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Dr.-Ing. M. Schuster

Products and developments

Home automation for the KNX bus

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Enertex® EibPC²

Logic machine and visualization for the KNX bus

- DIN rail, dimension: 4 SU
- bus powered
- low power consumption: typ. 1.8 – 3.2 W
- integrated bus coupler, free KNX IP tunnel for ETS
- 2 port ethernet switch
- KNX and LAN functions, VPN, Webserver
- Free programming environment incl. bus monitor, debugger (Win 10, Linux, OSX)
- many predefined functions
- display makes commissioning easy, shows system status

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Enertex® EibPC²

- encrypted web server
- 65,000 processing objects
- real time logic
- timers, stopwatches, astro functions, scenes
- diagnostic functions (phys. address, routing counter, raw data..)
- VPN Server
- Raw TCP/UDP connections
- http(s), XML, JSON parser to implement Web-APIs
- Modbus TCP Master and Slave
- telegram recording
- emails and FTP
- store variables in flash (8GB)

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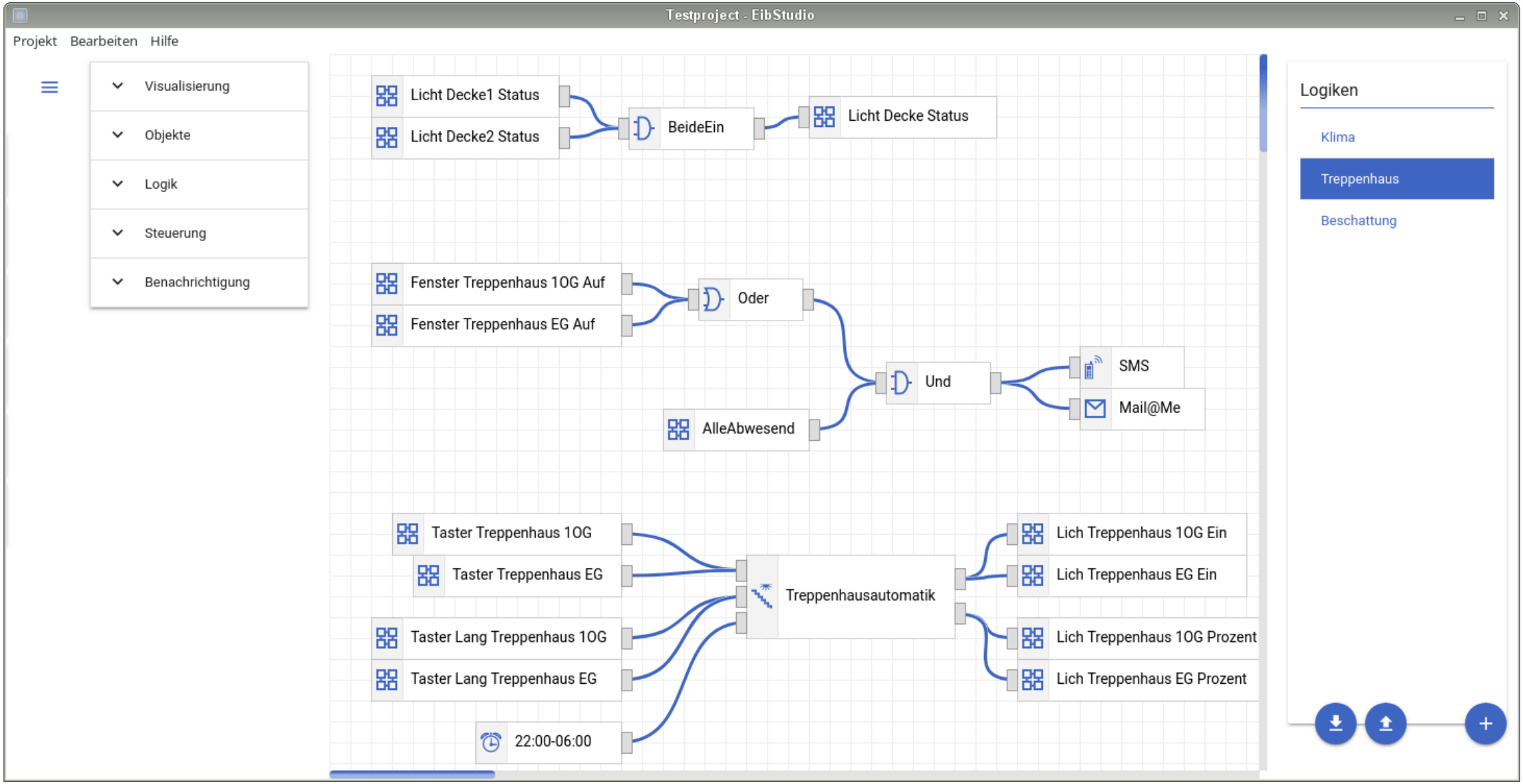
EibStudio 4
- graphical logic editor



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EibStudio 4
- graphical visualization editor

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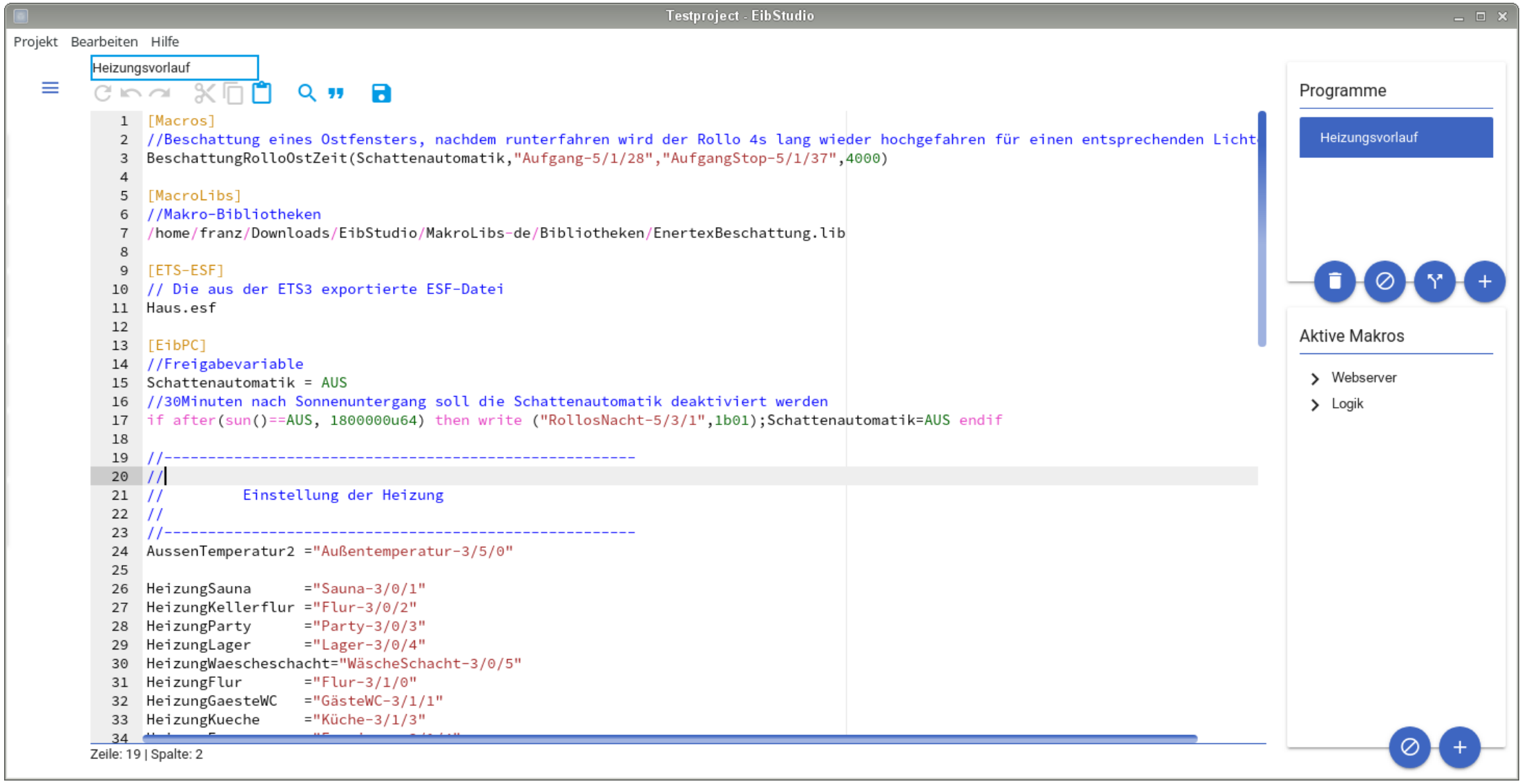
EibStudio 4

