

## Intelligent measuring systems Smart Meter Gateway CONEXA



# CONEXA Smart Meter Gateway for more intelligent networks and greater energy efficiency

As a municipal energy supplier or distributor, you are not only at the centre of the energy transition, but also face a fundamental change of the energy grid, due to the implementation of the statutory requirements (Act on Digitisation of the Energy Transition), and thus further demanding challenges of the restructuring of the energy market.

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The draft of the Act on Digitisation of the Energy Transition was highly appreciated, when it was first presented as a draft bill in September 2015. The preceding contents from the benchmark paper of the BMWi of February 2015 were largely adopted, partly extended, or cancelled, when the requirements for the industry were too high. Today, no one doubts anymore that the installation of intelligent measuring systems (iMsys) and modern measuring equipment will start in January 2017. The basic prerequisites for a successful installation and operation of iMsys have not been completely specified, implemented or even practiced today. In order to get an overview concerning the installation and operation of the devices and their connection to downstream systems, it is important to develop one's own position with regard to the future direction of the company in the field of metering point operation.

Currently, we are on the way of developing and certifying BSI-compliant Smart Meter Gateways. This is already the 3rd generation of approved devices. The gained experience from the first designs will be fully implemented in the current devices and system components. We would like to share our findings from numerous reference projects on the use and operation of iMsys with you. This enables you to make all necessary decisions for the future orientation of your metering point operation, assembly department, or device administration as quickly as possible.

Right from the start, we rely on standardised protocols, processes, and interoperable equipment technology, in order to make downstream applications as flexible and simple as possible. We place a great emphasis on a modern, future-oriented architecture of our devices. Already today, we try to take future applications into account, when designing the measuring systems.

Discover our Smart Meter Gateway CONEXA 3.0 for your application in the digitisation of the energy transition.

## A summary of the advantages of CONEXA Smart Meter Gateways



### Sustainable interoperability

Our Smart Meter Gateway CONEXA supports the OMS 4.0 and TR/FNN standards for modern measuring systems (meters). In the field of administration IT, we have worked with key enterprises on the market, for several years.



### Maximum data security

Maximum data security thanks to cryptographic ciphering methods in accordance with the Protection Profile specifications (PP for Smart Meter Gateways) of the German Federal Office for Information Security (BSI).



#### **Maximum investment protection**

Maximum investment protection by remote updates and individual adjustment of the software in the safety and functional area of the devices.



#### **One for all: Multi-client capability**

Minimum investment costs, even for large home or office complexes through multi-client capability. The various measuring systems for gas, water and heat are also supported.



#### **Easy to install**

Easy installation with plug-in connectors according to the specifications of the FNN, as well as optimisation of the devices for quick installation due to well positioned LEDs for function display, and draughts for good mounting of the FAKRA- antenna.





## The smart way of communication

### Interoperable, standardised, sustainable

Standards are the foundation for a successful and sustainable system landscape. Today, this foundation is still missing in most utilities, since it was not mandatory according to past requirements, i.e. structures must be adjusted or newly built; processes and workflows must be redefined, implemented and tested.

In order to optimally support this process, we now already offer the 3rd generation of Smart Meter Gateways. Our CONEXA 3.0 is fully standardised and interoperable with downstream systems. In our agile development process, we cooperate with leading suppliers of gateway administration systems. This creates a powerful and interoperable overall system, which is optimally suited for today's and future requirements of a modern energy market.

### Selection of our cooperation and system partners



**BOSCH**  
Technik fürs Leben



**co.met**  
[www.co-met.info](http://www.co-met.info)

**GÖRLITZ**



Standardisation enables various companies to contribute their individual strengths to the solution, and thus to enhance the overall system. The definition and implementation of market standards pays off in the long run. Not only the development speed increases, but also the number of the available solutions.

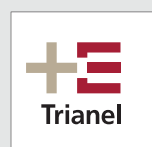
Theben customers expect that they will not have to deal with a completely new product philosophy every year. And they expect an innovative, sophisticated, and carefully developed device concept, which is oriented at customers' needs. This is what we stand for as a premium manufacturer.

