability. Otherwise, you need to appropriate IP settings. btain an IP address automatica se the following IP address: — ddress: met mask: ault gateway: btain DNS server address auto se the following DNS server ad erred DNS server:	4) Properties  amatically if your network acceleration ally	Cancel ×
ternet I ieneral You car this car for the OUS IP ac Subr Defa OUS Prefi Alter	Protocol Version 4 (TCP/IPv4 Alternate Configuration In get IP settings assigned auto bability. Otherwise, you need f appropriate IP settings. btain an IP address automatics se the following IP address: — ddress: het mask: ault gateway: btain DNS server address auto se the following DNS server ad erred DNS server: mate DNS server:	4) Properties  amatically if your network accession of the second	Cancel ×
eneral You can this cap for the O Us IP ac Subr Defa O Us Prefi Alter	Protocol Version 4 (TCP/IPv4 Alternate Configuration In get IP settings assigned auto bability. Otherwise, you need to appropriate IP settings. In the following IP address:	4) Properties  amatically if your network acceleration ally	Cancel X Ork supports dministrator

How to access communication module with, for example, manufacturer serial number 58703388 and management port enabled:

- 1. Configure the ethernet interface to DHCP mode.
- 2. Connect to the ethernet interface ETH1 of the communication module.

- a) IP address: https://172.16.0.1
- b) Hostname: https://LGZ58703388.landis
- 4. Provide your username and password at the login page.

Land	is+Gyr
	Welcome to E65CXE
	Username
	Password
	Login



#### 6.1.2 Static IPv4 address

This section explains how to access the Web UI when ethernet interfaces (ETH0, ETH1 or bridged as BR0) are configured with a static IP address.

Example: Communication module with ETHO configured to a static IP address 192.168.100.100.

1. Configure the ethernet interface to an IP adress in the same range as ETHO, e.g. 192.168.100.200.

etworking Sharing		
Connect usina:	General	
Intel(R) Ethemet Connection I218-LM	You can get IP settings assigned automatically if your network suppo this capability. Otherwise, you need to ask your network administrate for the appropriate IP settings.	orts or
Configure This connection uses the following items:	Obtain an IP address automatically	
Client for Microsoft Networks	Use the following IP address:	
File and Printer Sharing for Microsoft Networks	IP address: 192 . 168 . 100 . 200	
VirtualBox NDIS6 Bridged Networking Driver	Subnet mask: 255 . 255 . 255 . 0	
Internet Protocol Version 4 (TCP/IPv4) Internet Protocol Version 4 (TCP/IPv4) Internet Protocol	Default gateway:	
Microsoft LLDP Protocol Driver	Obtain DNS server address automatically	
< >	• Use the following DNS server addresses:	
Install Uninstall Properties	Preferred DNS server:	
Description	Alternate DNS server:	
wide area network protocol that provides communication across diverse interconnected networks.	Validate settings upon exit Advanced	ł

- 2. Connect to the ethernet interface ETHO of the communication module.
- 3. Enter the IP address of ETH0 into the web browser: https://192.168.100.100.
- 4. Enter your username and password on the login page.

For more information about the different configuration options of the ethernet interfaces, refer to <u>Ethernet ports</u> on page 32.

#### 6.1.3 Dynamically assigned IPv4 address

This section explains how to access the Web UI when the communication module is connected to a network where the IP address is assigned by a DHCP server from the network.

For more information about the different configuration options of the ethernet interfaces, refer to Ethernet ports on page 32.

Example: a communication module with manufacturer serial number 58703388, and ETHO configured to DHCP and connected to a LAN where the assigned IP address is 10.41.4.34.

- 1. Make sure the PC is connected to the LAN.
- 2. Enter the IP address of ETH0 into the web browser: https://10.41.4.34.
- 3. Enter your username and password on the login page.

Depending on the IT network infrastructure settings, the device may be accessible over the hostname and domain (DNS suffix the network assigns): Instead of entering the IP address you could use https://LGZ58703388.example.net.

#### 6.2 Device information, status and configuration

After accessing the Web UI, you can log in using the username and password.

In order to make changes on the configuration:

1. Click Enter configuration mode at the top of the page.

Landis+Gyr		Enter configuration mode	show description Engli	sh 🗸
User: admin	Status Diagnostic			
Logout	Configuration Command	Time synchronization setup		
DEVICE		Time synchronization source Base meter		
System				
Time				
Utility				

#### Figure 9: Configuration mode

- 2. Make your configuration change.
- 3. Click Save.

Landis <mark>+</mark> Gyr		Cancel configuration mode	show description	English 🗸
User: admin	Status Diagnostic			
Logout	Configuration Command	Time synchronization setup		
DEVICE		Time synchronization source Base meter V		
System				
Time				
Othity				
COMMUNICATION		Time zone UTC 🗸		
Network				
Serial Ports		Clock supervision limit configuration		
Forwarding				
Openverv		Clock synchronization alert limit, in [s]		
PROTOCOL CONVERSION		Clock invalid limit, in [s] 750000		
Info				
Clients				521/0
Servers				Save
Synthesizers				

#### Figure 10: Configuration mode - Save

- 4. Repeat steps 2 and 3 on each menu page you would like to change.
- 5. Click Apply configuration change at the top of the page to confirm the changes.

Landis <mark>+</mark> Gyr	Apply configuration change Discard configuration change
User: admin	
Logout	Serial port status
DEVICE	

Figure 11: Apply/Discard configuration change

# Note

#### Additional description

Every menu page on the Web UI provides an additional description of the functions to be configured. This additional description can be enabled by clicking the **Show description** slider at the top of the Web UI.

#### Note

Entering configuration mode simultaneously by several users is not possible. The button "Cancel configuration mode of user '*username*''' discards all changes made by '*username*'.



Applying configuration changes might cause components in the device to be stopped and restarted. Depending on the components this might take a few minutes.

#### 6.2.1 System

#### 6.2.1.1 System information

Under **Device** > **System** > **Info** the manufacturer serial number, firmware version, installed feature licenses and the operation status of the communication module are shown.

Landis+Gyr		Enter configuration mode Show description English
User: admin	Info 🧹	
Logout	Identifiers Monitoring Firmware Update TLS Certificates	System information
Surtom	Event Log	ELGZ0044113613
COMMUNICATION Serial Ports Converting	Diagnostics Config Export Config Import Features	Firmware version E65CXE-2.1.1-sama5-build-20211108.2022 Total Features data_logging, scada1, synthesizers
OpenVPN		Internal operating status Z System is in normal operation
PROTOCOL CONVERSION Info Clients Servers Synthesizers		Device error information Z No error detected
SERVICE		
Data logging		
USER		
Manage Users Access Control My Settings		

Figure 12: Device > System > Info

The system information page is updated automatically approximately every 3 seconds.

#### 6.2.1.2 Device identifiers communication module

Under **Device** > **System** > **Identifiers**, you can view all the device identifiers, firmware package versions, hardware identifiers and production information.



Figure 13: Device > System > Identifiers

#### 6.2.1.3 System monitoring

Under **Device** > **System** > **Monitoring** you can view the system load, resource usage, device traffic, actual system temperature and the time since last system start.