- code-based programming is possible



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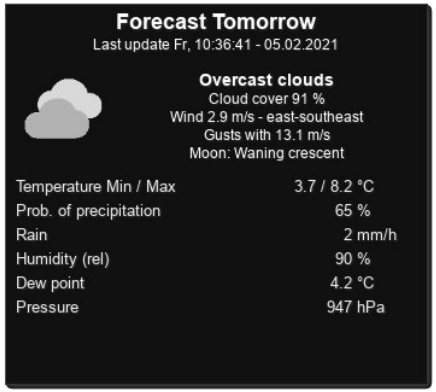
EibPC² as universal KNX gateway

- integrate many of your ethernet devices into KNX
- most devices can be controlled via one of
  - http
  - raw TCP/UDP
  - Modbus TCP

PV inverters, EV charger, heat-pumps, gas boiler, AV receiver ...



- Online services also provide data
  - weather forecast
  - garbage collection dates
  - fuel prices
- make them available to every KNX device

Web-Visu

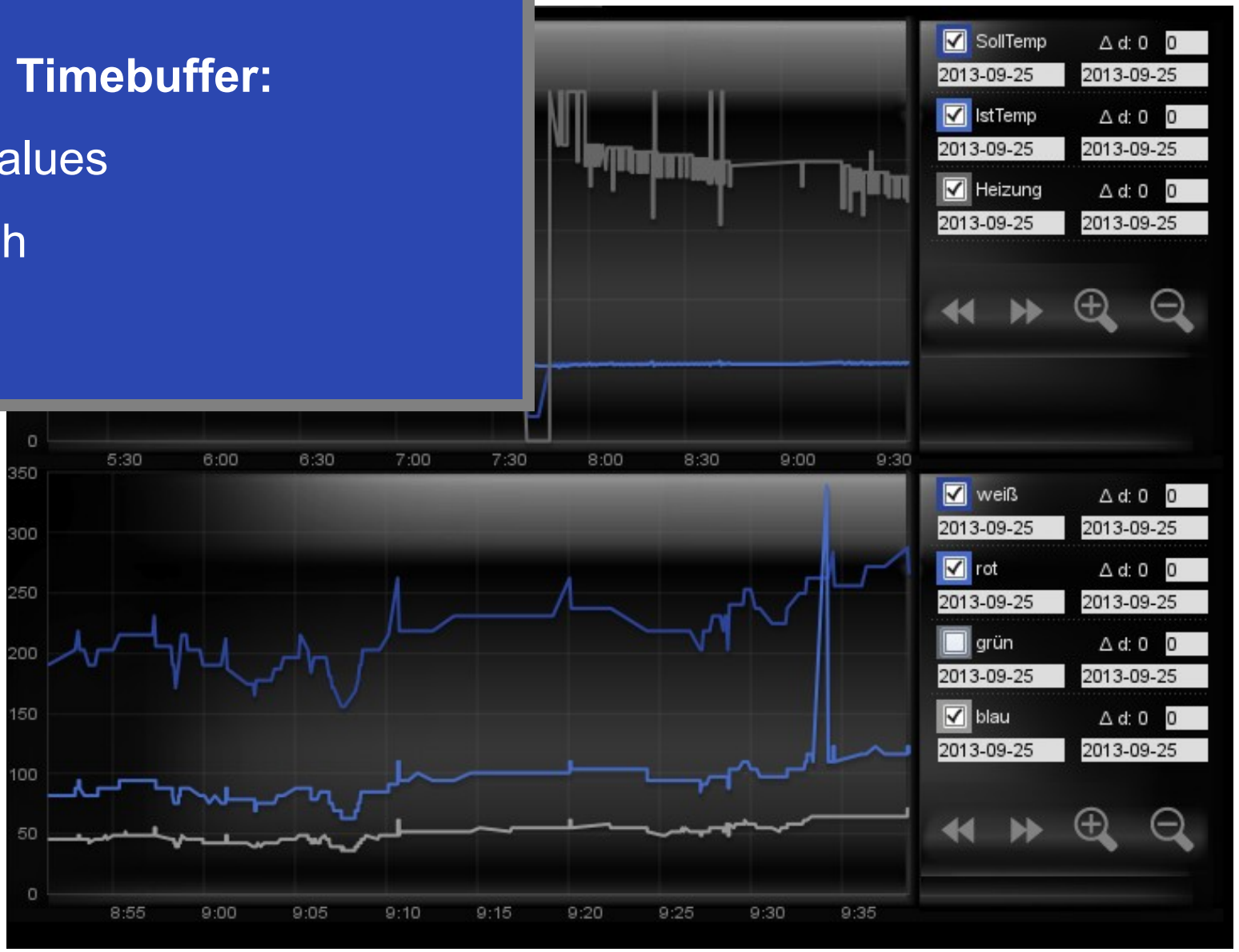

:: Wetter
Aktuell
Uhrzeit
Fr, 11:41:00
DATE
Datum
27.01.2012
Licht in Lux
5626.88
N
W
O
S
Wind in km/h
1.98 @ 0.00%
Wettervorhersage
°C
Vorhersage für 28/01/12
Hamburg
Berlin
Hannover
Essen
Leipzig
Frankfurt
Nürnberg
Stuttgart
München
27 Jan 2012 06:30 GMT
Vorhersage


:: Wohnzimmer
:: EG :: Wohnzimmer
Uhrzeit
Fr, 11:42:00
DATE
Datum
27.01.2012
Rollos
Türe
Schalten und Dimmen
Deckenlicht
Ventilator
WandDimmer
Steckdosen
Fernseher
WigaDimmer
Heizen - Fussboden Schaltuhr
Heizen ab hh:mm
hh:mm 12:10
Wandheizung
Wiga-Fussboden
1.0
0.5
0.0
-0.5
-1.0
10
11
Heizkörper
Wiga
18.50
18.48
18.46
18.44
18.42
18.40
18.38
10
11
Temperatur

Long-term recording

Timecharts and Timebuffer:

- up to 65.000 values
- storable in flash
- easy handling



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Individualized ...