You can find the current list of the supported GWA systems and modern measuring systems (meters) on our website: [www.smart-metering-theben.de/en/list](http://www.smart-metering-theben.de/en/list)

**Lackmann**  
Zähler + Systemtechnik

**NEXT  
LEVEL**  
Integration

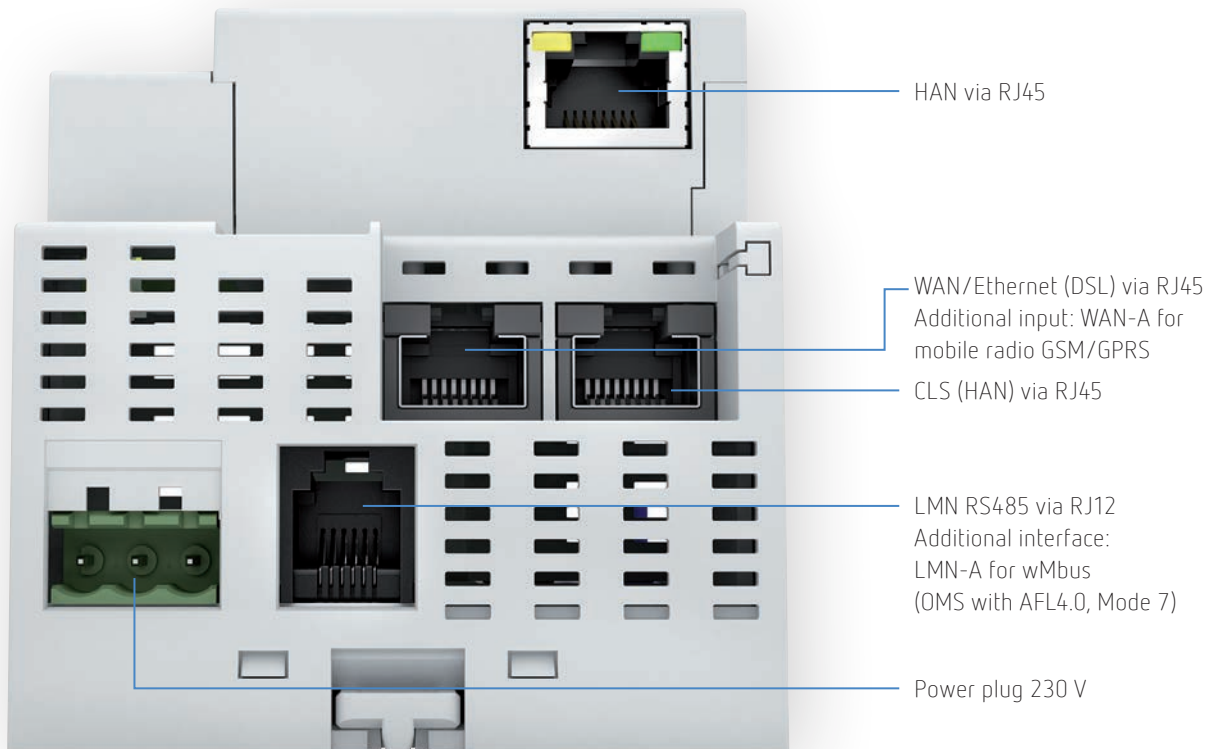
**robotron**  
datenbank-software



All cooperation and system partners, you can find on our website: [www.smart-metering-theben.de/en](http://www.smart-metering-theben.de/en)

# CONEXA 3.0

## Flexible, easy to install, safe



## The most important performance characteristics

- Developed in accordance with the requirements of the BSI (German Federal Office for Information Security) (PP, TR-03109), PTB-A 50.8 and FNN specifications
- Can be updated for certified functions for mains and energy distribution
- In the future also suited for CLS components (Controllable Local Systems) and Smart Grids
- Transfer from meter to CONEXA via wM-Bus (OMS with AFL4.0, Mode 7) and serial via RS485
- Transfer of data to the administrator via XML (COSEM/https-Webservices) standard via Ethernet, Powerline via Ethernet, mobile radio, MMTS, GPRS, or in the course of 2016, also for LTE
- Integrated standard interfaces for WAN, LMN, HAN, and CLS
- Multi-client capability for apartment buildings
- Multi utility for applications in the field of electricity, gas, water, heat