Landis+Gyr		Enter configuration mode			show description	English 🗸
User: admin	Info Identifiers					
	Monitoring Firmware Update TLS Certificates	System monitoring in	formatior	1		
System	Event Log	System load				
Time Utility	Config Export Config Import	10 seconds		15 minutes		
COMMUNICATION	Features					
Network Serial Ports Forwarding		9.91 0 % 100		<b>4.28</b> % 100		
OpenVPN		Resource usage				
PROTOCOL CONVERSION Info Clients Servers Synthesizers		Storage usage 0.56 0 % 100		RAM usage		
SERVICE Data logging		Device traffic				
Data logging		Device name	Activity	RX Bytes	TX Bytes	
USER						_
Manage Users Access Control		ethu	_	14222973	3318061	
My Settings		Actual internal temperat	ture, in [°C	] 43.5		•

Figure 14: Device > System > Monitoring

The system information page is updated automatically approximately every 3 seconds.

#### 6.2.1.4 Firmware update



#### Note

Check firmware update compatibility

Make sure that the update package is compatible with the device and the installed firmware. If you are not sure about the compatibility, contact Landis+Gyr before update.

The current firmware versions of the communication module are displayed on the identifiers page (**Device** > **System** > **Identifiers**).

The firmware can be updated using one of two update packages:

Regular update package	Consists of all the files of the new version.	Used when the update is done over higher bandwidth channel. Faster installation process.
Delta update package	Consists of only the files that have changed from the previous version.	Used when the update is done over lower bandwidth channels.

Independent of uploading a regular package or a delta package it is possible to upload either the full file (**Network type** > "High speed and reliable") or smaller chunks (**Network type** > "Typical speed" or "Low speed"). A chunked upload has the advantage that it is resumable if the upload gets interrupted. Already uploaded chunks are persistently stored in the device.

- To update the firmware of the respective communication module, go to Device > System > Firmware Update. In the Firmware upload section, two options are offered:
  - Drag and drop the firmware package into the grey box or
  - Click Choose file to open the File Select window.
- 2. Select the appropriate speed from **Network type** drop-down list.
  - a) **High speed and reliable**, with this option the full file is uploaded. The upload is not resumable, if interrupted. Recommended option when the upload is done over higher bandwidth channel.
  - b) **Typical speed**(default), with this option the file is uploaded in small chunks. The upload is resumable, if interrupted. Recommended option if there is no reason to use the high or low speed options.
  - c) **Low speed or unreliable**, with this option the file is uploaded in small chunks. The upload is resumable, if interrupted. Recommended option when the upload is done over lower bandwidth channel and/or weak reception quality.
- 3. Click **Upload**. After a successful firmware package upload, the package is validated (integrity, authenticity, compatibility), unpacked and installed. Depending on the size of the update, this might take up to 15 minutes. The version and progress of the update are displayed.
- 4. To activate the new firmware, click **Activate**, or alternatively, configure an activation scheduler.

The communication module will only execute the update after the successful validation of the firmware. The communication module restarts automatically to activate the new firmware. After activation, the new firmware version will be indicated under the **Info** and **Identifiers** sections of the Web UI.



Figure 15: Device > System > Firmware Update

#### 6.2.1.5 HTTP TLS key and certificate in use

In the HTTP TLS key and certificate section (**Device** > **System** > **TLS Certificates**), you can upload a new certificate and private key for TLS. After the new certificate or private key has been applied, reload the Web UI as the new certificates are used immediately.

Landis+Gyr		Enter configuration m	node	O	show	description Engli	sh 🗸	
User: admin	Info Identifiers							
Logout	Monitoring Firmware Update	HTTP TLS key an	d certificate in us	e				
DEVICE System	Event Log Diagnostics	Certificate chain						
Time Utility	Config Export Config Import Features	Subject	Issuer	Valid From	Valid To	Subject Key ID	Subject Alternative Name	
COMMUNICATION		O = Landis Gyr, CN =	C = GR, O = "Landis +	Jan 1	Dec 3:	03:6E:64:B0:27:2F:C	DNS:LGZ-Default-F	
Network		C = GR, O = "Landis +	C = CH, O = "Landis +	Jan 1	Dec 3:	F6:89:10:E4:39:88:1	URI:http://www.la	
Forwarding OpenVPN								-
PROTOCOL CONVERSION		HTTP TLS key an	d certificate (plea	se reloa	ad the p	age after applyin	g new	
Info		contineatos)						
Clients		Certificate chain						
Synthesizers		Choose File No file	chosen					
SERVICE		Private key						
Data logging		Choose File No file	chosen					

Figure 16: Device > System > TLS Certificates

#### Note

#### Restricted use of fallback certificate on the Web UI



In very rare cases (in which the configured certificate is not valid), a fallback certificate will be used on the Web UI. Such cases can be detected by a warning in the browser about an unsecure connection. Landis+Gyr cannot guarantee the security of the connection in such cases and therefore a new certificate should be installed immediately.

#### 6.2.1.6 Event log

In the event log section (**Device** > **System** > **Event log**), you can view or download logs of events. The logs show timestamps, event IDs, clock status at the time of the event, severity of the event and event description among other information. Events can also be filtered from the logs. The following log files are available for viewing or download:

- Event Log System
- Event Log User Authentication
- Even Log Access Rights and User Management
- Event Log Communication
- Event Log Firmware Update and Licenses
- Event Log Security
- Event Log Critical Error
- All Events Log
- Diagnostics Log
- All Events and Diagnostics Log

Landis+Gyr		Enter configuration mode Show description English V
Logout	Into Identifiers Monitoring Firmware Update TLS Certificates	Download status
System	Event Log Diagnostics	
Time Utility	Config Export Config Import Features	Event log
COMMUNICATION		Log type Event Log System (Sy)
Network Serial Ports		Output format Brief 10 entries per page
Forwarding OpenVPN		Filter No filter
PROTOCOL CONVERSION		submit
Info		

Figure 17: Device > System > Event log

#### 6.2.1.7 Diagnostics download

In the diagnostics section (**Device** > **System** > **Diagnostics**), you can download support dumps for correspondence with L+G customer support.

Device reboot can be activated by clicking **reboot**. Triggering a reboot is normally not necessary.

Landis+Gyr		Enter configuration mode	show description English V
User: admin	Info -		A
Logout	Monitoring Firmware Update TLS Certificates	Download status	
System	Diagnostics		
Time Utility	Config Export Config Import	Cancel all downloads	
COMMUNICATION	Features		
Network Serial Ports Forwarding			cancel
OpenVPN		Diagnostics download	
PROTOCOL CONVERSION			
Info		Support dump (S)	
Clients		Support during (Sy	· ·
Synthesizers			submit
SERVICE			
Data logging		Trigger a device reboot	
USER			
Manage Users Access Control My Settings			reboot

Figure 18: Device > System > Diagnostics

### 6.2.1.8 Feature license

In section **Device** > **System** > **Features**, feature licenses can be activated for additional functionality on the device. A file can be uploaded for feature licenses by entering configuration mode and clicking **Choose file** and selecting a file. Apply the configuration after installing new licenses and before making any further changes.