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Sonos integration

- control up to 4 zones in real time via browser
- integration in KNX: turn on via GA, choose songs, etc ..
- zone administration
- radio and playlists

Integration HUE

- connection manager
- integration in KNX: turn on via GA, dimming, etc ..
- control up to 10 lamps

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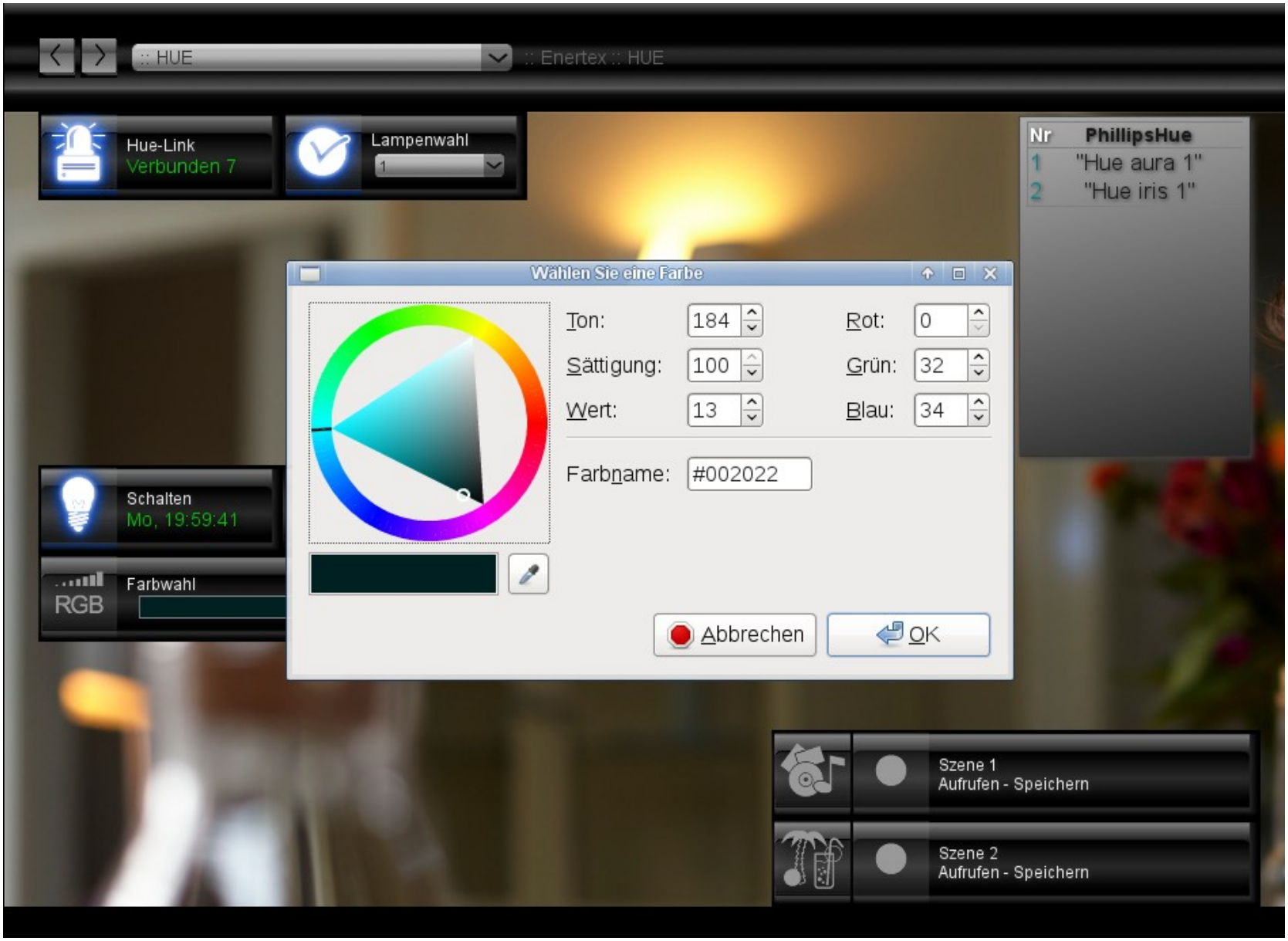
Integration HUE III



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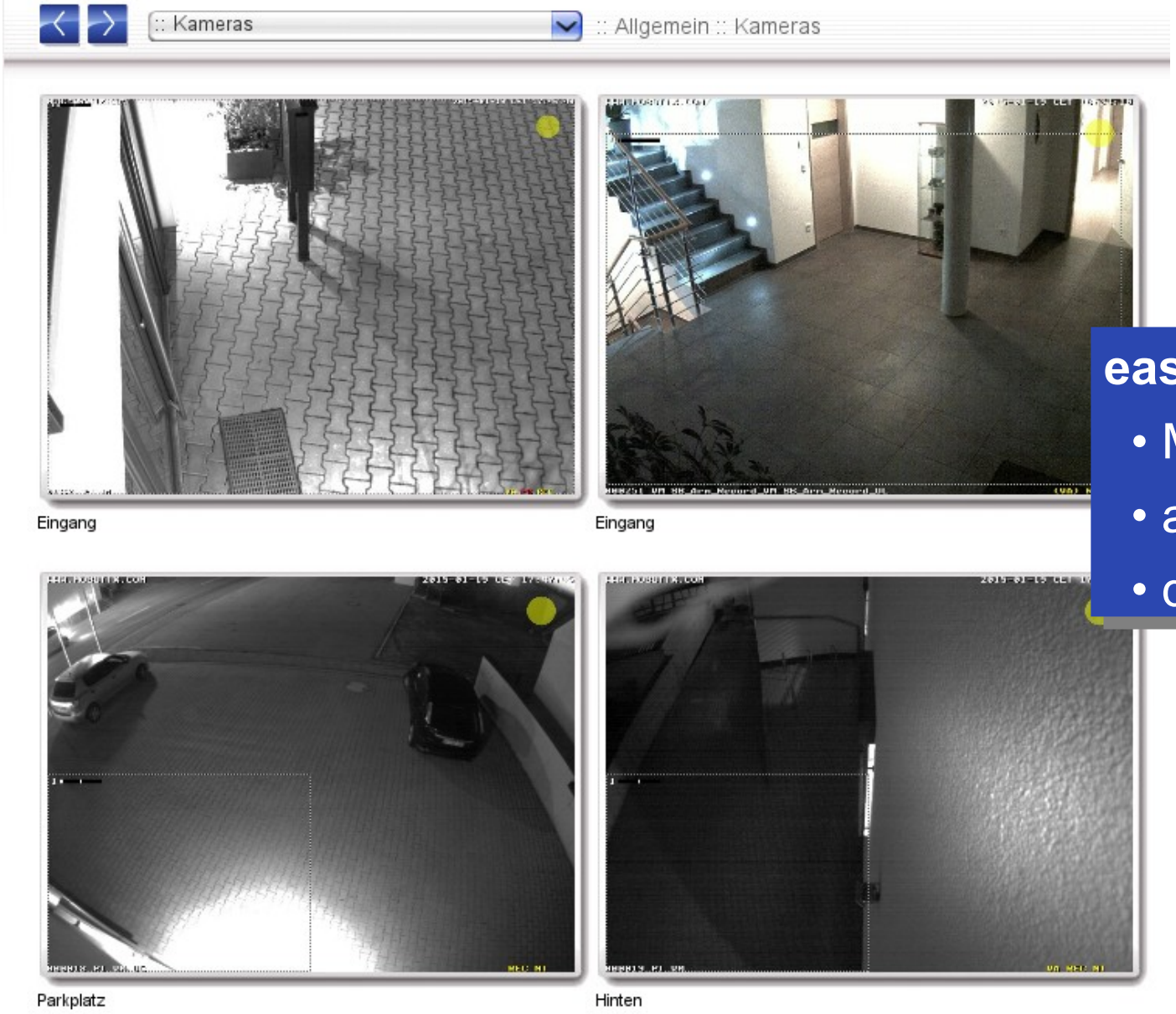
Cameras