## With plug-in module or blind cover

- Beyond the basic functions required by TR and FNN, the CONEXA 3.0 offers further options for business models
- The objective of Theben is to easily link new functions for the efficient and user oriented application within the buildings



## Plug-in module HAN as per BSI (PP-TR)

- HAN module as connection to the local home network
- Interface for the end consumer for querying consumption values and, if applicable, feed-in values
- For the connection of controllable devices (CLS), e.g. intelligent household appliances



## Plug-in module KNX development study

- KNX module as a connection to the KNX building system technology
- Interoperable connection between different manufacturers in accordance with the European Standard (EN 50090)



# CONEXA 2.0 and 1.0

## Powerful, reliable, accurate



## The most important performance characteristics

- Support of standard protocols: SML, M-Bus (OMS), wM-Bus (OMS), VDEW 2.1, IEC 1107
- Integrated display screen for consumption data, tariff information and more
- Software applications for Smart Home, Smart Metering and Smart Grid possible
- Transfer of the measurement values from meter to CONEXA via wM-Bus, M-Bus, and serial via RS232/ RS485
- Transfer of data to the administrator by XML (SOAP) standard via Ethernet, UMTS, or GPRS
- Can be extended via standard interfaces (2 x USB, micro SD card, RJ45, RJ10)
- Software updates via remote access for future functions in mains and energy distribution, also for the adaptation of future interfaces and protocols
- Protection rating IP 51, protection class II





## CONEXA 2.0

### Flexible measuring system for meter connection

- Optional connection to load meters via RS485
- Easy installation via 3-point fixing in the meter cabinet or wall mounting
- Sealable housing: 198 x 184 x 92 mm
- Type-approval certificate PTB 50.7-A



## CONEXA 1.0

### Measuring system as extension for EasyMeter electricity meters

- Can be upgraded to EasyMeter electricity meter/basic meter thanks to power supply via jumper
- Simple plug-in installation without the need for extra space in the meter cabinet
- Sealable housing: 178 x 298 x 89 mm
- Type-approval certificate PTB 50.7-A

# Switch modules from Theben

## EEG-compliant, bidirectional, safe

The CSM 324 and CSM 124 switch modules are used to control external consumers, such as heat pumps, night storage heatings, as well as generation plants, such as photovoltaic and CHP plants, and storage facilities in the field of electric mobility. The switch modules are the basis for safe and interoperable systems in today's mains operation and for new business models in the area of future distribution grids.



### CSM 324 development study

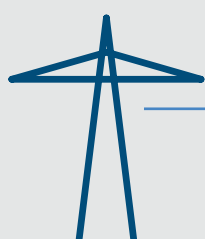
#### Switch module for CONEXA 3.0

In connection with the Smart Meter Gateway CONEXA 3.0, which was developed according to BSI, FNN und PTB-A 50.8, the CSM 324 switch module is used for 4-stage power reduction and in accordance with the legal requirements by the EEG. For example for controlling inverters in photovoltaic power plants.

- Switch module for power reduction in e.g. 4 stages  
0 %, 30 %, 60 %, 100 % in accordance with Section 6 EEG

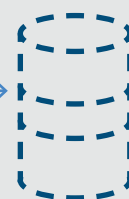
## EEG switching as per FNN

The existing network control technology shows a variety of different protocols, which have been used for controlling generation plants and large consumers, as well as energy storage systems. In order to enable the interoperability between the devices and the system, a uniform protocol (IEC 61850) has now been defined between network control technology and control unit.