Landis+Gyr		Enter configuration mode Show description English V	
User: admin	Info		*
Logout	Monitoring Firmware Update TLS Certificates	Feature license	
System	Event Log	Features	
Time Utility	Config Export Config Import	Built-in	
COMMUNICATION	Features		
Network Serial Ports		LICENSES data_logging, scada1, synthesizers	
Forwarding		Total	
OpenVPN		data_logging, scada1, synthesizers	
PROTOCOL CONVERSION		Licenses	
Clients		LICENSELandis+Gyrproduct:E65CXEserial:44113613feature:scada1 b8055d730f5aeafc37b4c3ed2bbc14f87e70df16af8026d446a1c13b45256e91	
Servers Synthesizers			
Synthesizers			
SERVICE Data logging		Feature license	
Data logging		License	
USER		Choose File No file chosen	
Manage Users Access Control			
My Settings			
			Ŧ

Figure 19: Device > System > Features

#### 6.2.2 Time

#### 6.2.2.1 Time status and diagnostic

Go to **Device** > **Time** > **Status** to view the current system time and date in local time. Clock status (valid/invalid) and the last time synchronisation are also shown. The status page is updated automatically approximately every 3 seconds.

Figure 20: Device > Time > Status

Landis+Gyr		Enter configuration mo	ode	show description English -	
User: admin	Status 🧹				
Logout	Diagnostic Configuration Command	Time status			
DEVICE					
System		System time			
Time		Time 2021-12-07716-/	0-22+00-00		
Utility		Time 2021-12-07/10.4	9.33+00.00		
COMMUNICATION		Clock valid			_
Network Serial Ports Forwarding		Last time synchror	nization		
OpenVPN		Synch source type	Source	Last time synchronization	
PROTOCOL CONVERSION		Base meter		2021-12-07T16:45:01+0000	
Info					_

Additional diagnostic information is available under **Device > Time > Diagnostic**.

#### 6.2.2.2 Time synchronisation setup

Time synchronisation can be found under **Device** > **Time** > **Configuration**. You can configure clock synchronisation based on the base meter clock or NTP. With NTP, the device synchronizes its time on a periodical interval to a NTP server or servers. Up to 6 NTP servers or pools can be configured, using either an IP address or a hostname. The number of server addresses per pool is limited to 4. NTP offers improved reliability and accuracy by using multiple servers in time synchronisation.

Landis+Gyr		Cancel configuration mode Show description English V
User: admin	Status	
Logout	Configuration Command	Time synchronization setup
DEVICE		Time synchronization source Base meter V
System		
Time		
Utility		
COMMUNICATION		Time zone UTC 🗸
Network		
Serial Ports		Clock supervision limit configuration
Forwarding		
Openven		Clock synchronization alert limit, in [s] 600000
PROTOCOL CONVERSION		Clock invalid limit, in [s] 750000
Info		
Clients		
Servers		save
Synthesizers		

Figure 21: Device > Time > Configuration

Note Always configure the correct time zone to show local time.

#### 6.2.2.3 Force a time synchronisation

Under **Device** > **Time** > **Command** you can force the device to synchronise its time with the configured synchronisation source. Click force a time sync to execute the synchronisation.

Landis+Gyr		Enter configuration mode	show description English -
User: admin	Status Diagnostic		*
Logout	Configuration	Force a time synchronization	
	Command	Force a time synchronization	
DEVICE			
System			force a time sync
Time			Torce a time sync
Utility			

Figure 22: Device > Time > Command

#### Note

In case of large time offsets while forcing a time synchronisation, resulting in large time jumps, certain operations on communication protocols (such as HTTP, Modbus, IEC 60870-5-104) may time out and must be executed again.

#### 6.2.3 Utility

#### 6.2.3.1 Utility owned identifiers

Additional system identification information can be added in section **Device > Utility > Config Idents** and the information is shown in section **Device > Utility > Identifiers**. This information can include the installation location, the customer property numbers of the module and the server name.

Utility serial numbers and identifiers are free-purpose identification numbers. They are owned and handled by the utility, and the utility decides how to use and compile the numbers.

Landis+Gyr		Cancel configuration mode Show description English V
User: admin	Identifiers	
	Admin	
Logout	Config Idents Config Admin	Utility owned identifiers
DEVICE		Customer property number 1
System		
Time		Customer property number 2
Utility		
COMMUNICATION		Customer property number 2
Network		Customer property number 5
Serial Ports		
Forwarding		Customer property number 4
OpenVPN		
PROTOCOL CONVERSION		Server name
Info		
Clients		
Servers		Installation identifier
Synthesizers		
SERVICE		
Data logging		save
2 and 1086 mg		

Figure 23: Device > Utility > Identifiers

# 6.3 Communication

#### 6.3.1 Network

### 6.3.1.1 Ethernet ports

Landis+Gyr		Enter configuration mo	de	show description English V
User: admin	Status Ethernet			,
Logout	Nameservers Routing	Network status		
DEVICE System Time Utility		Default gateway 10.41.4.1 dev eth0		
		Name resolution		
		Kind	Destination	
Network		domain	eu.bm.net	
Serial Ports		search	eu.bm.net	
Forwarding		nameserver	8.8.8.8	
OpenVPN		nameserver	8.8.4.4	
PROTOCOL CONVERSION		nameserver	10.41.1.181	
		ignored nameserver	10.41.1.182	
Info		ignored nameserver	10.49.128.28	
Clients				
Synthesizers		Interface status eth	10	
SERVICE		MAC		
Data logging		00:0f:93:7a:97:3d		
USER				
Manage Users Access Control		IPv4		
My Settings		Address 10.41.4.63/24		

Figure 24: Communication > Network > Status

Landis+Gyr		Cancel configuration mode show description English V
User: admin	Status	
	Ethernet	
Logout	Nameservers Routing	Ethernet configuration Interface eth0 and management on eth1 V
DEVICE		
System		Interface eth0 IPv4 Mode 🗸
Time		
Utility		
COMMUNICATION		IPv4 Configuration DHCP 🗸
Network		
Serial Ports		
Forwarding		
OpenVPN		
PROTOCOL CONVERSION		save
Info		

Figure 25: Communication > Network > Ethernet

Configuration of the Ethernet ports is available under **Communication** > **Network**. The upper part of the status screen (**Communication** > **Network** > **Status**) indicates the current address information including MAC, IP address and Gateway. Settings can be changed on the Ethernet page (**Communication** > **Network** > **Ethernet**).

Ethernet interfaces are named ETH0 and ETH1. Port ETH0 can be disabled if required. ETH1 is always enabled and commonly used with fixed IPv4 settings as local management access. However, if needed, ETH1 is also freely configurable.

Basic functionality can be selected from the following configuration options:

- Interface ETH0 and management on eth1
  - eth0 is freely configurable
    - mode: IPv4
    - IPv4 config: static/ DHCP
    - default gateway
  - ETH1 is mapped as management interface with IPv4 172.16.0.1 and as DHCP server.
- Management ETH1
  - ETHO is disabled
  - ETH1 is mapped as management interface with IPv4 172.16.0.1 and as DHCP server.
- Bridge between ETH0 and ETH1
  - bridge BRO is freely configurable
    - mode: IPv4
    - IPv4 config: static/ DHCP
    - default gateway
    - optionally: recovery IP (IPv4 172.16.0.1) on BR0 without DHCP server

#### • Interface ETH0 and ETH1

- ETH0 is freely configurable
  - mode: IPv4
  - IPv4 config: static/ DHCP
  - default gateway
- ETH1 is freely configurable
  - mode: IPv4
  - IPv4 config: static/ DHCP
  - optionally: recovery IP (IPv4 172.16.0.1) on BR0 without DHCP server

The IP address can be configured either manually by the user or automatically using the dynamic address assignment functionalities. For the main port, the manually inserted IP address cannot refer to the same subnet as the one used for the management port.