easy integration

- Mobotix
- any webcams (MJPEG)
- data streams

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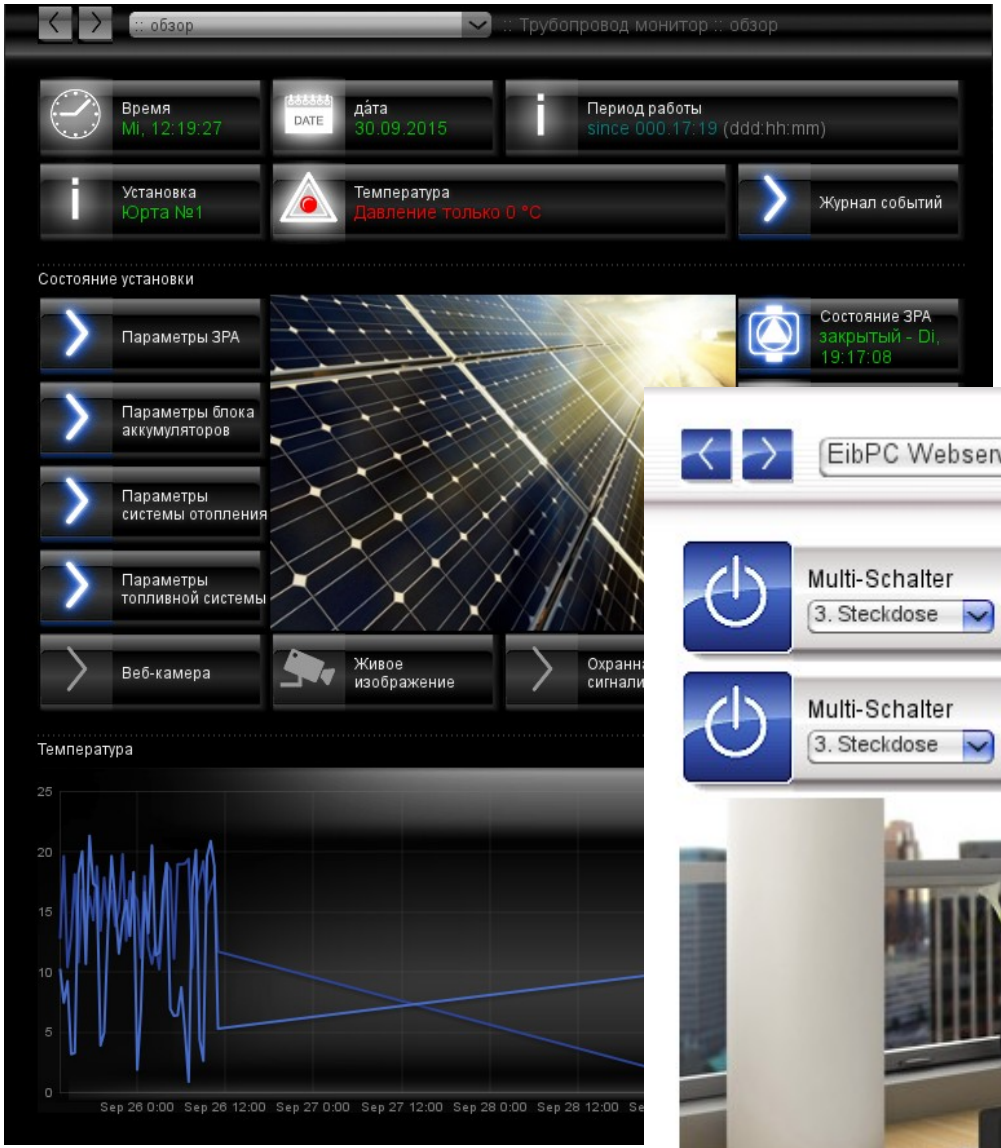
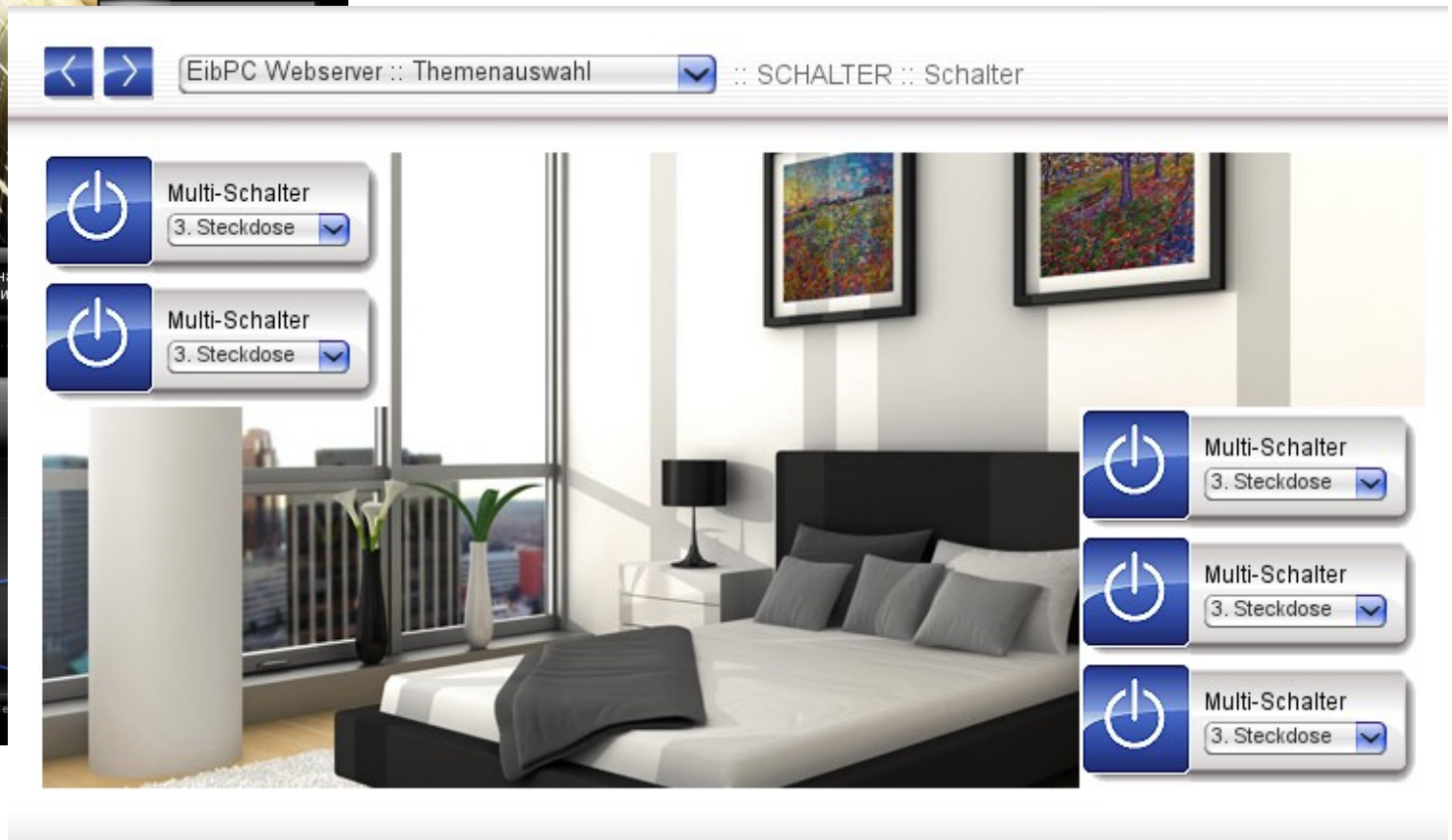
Individually personalized ...



as part of the design

- blue
- black



Status indicator...