Network control  
technology

Typical protocol  
power suppliers:  
IEC 60870-5-104,  
IEC 61850, (105), OPC  
(DCOM), OPC-XML-DA



Data centre  
Protocol converter

61850  
as per FNN



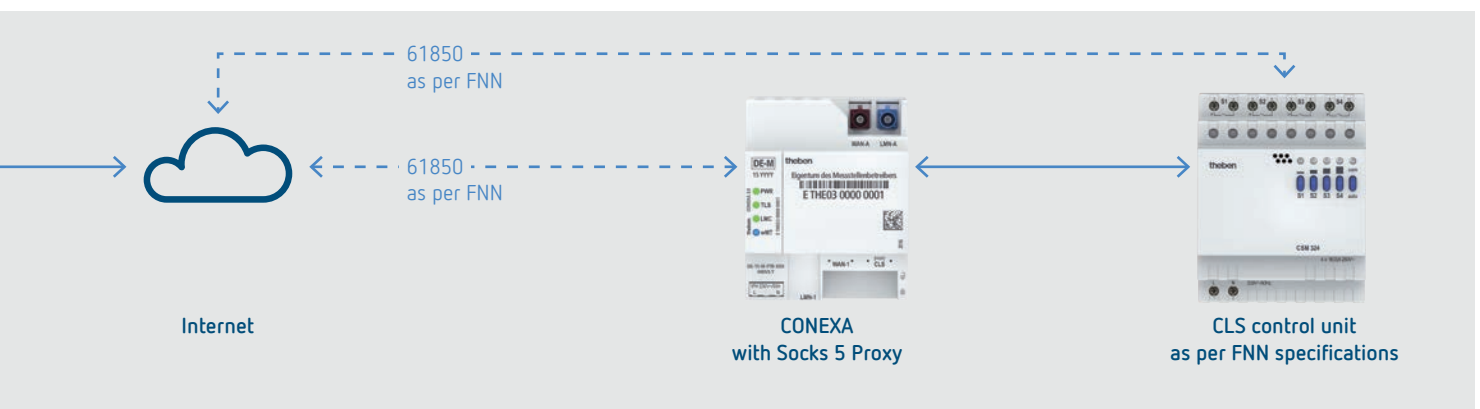
## CSM 124

### Switch module for CONEXA 2.0 and 1.0

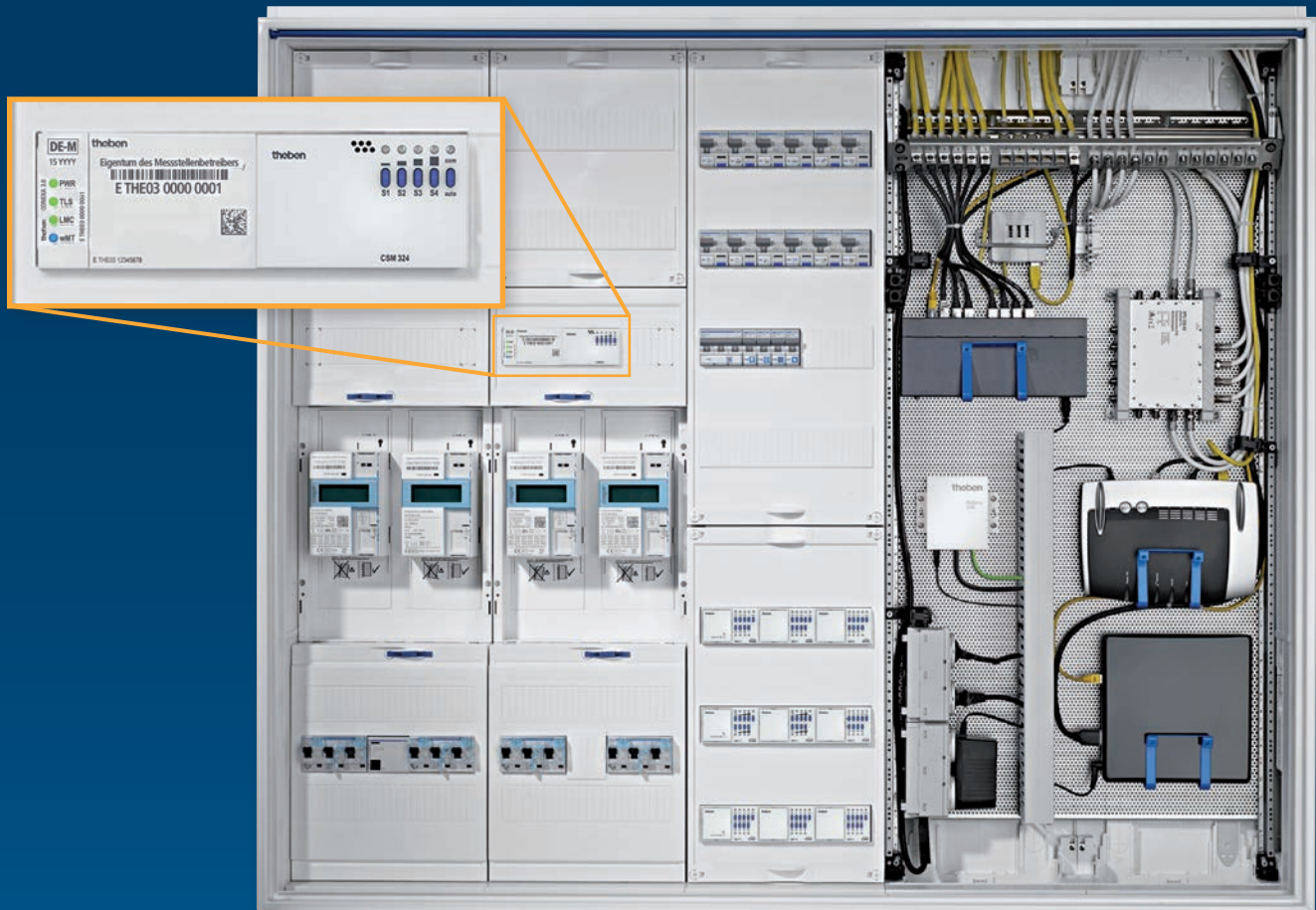
In connection with CONEXA 2.0 and 1.0, the CSM 124 switch module is used for 4-stage power reduction in accordance with the legal requirements by the EEG. For example for controlling inverters

in photovoltaic power plants.

- 4 floating outputs
- 4 relays 16 A
- Communication port to SMGW
- Housing width 4 TE
- For installation on a DIN-rail



# The technical centre of the future ENWG-compliant meter cabinets



Source: Hager

## Installation scenario 1 ENWG-compliant meter cabinet

The eHZ meter cabinet with pluggable measuring technology is the optimum centre for a modern and up-to-date system architecture. It is optimally suited for the installation of intelligent measuring systems (iMsys) and expansion units – e.g. the control box for lawful switching of EEG plants. Also for the integration of iMsys into the building system technology (KNX), the technical centre offers excellent and flexible opportunities for new construction and renovation.





Source: Lackmann



Source: Lackmann

## Installation scenario 2 3 point meter cabinet

Most likely, the installation of the 3 point version will be the most common installation scenario of iMSys in Germany. For this purpose, the basic meter as per FNN specifications is ideally suited.

With its DIN-rail, it offers flexible mounting options for the Smart Meter Gateway and further switch and control devices.

## Installation scenario 3 Mounting on bezel plate

The eHZ bezel plate offers flexible mounting options for the Smart Meter Gateway and further switch and control devices without additional space requirement inside the meter cabinet. The mounting plate is a good base for the use of modern measuring systems, or the system landscapes connected to them.



## Reliable, open, accurate Smart Meter Gateway CONEXA in practice

### AllgäuStrom

The AllgäuStrom cooperation, a network of nine Allgäu energy suppliers, uses the Smart Meter Gateway CONEXA as a basis for the products „AllgäuStrom Clever & Smart“ (3 tariffs) and „AllgäuStrom mobil“ (2 tariffs). The visualisation is done via the AllgäuStrom Smart Meter portal.