#### 6.3.1.2 Bridging

An ethernet bridge represents the software analogue to a physical ethernet switch while sharing a single IP subnet.

Bridging of the two ethernet interfaces ETHO and ETH1 allows you to connect several communication modules transparently, without using an external switch. Therefore, it is a cost competitive option for meter room applications or other use-cases where the ethernet interfaces are kind of daisy chained. Bridging has been tested with up to 20 communication modules.

The network is a linear topology and a loop must be avoided since there is no spanning tree protocol support implemented in the bridges.

#### 6.3.1.3 Nameservers

The **Communication** > **Network** > **Nameservers** section allows you to configure the name(s) of the DNS server(s). The addresses of up to 3 DNS servers can be configured.

Landis+Gyr		Cancel configuration mode Show description English V	
User: admin	Status		
	Ethernet		
Logout	Nameservers	Nemecenters configuration	
	Routing	Nameservers conliguration	
DEVICE		Name server 1	
System		8.8.8	
Time			
Utility		Name server 2	
		8.8.4.4	
COMMUNICATION			
Network		Name server 3	
Serial Ports			
Forwarding			
OpenVPN		save	
PROTOCOL CONVERSION			

Figure 26: Communication > Network > Nameservers



If the IP address is obtained automatically via DHCP, the servers configured above will be used as secondary nameservers, otherwise as primary.

#### 6.3.2 Serial ports

The CU-XE communication module features several serial ports. For the usage of the serial and internal ports, go to **Communication** > **Serial ports**.

#### 6.3.2.1 RS-485/RS-422

The RS485/RS422 interface can be used for virtual bus (forwarding). The port can be configured according to the peer. The CM supports a maximum transmission speed of 115.2 kbps. To configure the termination resistor, refer to <u>RS-485/RS-422 interface</u> on page 8. To switch between RS485 and RS422, DIP switch settings have to be applied according to tables shown in section <u>RS-485/RS-422 interface</u> on page 8.

Landis+Gyr	Cancel configuration mode	show description	English 🗸	
User: admin				_
	Combined RS485/422 port			*
Logout	Enable RS485/RS422 port			
DEVICE				
System	RS485			
Time	Baud rate			
Othity	115200 Bd		~	
COMMUNICATION	Data bits			
Network	8		~	
Serial Ports				
OpenVDN	Parity			
Орентиры	None		~	
PROTOCOL CONVERSION	Stop bits			
Info	1		~	
Clients				
Servers				
Synthesizers			save	
SERVICE				- 1

Figure 27: Communication > Serial Ports

#### 6.3.2.2 RS-232

The RS232 interface can be used for virtual bus (forwarding). The port can be configured according to the peer. The CM supports a maximum transmission speed of 115.2 kbps.

Landis+Gyr	Cancel configuration mode	show description	English 🗸	
User: admin			save	
Logout				
DEVICE	RS232 port			
System Time Utility	Enable RS232 port			
COMMUNICATION	Port settings			
Network	Baud rate			
Serial Ports	115200 Bd		*	
Forwarding OpenVPN	Data bits			
	8		~	
Info	Parity			
Clients	None		*	
Servers				
Synthesizers	Stop bits			
SERVICE	1		*	
Data logging	Flow control			
	RTS/CTS		*	
USER				
Manage Users			save	
Access Control My Settings				Į

Figure 28: Communication > Serial Ports

#### 6.3.3 Forwarding

Under **Communication** > **Forwarding**, you can view the use of the serial ports and configure forwarding rules between interfaces.

User: admin	Cuncerconn	guration	moue						
Logout	Serial por	t status							
DEVICE	Usage of	serial a	and internal por	S					
System	Serial int	erface	Used as	Used by compon	ent				
Utility	Base mete	er channe	Internal port to be	Forwarding					
	Base mete	er channe	Internal port to be	Forwarding					
COMMUNICATION	Combined	d RS485/	RS485 port	Forwarding					
Network Serial Ports	RS232		RS232 port	Forwarding					
OpenVPN			4:						
Forwarding OpenVPN TOCOL CONVERSION Info Clients Servers Synthesizers	Forwardin	ng config	guration						
Forwarding OpenVPN TOCOL CONVERSION Info Clients Servers Synthesizers	Forwardin Channels Name	ng config S: Endpoi	guration	Endpoir	nt 2		Endpoint 3		
Forwarding OpenVPN TOCOL CONVERSION Info Clients Servers Synthesizers SERVICE Data logging USER	Forwardin Channels Name test	ig config Endpoi Serial Comb	guration int 1 interface interface interface	Endpoir Serial i Base n	nt 2 nterface nterface neter channel 1	<b>v</b>	Endpoint 3 Usten on all TCP interfaces TCP listening port 4059	~	*

#### Figure 29: Communication > Forwarding

To be able to establish a direct connection between devices on different interfaces (serial and/or TCP/IP), the communication module provides a forwarding functionality. Application level data received on one interface is forwarded to one or more other interfaces (and vice versa). Using this approach, the device is capable of handling every data transmission on the configured interfaces independent of any protocol language. In this sense, the forwarding component acts as a fully transparent media converter.

The communication module contains several different ports that can be used for forwarding:

- TCP ports
- Serial ports (combined RS485/RS422 or RS232)
- Internal channels to the base meter (base meter channel 1 or 2)

Up to maximum 10 channels can be defined in the forwarding configuration.

Using the buttons below the channels table you can add new channels or delete the last channel or all channels.

With the arrow buttons in the last column of the channels table you can move the table entries up and down for sorting purposes.

To delete a specific channel from the channels table click on the "x" button in the last column of the channels table.

Ethernet bridging is meant to be used for forwarding using Ethernet ports (forwarding from Ethernet to Ethernet is not possible).

The forwarding feature can be used in a number of different ways. See the example below.



#### Note

Forwarding is not protocol-aware, i.e. every use case that does not require actions on the communication module itself is supposed to be supported. Every protocol requiring actions (such as transmission speed switch at HDLC Mode E) is not supported.

Forwarding works like a bus with several attached ports. The number of ports attached to a bus is only limited by the number of available ports. Traffic received from one of the connected ports is forwarded to every other port. This also implies that the slowest port defines the bus speed, which may have an impact on the timing behaviour.



#### Note

It is possible to have up to 4 virtual busses configured to work in parallel. If forwarding is being used to read out the base meter, DLMS and IEC 62056-21 protocols are supported by the meter.

#### 6.3.4 OpenVPN

OpenVPN is an open source software that implements virtual private network (VPN) techniques to create a secure encrypted point-to-point TSL connection. More information on OpenVPN is available at: <u>https://openvpn.net/</u>. In the **Communication** > **OpenVPN** > **Status** section of the Web UI you can see the overview of the currently enabled OpenVPN connections and the status of the current OpenVPN sessions.