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KNX SmartMeter
- KNX energy meters

- dimension: 4 SU
- SD card for long-term recording
- supply only via KNX Bus, measurement voltage from 0 ... 230 VAC possible
- active and reactive power measurement resolution 0.4 W (0.4 VA)
  1) current range from 2mA to 85A
  2) current range from 10mA to 630A
- bidirectional power measurement
- 1- and 3-phase measurement
- balancing energy meter
- energy meter with lowest loss on the market
- measurement of the harmonics acc. to standard (THD-U and I)
- Indication of current and voltage peaks
- current measurement with external current sensors

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Enertex® KNX SmartMeter
Lowest losses. Highest resolution.

Competitors: shunt resistor 0,5 ... 5 mOhm

Competitor direct measurement 16A (Mxx 3 mOhm)	
losses current meas. per phase:	1.5 W
losses voltage meas.:	1.8 W
sum of losses:	6.3 W
min. possible measurement:	4.6 W

Competitor direct measurement 85A (Exx 0,5 mOhm)	
losses curr. meas. per phase:	3.6 W
losses voltage meas.:	1,8 W
sum of losses:	12.6 W
min. possible measurement:	19 W

Enertex Smartmeter

sum of losses:	**0.5 W (bus powered)**
min. possible measurement:	**0.46 W (= 40-times better!)**

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Enertex® KNX SmartMeter

Version 1149-85

measurement range 2mA .. 85 A
with 230V 460mW .. 20kW (1-ph.)
accuracy class 1

accuracy: 1% in range from 10mA to 85A
accuracy: 10% in range from 2mA to 10mA
resolution: 0,2 mA

Version 1149-630

measurement range 10mA .. 630 A
with 230V 2.3W .. 145kW (1-ph.)
accuracy class 1

accuracy: 1% in range from 50mA to 630A
accuracy: 10% in range from 10mA to 50mA
resolution: 1.0 mA

Current sensor
- calibrated for the device, linear over the entire range
- integral accessory **without additional costs**
- 630-Version sensor can be opened

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Enertex® KNX SmartMeter record and present

Recording to SD card

Different strategies (parameterize with ETS)

- energy
- power and power factor
- condition monitoring, current, voltage, THD, transients
- harmonics

+ Long-term recording on SD card

+ with battery-buffered real-time clock (variant RT) for operation without KNX

+ no parameterization necessary (delivery state is one record per minute)

+ also for conventional systems with a simple 24V supply

Enertex® KNX SmartMeter application examples KNX

Operation of a PV system

- consideration of different tariffs for generation and consumption
- consideration of tariff periods
- separate counters for generation and consumption
- separate counters for daily and total consumption

How much energy was consumed - today and in total?
How much generation in € - today and in total?
How much consumption in € - today and in total?

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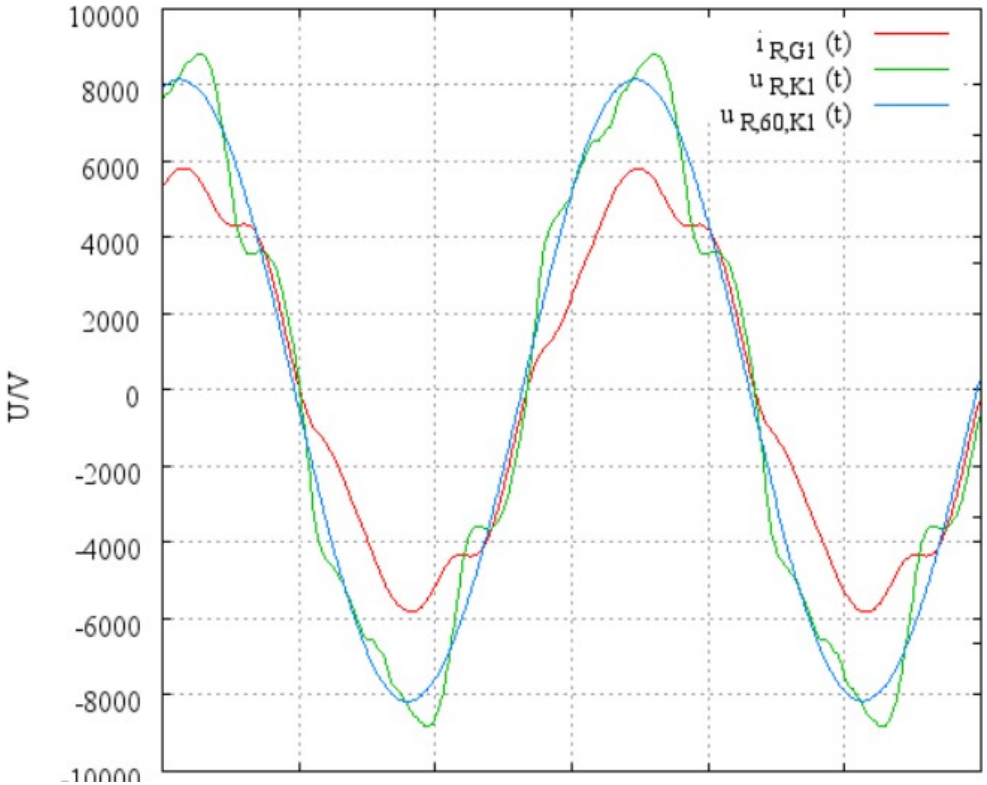
Enertex® KNX SmartMeter power quality



power quality

- calculation of distortions in mains
- determination of the THD according to DIN
- calculation of the harmonics
- determination of transient peaks

How "good sinusoidal" is my voltage / current (e.g., inverter, ECG, industry)?

Can my devices be damaged?

Do my devices pollute the voltage?

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Energy Management for KNX with Enertex® KNX SmartMeter and Enertex® EibPC²