- Start in June 2012
- Communication via mobile radio
- Basic meter EasyMeter 3QD, no tariffs
- Today, standardised installation of the measuring systems

### Bahnstadt Heidelberg

In 2012, CONEXA was selected by the municipal utilities in Heidelberg and the municipal utility network Trianel as the Smart Meter Gateway for the district of Bahnstadt in Heidelberg. There, CONEXA is used in residential and business premises to the passive house standard by around 12,000 people.

- Implementation under the leadership of Trianel
- Installed so far, approx. 1,600 meters and 200 gateways
- Powerline communication inside the buildings
- Multi client operation
- Gateway for BackFlash meter ratio 10:1
- Today, standardised installation of the measuring systems

### BOSCH eon-edis

In Eisenhüttenstadt, two modernised high-rises were equipped with 50 electricity meters and CONEXA 2.0. The consumption data are transmitted to the downstream systems as an MSCONS message, every month. Operation via the SaaS-Bosch data centre.

- RLM meter via RS485 USB
- Up to 8 clients/gateway
- TC connection for DSL or antenna for M2M mobile radio
- Accounting relevant metering point operation since January 2014
- Today, standardised installation of the measuring systems

### Städtische Werke Kassel

Digital meters measure the energy flow in the energy storage house and make the measurement values available to the home management system for control and visualisation of the energy consumption, and to the grid operator for billing the feed-in remuneration and energy import.

- Start in September 2012
- Remote communication via Ethernet
- Basic meter EasyMeter 3QD
- Integration of Qunis Heat cost allocator with wMBus as per OMS in multi-family houses
- Accounting relevant operation since 2013

Detailed project descriptions and references, you can find on our website at: [www.smart-metering-theben.de/en](http://www.smart-metering-theben.de/en)





### smartOPTIMO

SmartOPTIMO tests the entire system chain as per BSI all around the Smart Meter Gateways. The system chain consists of the intelligent measuring system, which uses a telecommunications link to permanently communicate with the gateway administrator and the measuring system management (MsM), which controls it, receives the measurement data and forwards them via interfaces to the back end systems (ERP/EDM). Furthermore, also external market participants (ETM) should get secure access to the gateway.

- Combination of BSI basic meters from ISKRA and SMGW CONEXA 3.0
- Development partner: NLI (Next Level Integration)
- Test of interoperability of iMsys
- Administration via the platform of NLI
- Test of ordering and delivery processes

### Soluvia Metering

CONEXA 3.0 was selected by Soluvia Metering for a three-stage field test. In a first step, ten basic meters and gateways each were installed, to test the system operation. In the second stage from 2015, the entire ordering, certification, delivery, and start-up process is to be tested. The third stage will start in spring 2016 and includes the expansion of the existing systems with meters for gas, water and heat, as well as the installation of EEG switching devices.

- Start in spring 2015
- 120 Smart Meter Gateways CONEXA 3.0
- Ordering, certification, delivery, and start-up process
- Test of iMsys via 3 laboratory and field stages

### Energy supply in Sömmerda

The Sömmerdaer Energieversorgung GmbH completely convert their grids in two stages into a Smart Grid with almost 100 iMsys. During the process, the load meters of the RLM customers will be gradually integrated into the smart system environment. Topics, such as grid quality monitoring, grid control, as well as integration of gas and district heating meters will also be part of the project in the coming year.

- Start beginning of 2014
- 19 transformer stations with about 250 Smart Meters and 30 Gateways
- Since June 2015 complete conversion of the system landscape
- Final expansion stage with 105 transformer stations

### Stadtwerke-Kooperation Trianel

Already today, the Stadtwerke-Kooperation Trianel controls wind farms and photovoltaic systems via their smart metering platform ([www.fernsteuerbar.de](http://www.fernsteuerbar.de)), which they developed themselves. For this purpose, Trianel Metering Service used the EEG switch module CSM124 and the Smart Meter Gateway CONEXA 2.0 from Theben as a standard for the remote control solution in the transregional metering point operation.

- Start in January 2014
- Standard use for all applications in the EEG area
- Further standardised expansion of the system

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990 0 636 0216 Subject to technical changes and improvements.