Landis+Gyr		Enter configuration mode	show description English V
User: admin	Status 🧹		
Logout	Configuration	Connections	
DEVICE			
System		Connection status	
Time			
Othrey			
COMMUNICATION			
Network			
Serial Ports			
OpenVPN			

Figure 30: Communication > OpenVPN > Status

For the OpenVPN credentials, configuration and channels, go to **Communication > OpenVPN > Configuration**.

Following parameters can be configured:

- Network type: Currently only TUN is supported
- **Protocol:** OpenVPN can utilize TCP or UDP. Use UDP for better performance.
- OpenVPN server: The hostname or IP address of the OpenVPN server.
- **Port:** Port of the OpenVPN server.
- Local address of the TUN/TAP device: IP address of the local device. Can be left empty if the OpenVPN server configures the client.
- **Remote address or netmask:** For TUN devices in point-to-point mode, this is the IP address of the remote VPN endpoint. The proper usage of ifconfig is to use two private IP addresses which are not a member of any used, existing subnet. The IP addresses may be consecutive and should have their order reversed on the remote peer. Can be left empty if the OpenVPN server configures the client.
- Encryption algorithm: With Static key authentication only use AES CBC.
- **Authentication method:** Can be set to existing credentials, certificates, username/ password with certificates, and static key.
- **Ping:** Configure to enable ping and set the interval for sent pings. Purpose of these pings is to maintain the connection if no packets are sent.
- **Ping restart:** Configure the time after which OpenVPN connection is restarted if no data is received.
- **Compression:** Enable and choose a compression algorithm. LZO and LZ4 are different compression algorithms, with LZ4 generally offering the best performance with least CPU usage. For backwards compatibility with OpenVPN versions before v2.4, use "LZO".

Landis <b>+</b> Gyr		Cancel configuration mode Show description English V	
User: admin	Status		
	Configuration	OpenVPN channels × Last Connection	
Logout		1:	
DEVICE			
System		1:	
Time		Connection name	
Utility		connection name	
COMMUNICATION			
Network		Enable	
Serial Ports		Network type	
Forwarding		IP Tunnel (TUN)	
OpenVPN			
PROTOCOL CONVERSION		Protocol	
Info		UDP V	
Clients		OpenVPN Server	
Servers			
Synthesizers		Value required.	
SERVICE		Port	L
Data logging		1194	
USER			
Manage Lisers		Adapter parameters (ifconfig)	
Access Control		/ tadptor parametere (normg)	
My Settings		Local address of the TUN/TAP device	
		Remote Address or Netmask	
		Encryption algorithm	
		AES-256-CBC	
		Authentication algorithm	
		SHA256	
		Authentication method Save X	•

Figure 31: Communication > OpenVPN > Configuration

#### 6.4 Protocol conversion

One of the core features of the firmware is the ability to convert between communication protocols. Protocol conversion process includes several components, including clients, servers and the datahub. The datahub acts as a mediator between data producing and consuming components. The data that travels through the datahub is modelled streams of atoms called data points. Each data point contains a value, a timestamp, some quality information, and a unique data-point identification number.

For protocol conversion the client mapping with server must be configured. The data read by the DLMS/COSEM and/or the Modbus clients can be mapped to either or both of the Modbus and IEC 60870-5-104 servers.

The proper configuration can be verified using any Modbus Master and SCADA 104 test tool.

#### 6.4.1 Checking the protocol conversion status of all clients and servers

The status of protocol components, the clients and servers, can be checked on the **Protocol Conversion** > **Info** > **Status** page. Green colour indicates the client/server is properly configured and running.

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Figure 32: Protocol Conversion > Info > Status

Additional information is displayed on the Protocol conversion diagnostics and monitoring information screen:

Landis <mark>+</mark> Gyr		Enter configuration mode show description English V
User: admin	Status	Destand security discounting and excellence information
Logout	Diagnostics	Protocol conversion diagnostics and monitoring information
DEVICE		DLMS/COSEM Client
System		Status
Time		[4] Component disabled by configuration
Other		•
COMMUNICATION		
Network Serial Ports		Modbus Client
Forwarding		Ctatue
OpenVPN		141 Component disabled by configuration
PROTOCOL CONVERSION		Li component organica ol comBoranon
Info		- U
Clients		
Servers Synthesizers		Modbus Server
SERVICE		Status
Deta logging		[4] Component disabled by configuration
Data logging		
USER		<b>V</b>
Manage Users		
Access Control		IEC 60870-5-104 Server
iviy Settiligs		Status
		[4] Component disabled by configuration
		•

Figure 33: Protocol Conversion > Info > Diagnostics

#### 6.4.2 DLMS/COSEM client configuration

The CU-XE communication module features a DLMS/COSEM client. It can connect to and read various types of data from devices that utilize the DLMS/COSEM protocol. The data is read using a polling mechanism. The DLMS/COSEM client can communicate with multiple devices via the serial port.

DLMS/COSEM client configuration requires a base meter channel that is available for use and does not have forwarding rules in place.

If the needed base meter channel is used in a forwarding rule, the forwarding rule must be removed before DLMS/COSEM configuration (see section Forwarding on page 35).

The usage of serial and internal ports is displayed in the serial port status area.

The DLMS/COSEM client must be enabled in the checkbox for the client to work. In the same section time synchronization interval and offset (deviation that triggers a synchronization) can be configured as well as the delay until reconnecting to a device if a communication failure occurs. Slow, fast, and normal polling group intervals are also configurable. Slow polling is used for data that is static, such as serial number or firmware version. Fast polling is used for limited number of high-priority values, and normal polling for all the remaining values.

Landis+Gyr		Cancel configurat	tion mode	(	show description	English 🗸
User: admin	DLMS/COSEM					
	Modbus					
Logout		Serial port stat	tus			
DEVICE						
System		Usage of seria	al and inter	nal ports		
Time Utility		Serial interface	Used as	Used by compo	nent	
COMMUNICATION		Base meter chi	Internal por	Forwarding		
Network		Base meter chi	Internal por	Forwarding		
Serial Ports		Combined RS4	RS485 port	Forwarding		
Forwarding		RS232	RS232 port	Forwarding		
OpenVPN						
PROTOCOL CONVERSION						
Info		DLMS/COSEM-C	lient Version	1 🗸		
Clients		Enabled				
Servers						
Synthesizers		Time symphra	ninction			
SERVICE		Time synchro	nization			
Data la salar		Enabled	Inte	erval	Time offset	Use local time
Data logging			21	600	2	
USER						
Manage Users		Intervals				
Access Control						
My Settings		Slow polling gro	oup No	rmal polling	Fast polling group	Activation
		Re400	gro	up interval		60
		00400	10		1	save

Figure 34: Protocol Clients > Clients > DLMS/COSEM

Then a meter can be configured in the Meter Configuration area as follows:

- 1. Enter the configuration mode.
- 2. Click on the **Device** button to display device definition.
- 3. Enter device label.
- 4. Choose serial interface.
- 5. Enter address information.
- 6. Click on the **row** button to display the first mapping.
- 7. Enter a name and a logical name (OBIS code) and select the type (e.g. Register).

- 8. Click on the **save** button. If the mapping definition is correct, the **Valid** checkbox is activated.
- 9. Define the next rows until the meter mapping is complete.

Note

Please note that there is no verification, whether the entered OBIS codes are configured accordingly in the base meter.