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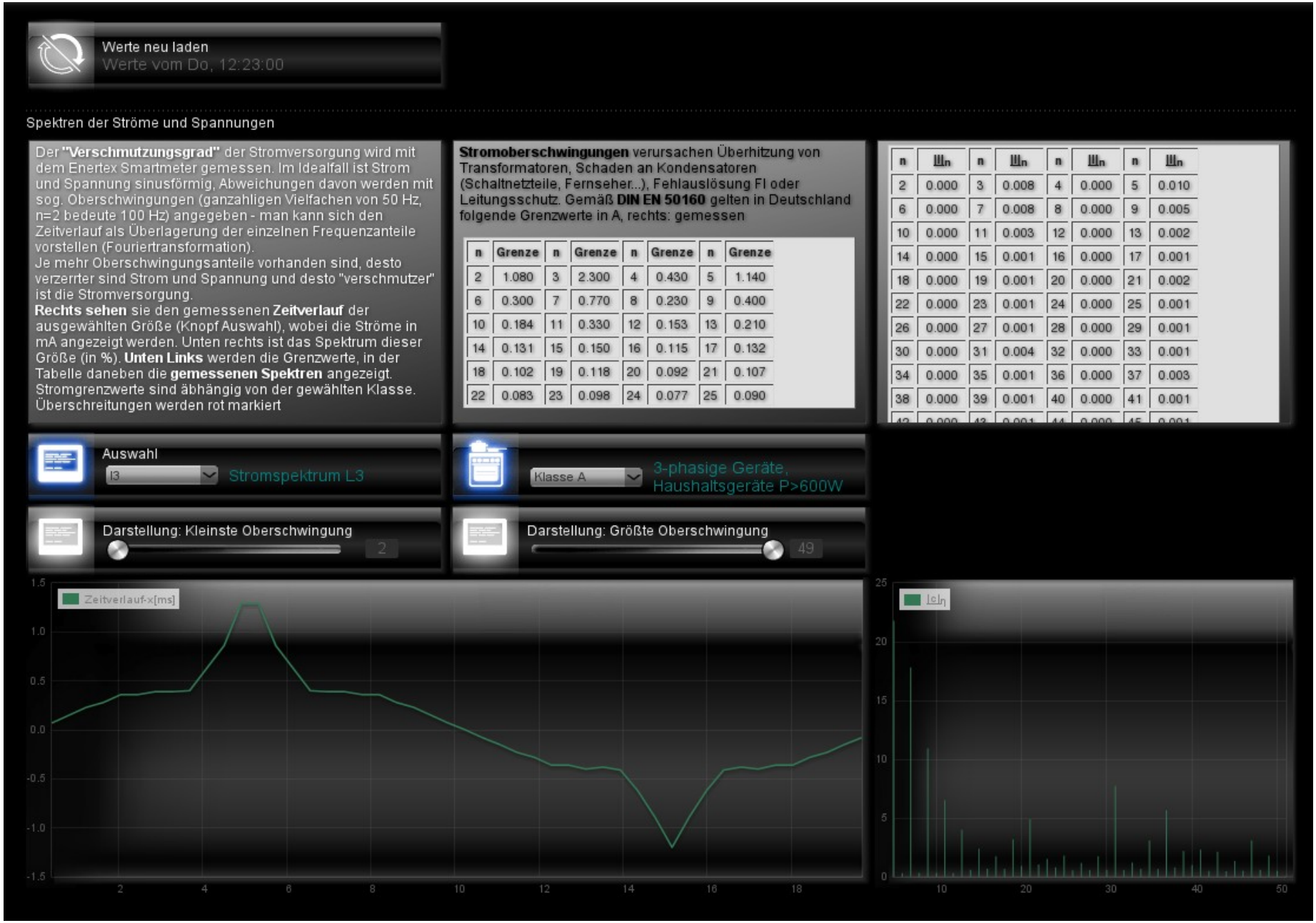
Network analysis

Harmonic component



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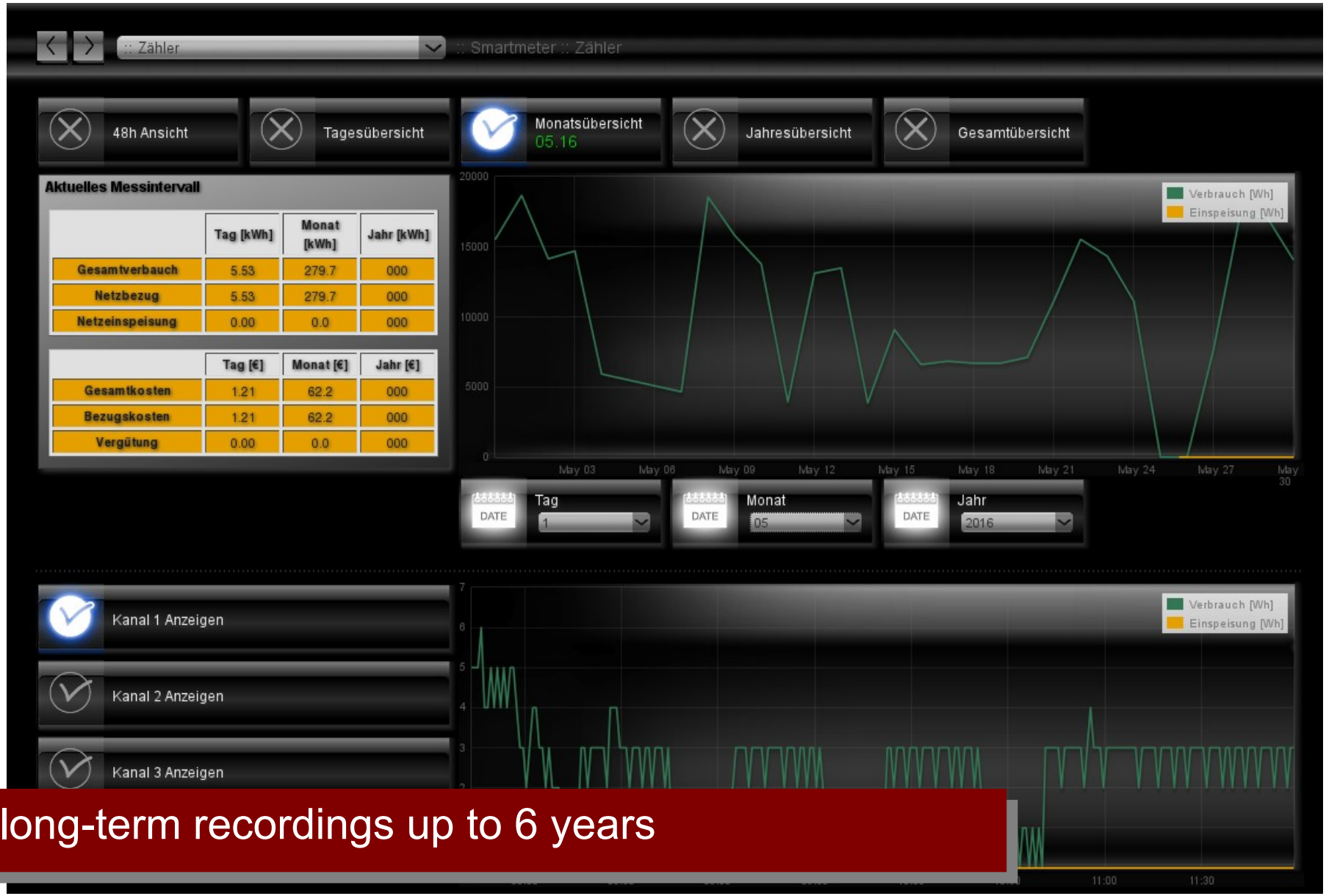
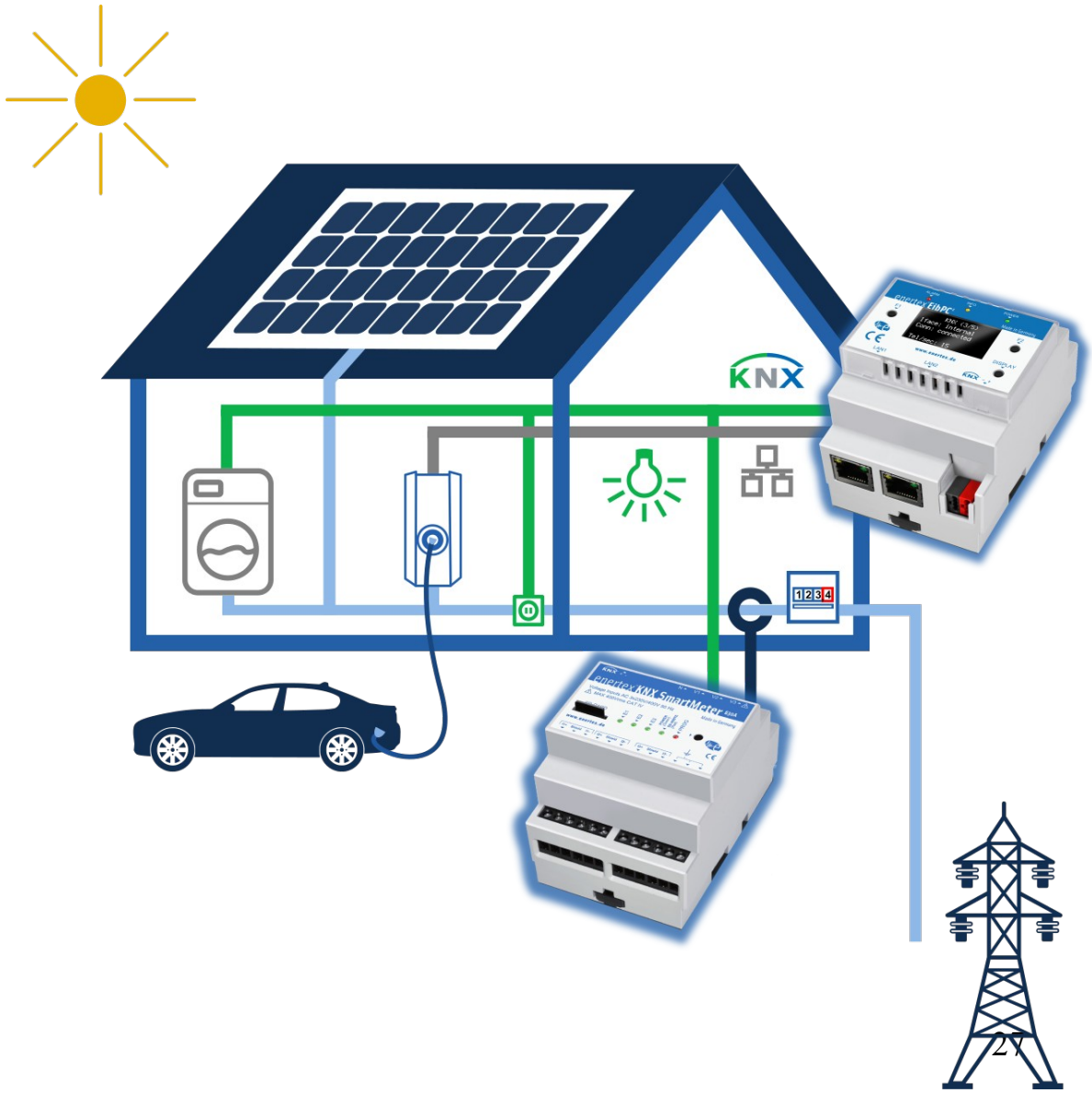
Data logger