Landis+Gyr		Cancel configuration mo	de		show description	English 🗸	
User: admin	DLMS/COSEM		(-				
	Modbus	1: 1:	C Device X La	ast Device			
System Time Utility		Label Serial inte	rface	)			
COMMUNICATION		Time Sync	Mode Off				*
Network Serial Ports Forwarding OpenVPN		Address Client Add	dress 16				
PROTOCOL CONVERSION		Logical De	evice Address 1				
Info Clients		Physical A	ddress 0				
Servers Synthesizers		Password	*****	•••••			
SERVICE Data logging		Mapping	S:				
USER		Valid	Name	Туре	Logical name	Polling group	
Manage Users Access Control				RV	1-1:1.8.1.255	No 🗸	×
My Settings		C row × L	ast row				
						sa	ive

Figure 35: Protocol Conversion > Clients > DLMS/COSEM

#### 6.4.3 Modbus client configuration

The CU-XE communication module features a Modbus client. It can communicate with multiple devices using serial and TCP/IP connections. The Modbus client can read values from registers. Reading is done using a polling mechanism, on a configurable schedule.

For the Modbus client to work, it must enabled in the checkbox on **Protocol Conversion** > **Clients** > **Modbus** page.

On the same page polling optimization can be enabled. User can also configure the starting time for first poll and further polling intervals for slow, fast, and normal polls. Slow polling is used for data that is static, such as serial number or firmware version. Fast polling is used for limited number of high-priority values, and normal polling for all the remaining values.

Landis <mark>+</mark> Gyr		Cancel configurat	tion mode	show descr	iption English 🗸					
User: admin	DLMS/COSEM Modbus	Modbus Serial port status								
DEVICE		Usage of seri	al and inter	nal ports						
System Time		Serial interface	Used as	Used by component						
Utility		Base meter chi	Internal por	Forwarding						
COMMUNICATION		Base meter chi	Internal por	Forwarding						
Network		Combined RS4	RS485 port	Forwarding						
Serial Ports		RS232	RS232 port	Forwarding						
Forwarding OpenVPN										
PROTOCOL CONVERSION		Modbus Client	Version 1 🗸							
Info		Enable								
Servers Synthesizers		Global setting	IS							
SERVICE		Optimize pol	ling							
Data logging		Start								
Data logging		Start immediate	у		~					
USER										
Manage Users Access Control		Polling interv	als							
My Settings		Slow polling in 86400	iterval	Normal polling interval	Fast polling interval					

#### Figure 36: Protocol Conversion > Clients > Modbus

Then a device can be configured in the Device Configuration area as follows:

- 1. Enter the configuration mode.
- 2. Click on the **Device** button to display a device definition.
- 3. Enter device label.
- 4. Choose interface.
- 5. Enter the hostname, TCP port and unit identifier.
- 6. Click on the **row** button to display the first entry of the register list.
- 7. Enter an ID and an index and select the bank (coils, contact, input or holding), the type and the polling group (normal, fast or slow).
- 8. Click on the **save** button.
- 9. Define the next rows until the register list is complete.

andis <mark>+</mark> Gyr		Cancel conf	iguration mode			how description	English 🗸	
User: admin	DLMS/COSEM							
Logout DEVICE System Time Utility COMMUNICATION Network Serial Ports	Modbus	Device C	1: Label Interface 7CP Hostname Host1	Device × La	IST Device			
Forwarding			TCP Port			Unit identifier		
			502 Register list:			1		
Servers Synthesizers			ID	Bank	Index	Туре	Polling	
SERVICE			0	coils 🗸	0	bla 🗸	Normal V	×
Data logging			G row X Last row					
USER								
Manage Users Access Control My Settings							s	ave

Figure 37: Protocol Conversion > Clients > Modbus

#### 6.4.4 Modbus server configuration

The CU-XE communication module features a Modbus server. Modbus is a protocol based on request, reply. The client requests operations from the server. The server then replies. The Modbus server supports the server side of the RTU and TCP variants of the Modbus protocol over serial- and TCP/IP network links, respectively.

The Modbus server must enabled in the checkbox and configured for the server to work.

Landis+Gyr		Cancel configurat	tion mode	show description English V
User: admin	Modbus			*
Logout	IEC 60870-5-104	Serial port sta	tus	
DEVICE System		Usage of seri	al and interi	nal ports
Time Utility		Serial interface	Used as	Used by component
COMMUNICATION		Base meter chi	Internal por	Forwarding
Network		Base meter chi	Internal por	Forwarding
Serial Ports		Combined RS4	RS485 port	Forwarding
Forwarding		RS232	RS232 port	Forwarding
OpenVPN				
PROTOCOL CONVERSION				
Info		Modbus Server	Version 1 🗸	
Clients		Enabled		
Servers				
Synthesizers		Global setting	S	
SERVICE				
Data logging		Server port 70	:P port 🗸	
		TCP Port		
USER		1502		
Manage Users		Byte order		
Access Control My Settings		ABCD		save
inty settings				

Figure 38: Protocol Conversion > Servers > Modbus

Once the Modbus server is enabled, both the Modbus TCP port and the Modbus serial port (RTU mode) can be selected and configured. In the example above the TCP port with port 1502

is selected. Byte order can also be selected from one of the four endianness modes for 32-bit data types: ABCD, DCBA, CDAB or BACD.

Then the mapping to a client can be defined in the Mapping groups area as follows:

- 1. Make sure that you are in configuration mode.
- 2. Click on the **Group** button to display a group definition.
- 3. Enter a label.
- 4. Click on the **row** button to display the first mapping.
- 5. Select a data point, the bank (coils, contact, input or holding) and the format (bool, i16, i32 or float) and enter the address and the scaling.
- 6. Click on the **save** button.
- 7. Define the next rows until the mapping is complete.

Landis+Gyr		Cancel config	uration mode			show descript	tion English <b>\</b>	•
User: admin	Modbus	ABCD						~ ^
Logout	IEC 60870-5-104							
DEVICE		Mapping g	roups 2	Group 🗙 Las	t Group			
System Time Utility		Gr	Group 1 Label					
COMMUNICATION								
Network Serial Ports Forwarding			Mappings					
OpenVPN			Data point	Bank	Address	Format	Scaling	
PROTOCOL CONVERSION								×
Info Clients			~	coils 🗸	0	bool 🗸	1	•
Servers								×
Synthesizers			~	coils 🗸	0	bool 🗸	1	
SERVICE								
Data logging			🖸 row 🗙 Las	t row 🗙 All				
USER								
Manage Users Access Control My Settings								save X

#### Figure 39: Protocol Conversion > Servers > Modbus

Please note that once the activated DLMS/COSEM client is selected for mapping with any server, only the previously activated OBIS objects can be used for mapping any data point.

#### 6.4.5 IEC 60870-5-104 server configuration

The IEC 60870-5-104 standard describes the communication between server device and a client device on an IP network. The client monitors process data coming from the server and may instruct server to perform some action with a command. A server can elect to transmit data spontaneously or it can transmit data in response to an interrogation or read command. The IEC 60870-5-104 server spends most of its time waiting for changes in the data set it has been configured to use. Once a value changes it will store the new value and potentially (pending on evaluation of a value based deadband) do a spontaneous transmission of this new value.