+ long-term recordings up to 6 years

Measure and control

- turn consumers on/off depending on PV and power consumption
- control EV charge current to maximize self-consumption
- use weather forecast to decide when to start charging
- synchronize charging of EV and energy storage
- implement your own strategies



Control EV Charger

- control charging of EV with KNX group objects
  - Start/stop charging + status
  - Is charging/idle
  - fill level in kWh, %
  - current and power
  - remaining charge time
- Different charging modes
  - maximize self-consumption of PV energy
  - optional time limit
  - limit current

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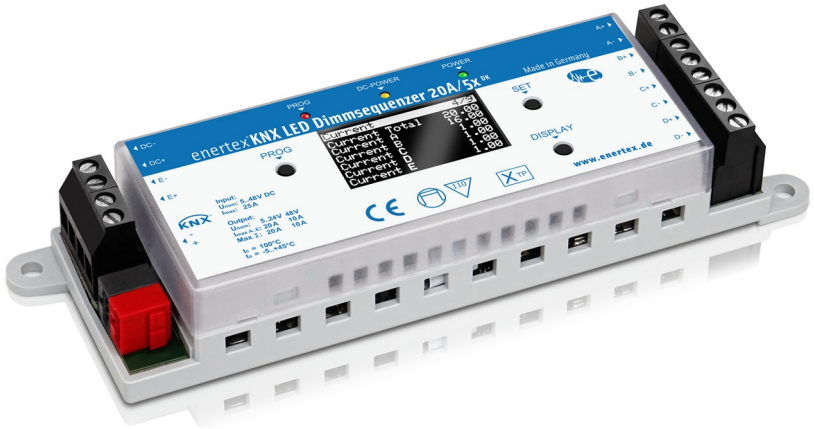
Enertex® KNX LED Dimmsequenzer 20A/5x REG or DK



REG and recessed ceiling (DK)

Variants with identical features

Hardware features:

- 5 channels, each up to 20 A
- 480W total dimming power
- 5 .. 48V lighting voltage
- Hardware protection against
  - overcurrent / short circuit (per channel and total)
  - over- and undervoltage
  - overtemperature
  - wrong polarity
- Extensive commissioning functions by the use of integrated display

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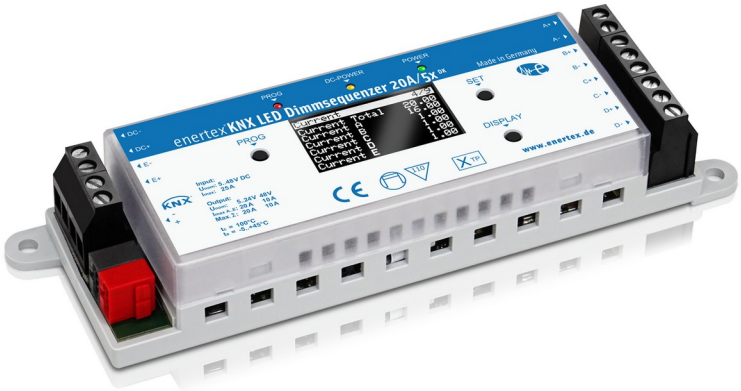
Enertex® KNX LED Dimmsequenzer 20A/5x REG or DK



REG and recessed ceiling
5 channels, 20A, 5 - 48 V
for LED constant voltage

Software features:

- operating modes:
  - RGB(W)
  - Tunable White
  - RGBCCT: Extended RGB / TW
  - Single Channel
- RGB and/or HSV colours
- different PWM frequencies and dimming curves for perfect adjustment to lighting and user preference
- RGB or HSV colours
- scenes, bit scenes and lock functions

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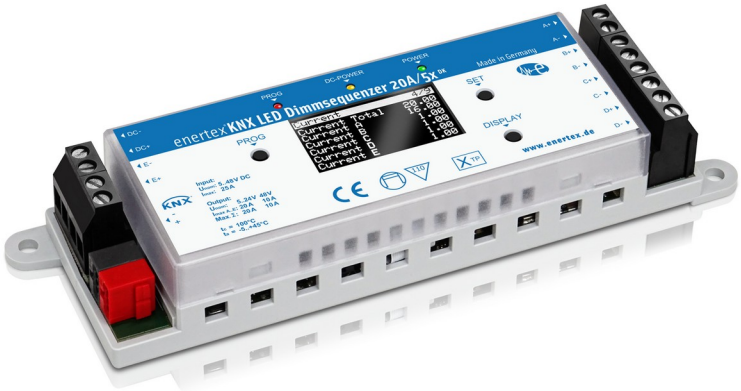
Enertex® KNX LED Dimmsequenzer 20A/5x REG or DK