The deadband mechanism looks at the value of a given data point and can be specified using either an absolute or relative change. For each data-point two values are stored: the most recent value, and the last value which caused a spontaneous transmission. Whenever the most recent value changes, the system compares the last value transmitted spontaneously with the

most recent value. If it finds that the deadband has been exceeded it triggers a spontaneous transmission.

Landis <mark>+</mark> Gyr	Cancel configuration mode Show description English -
User: admin Logout DEVICE System Time Utility COMMUNICATION Network Serial Ports Forwarding OpenVPN	Nodbus IEC 60870-5-104 Server Version 1 ▼ ■ Enable General Settings TCP Port 2404 Allowed Remote IP ••••• Common Address of ASDU
PROTOCOL CONVERSION Info Clients Servers Synthesizers	Number of cloned connections       1       Advanced Settings
Data logging USER Manage USers Access Control My Settings	Initial poll Synchronous Timeouts T0 T1 T2 T3 Max Acknowledge [s] [s] [s] [s] [s] K after 30 15 10 20 outstandivly APDUs APDUs 12 8

Figure 40: Protocol Conversion > Servers > IEC 60870-5-104

Then the server can be configured as follows:

- 1. Make sure that you are in configuration mode.
- 2. Enter necessary information in the TCP Port , Allowed Remote IP, Common Address of ASDU and Number of cloned connections fields.
- Select synchronous (connections accepted only after all mapped data points are polled) or asynchronous (connections accepted before all data points are polled) mode for the initial poll.
- 4. Configure the different timeouts if necessary:
  - T0: Interval at which offline session attempts reconnecting.
  - T1: Time waited for ACK to a transmitted APDU.
  - T2: Time before sending supervisory APDU ACK. Must be lower than T1.
  - T3: Idle time before sending TEST APDU.
  - Maximum unacknowledged transmitted APDUs.
  - Maximum unacknowledged received APDUs
- 5. Enable or disable time-tagged commands.
- 6. Configure maximum command age and maximum command derivation ahead of time.
- 7. Enable or disable direct command transmission. If enabled, direct executing is possible.
- 8. Enter time that a select will remain valid for.
- 9. Enable or disable sending of ACT TERM upon completion of commands.
- 10. Enable or disable timestamps for measured values.
- 11. Click on the **Group** button to display a group definition.
- 12. Enter a label.

- 14. Select a type, the data point 1 and 2 and the push mode (always, on change or deadband) and enter the IOA, the deadband and the scaling.
- 15. Click on the **save** button.
- 16. Define the next row until the mapping is complete.

Landis+Gyr		Cancel confi	guration mode				show descr	iption Engl	lish 🗸		
User: admin	Modbus	Process	information has	timestar	nps						
Logout		Mapping	groups 🗗 Gr	oup 🗙 L	ast Group	D					
DEVICE											
System Time Utility		Gr	Group 1								
COMMUNICATION											
Network			Manalana								
Forwarding			mappings								
OpenVPN			Туре	Data point	Data point	IOA	Push	Deadband	Scaling		
PROTOCOL CONVERSION				1	2		mode				
Info Clients			a_in 🗸	•	~	1	Av	0	1	×	11
Servers											
Synthesizers			a_in 🗸	~	~	1	A 🗸	0	1	×	
SERVICE										T	
Data logging			🖸 Mapping 🗙 L	.ast Mapp	oing 🗙 All						
USER											_
Manage Users Access Control									sav	ve X	
iviy Settings											•

Figure 41: Protocol Conversion > Servers > IEC 60870-5-104

#### 6.4.6 Synthesizers

The functionality of the firmware of Adventure based devices can be extended by uploading synthesizers. These synthesizers can fulfil special customer needs. The synthesizers take data from the datahub, perform processing, and inject the result back into the Datahub.

Out of security reasons every synthesizer must be written by Landis+Gyr. The synthesizer files are signed like firmware files. The signature is verified during upload of the synthesizers to the device.

Synthesizers can be uploaded and deleted on **Protocol Conversion** > **Synthesizers** > **Manage** page.

Landis+Gyr		Cancel configuration mode	show description English V	
User: admin	Manage			
Logout		Create a sysnthesizer		
DEVICE		Synthesizer ID		
System		synthesizer-1		J
Time		Sumthanizar engelification		
Utility		Synthesizer specification		
COMMUNICATION		Choose File No file chosen		
Network			save	
Serial Ports			Sure	
Forwarding				-
OpenVPN		Delete Overtheesinger		
PROTOCOL CONVERSION		Delete Synthesizer		
Info		Synthesizer ID		
Clients				)
Servers		Value must match the pattern ^[a-z0-9\-]{4,20	D}\$.	
Synthesizers				
SERVICE			save X	
Data logging				_

Figure 42: Protocol Conversion > Synthesizers > Manage

### 6.5 Service

#### 6.5.1 Data logging

The communication module features a data logger that logs values from various sources and process, including the base meter, externally connected devices, other components and internal processes (CPU usage, temperature etc.)

The communication module stores configurable number of data log entries, up to one million. If the number is exceeded, entries are removed until the number of entries is within the configured limit. Entries are removed in chronological order, starting from the oldest.

The data logger stores following information for every value:

- Timestamp
- Value and type
- Validity of the value
- Validity of the timestamp

Under **Service** > **Data logging** > **Query data** you can view or download data logs containing the logged events and data.

Landis+Gyr		Enter configuration mode show description English V
User: admin	Query data Configuration	A
		Download status
System		
Time Utility		Data looging data query
		Logger instance or view 1 V
Network Serial Ports		Output format 10 entries per page
Forwarding OpenVPN		Filter No filter V
PROTOCOL CONVERSION		submit
Info Clients		
Servers		
Synthesizers		
SERVICE		
Data logging		
		-

Figure 43: Service > Data logging > Query data

Data loggers can be configured under **Service** > **Data logging** > **Configuration**. You can create mappings and scalers. Scalers can be applied to mappings to scale and influence the measured values. Scalers can also be chained and used together. Following scalers are available:

- Round: Rounds the value to configured maximum number of digits.
- Add: Adds a configured value to the value of the scaling operation.
- **Multiply:** Multiplies the value with a configured factor.
- Polynomial: The value is used within a polynomial, which is defined in increasing order.
- Linear interpolation: The value is used as input for linear interpolation. This is based on a set of datapoints; interpolation is done between each pair of datapoints.

Landis+Gyr		Cancel confi	guration mode Show description English V
User: admin	Query data Configuration	Data Logg	ing A
Logout			
DEVICE		Loggers	E Logger X Last Logger
System Time Utility		0:	0: ×Logger
COMMUNICATION			ID 0 Value must be at least 1.
Network Serial Ports Forwarding			Label
OpenVPN			Enabled
PROTOCOL CONVERSION			Maximum number of entries 10000
Info Clients			Minimum sampling period (seconds) 900
Servers Synthesizers			Milliseconds time resolution
SERVICE			Failsate
Data logging			Scalare A Peolar
USER			
Manage Users Access Control			no none
My Settings			ID none C Operation

Figure 44: Service > Data logging > Query data

### 6.6 User configuration

The CU-XE provides data access protection via a Role-Based Access Control (RBAC) system. The access control is highly configurable. The RBAC as defined and described here only applies to the communication module and the RESTful/web interface. The base meter, for forwarding access, has its own RBAC configuration.

#### 6.6.1 Management of users

Users are managed in the **User** > **Manage Users** section. There are 9 configurable roles. Users are instantiated, and assigned to roles, granting them access rights. The maximum number of user profiles the device supports is 32.

A new user first needs to be added, assigned one or more role(s), and activated with credential (username/password) settings.



Figure 45: User > Manage users > Add user

Landis+Gyr		Cancel configuration mode Show description English V
User: admin	Status	
Logout	User Roles Add User Activate User	Activate a user profile
DEVICE	Reset User	Username
System	Delete User	Bruce_Wayne 🗸
Utility		Password
COMMUNICATION		Password reneated
Network		*******
Forwarding		
OpenVPN		save
PROTOCOL CONVERSION		

Figure 46: User > Manage users > Activate user

Table 1	L: Use	r managemen	t actions
---------	--------	-------------	-----------

Action	Description
Add user	Add a user profile, consisting of the username and the assignments to the roles. An added user profile is inactive until a password is assigned.

Action	Description
Activate user	After adding a user profile to the device, the user must be activated before permitting access to the device. User activation is done by assigning a password to the user profile.
Reset user	Reset the user password.
Delete user	Delete a user profile.
Change user to roles assignment	When a user profile is added, the user is assigned to roles. This can be changed at any point.
Change user password	A logged in user can change the password.

#### 6.6.2 Access and session management

The access rights of roles to resources (paths) are changeable for user roles. Go to **User** > **Access Control** > **Configuration**.

Landis+Gyr		Cancel configuratio	n mode	show description	Eng	lish 🗸	·				
User: admin	Status										
	Configuration										- î
Logout	Session Config Roles	Active roles									
DEVICE		Role ID	Role Name								
System		R1	consumer								
Time		R2	installer								
Utility		R3	maintenance								
		R4	operations								
COMMUNICATION		R5	device_admin								
Network		R6	security_admin								
Serial Ports		RA	access_admin								
Forwarding		RM	manufacturer								
OpenVPN											
											-
PROTOCOL CONVERSION											
Info		Access Control									
Clients		Path			R1	R2	<b>R3</b>	R/	R5	R6	
Servers		ruch					11.5		11.5		
Synthesizers		/command/configu	ration/export				✓		~		
SERVICE					0	-	-	-	-	0	
Data la asian		/command/diagnos	tics/download				~		~		
Data logging					-	_	_	_	_	-	
USER		/command/diagnos	tics/reboot			✓	✓		✓		
Manage Lisers										0	
Access Control		/command/downlo	ad/cancel				•				
My Settings											
,		/command/event-lo	og/read-entries					:	save		_
											*

Figure 47: Access Control > Configuration

Login supervision and user session timeout are also configurable, under User > Access control > Session config.

With login supervision, further login attempts with the same username from the same source IP address can be blocked for a specified time after a number of failed login attempts.

Landis+Gyr		Cancel configuration mode Show description English V
User: admin	Configuration Session Config	
Logout	Roles	Session management
DEVICE		User session inactivity timeout
System		
Utility		Timeout [s]
COMMUNICATION		600
Network		
Serial Ports		Login supervision
Forwarding		Maximum number of failed login attempts
openni		5
PROTOCOL CONVERSION		Login lockout time [s]
Info		600
Servers		Login attempts time window [s]
Synthesizers		120
SERVICE		
Data logging		save
USER		

Figure 48: User > Access control > Session config

#### 6.6.2.1 My settings / password

To change the current password, go to User > My settings > Password. Type the Old password and the New password in the respective fields.

#### Change password

The logged in user can change its password.

#### Old password

Value must be at least 8 characters long.

New password

New password repeated

Figure 49: User > My Settings > Password

save X

# 7 Service

# 7.1 Troubleshooting

When a fault has been detected in the system, check the following points regarding the interfaces. If you contact Landis+Gyr customer support, the support team may ask for a diagnostic export. See <u>Diagnostics download</u> on page 28 for more information on downloading it.

- Is the mains voltage present (meter LCD is working)?
- Has the maximum permissible ambient temperature been exceeded?
- Is there any visible damage to the installation?
- Check the status of the LEDs according to section <u>LED status descriptions</u> on page 14 If none of these steps resolves the problem, the communication module should be removed and sent to the designated service and repair centre.

## 7.2 Repairing the communication module

Communication modules can only be repaired by authorised service and repair centres or by the manufacturer.

#### Note



Meter data cannot be read without a communication module

The meter data cannot be read without a communication module because the communication module provides the functionality for reading.

If repairing the communication module is necessary, use the following procedure:

- 1. Describe the problem as accurately as possible and state the name and telephone number of the contact person in case of inquiries.
- 2. Pack the communication module carefully to ensure it will not suffer any further damage during transport. Use the original packing materials, if available. Do not enclose any loose components.
- 3. Send the communication module to the designated service and repair centre.

# 8 Maintenance

The CU-XE communication module requires no maintenance.

#### Caution



#### Never use running water for cleaning

Communication modules must not be cleaned under running water or with compressed air. Water ingress can cause short-circuits or damage components.

# 9 Decommissioning and disposal

Note



#### **Electronic waste treatment**

This product must not be disposed of in regular waste. Use a professional electronic waste treatment process.

The components used to manufacture the device can, in the main, be broken down into constituent parts and sent to an appropriate recycling or disposal facility. When the product is removed from use, the whole product must be sent to a professional electronic waste treatment process. The waste treatment and disposal plants must be approved by local regulatory authorities.

The end processing of the product and recycling of its components must always be carried out in accordance with the rules and regulations of the country where the end processing and recycling are done.

On request, Landis+Gyr will provide more information about the environmental impact of the product.

#### Note

#### Disposal and environmental protection regulations

The following are general guidelines and should NOT take priority over local disposal and environmental policies which should be adhered to without compromise.

Components	Disposal
Printed circuit boards	Delivered to recycling plants
Metal components	Sorted and delivered to metal recycling plants
Plastic components	Sorted and delivered to re-granulation if possible

# 10 Terms and abbreviations

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Term	Definition
10-BASE-TX	Ethernet standard for transmitting data at the nominal speed of 10 Mbit/s.
100-BASE-TX	Fast Ethernet standard for transmitting data at the nominal speed of 100 Mbit/s.
DHCP	Dynamic Host Configuration Protocol.
DLMS	Device Language Message Specification is a set of standards developed by the DLMS User Association.
IEC 62056-21	IEC 62056-21 is a standard for Electricity metering - Data exchange for meter reading, tariff and load control - Part 21: Direct local data exchange.
IEC 60870-5-104	IEC 60870-5-104 is a standard for telecontrol (SCADA) in electrical engineering and power system automation applications.
IPv4	Internet Protocol version 4. An internet protocol.
SCADA	Supervisory Control and Data Acquisition Control system architecture comprising computers, networked data communications and graphical user interfaces for high-level process supervisory management.
TLS	Transport Layer Security is a cryptographic protocol for secure Internet communications.
UI	User Interface

# 11 Third-party software used and open source (OS) software licenses

A document containing all information related to the licensing of open source software packages and third-party software for the E65C CU-XE communication module and its associated software components:

https://www.landisgyr.com/webfoo/wp-content/uploads/2012/12/LandisGyr-Third-Party-Open-Source-Licensing-for-E65C-and-E66C-Devices.pdf

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