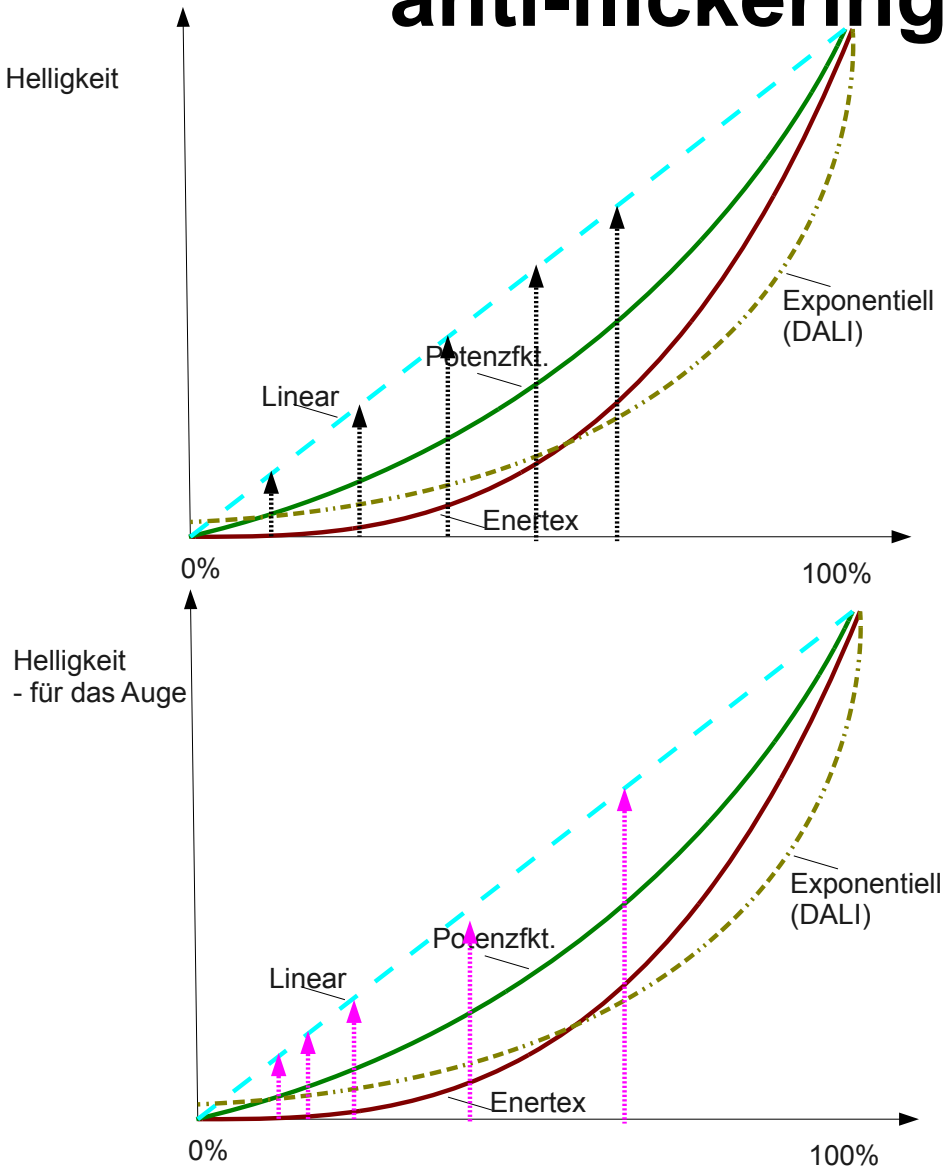


REG and recessed ceiling
5 channels, 20A, 5 - 48 V
for LED constant voltage

Software features (cont.):

- sequences and time based dimming
  Human Centric Lighting (HCL)
- protection functions accessible via display and group objects
- power supply protection
- lighting protection
- measurement of voltage, current, power, temperature, telegramrate
- energy and cost meters
- Switch ext. switching actuator to switch off LED Power Supply

Enertex® KNX LED Dimmsequenzer 20A/5x REG or DK anti-flickering



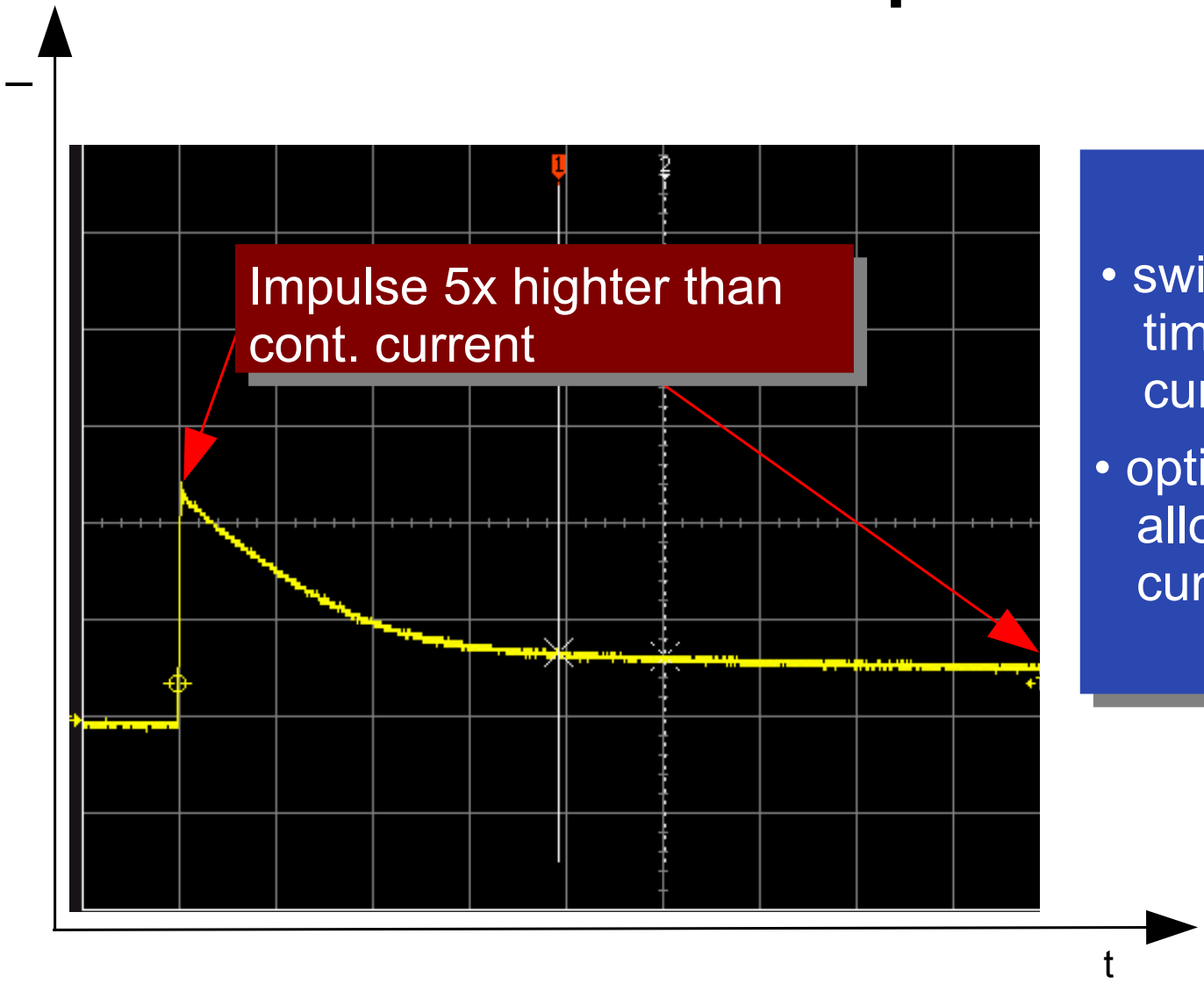
„flickering“

- 0 .. 255 steps acc. to KNX standard
- dimming through the steps
- depending on the lamps
- optical illusion at fast pass through the steps: flickering

Enertex® approach:
Softdimming algorithm

- no flickering
- no steps

Enertex® KNX LED Dimmsequenzer 20A/5x REG or DK
Switch on impulse current

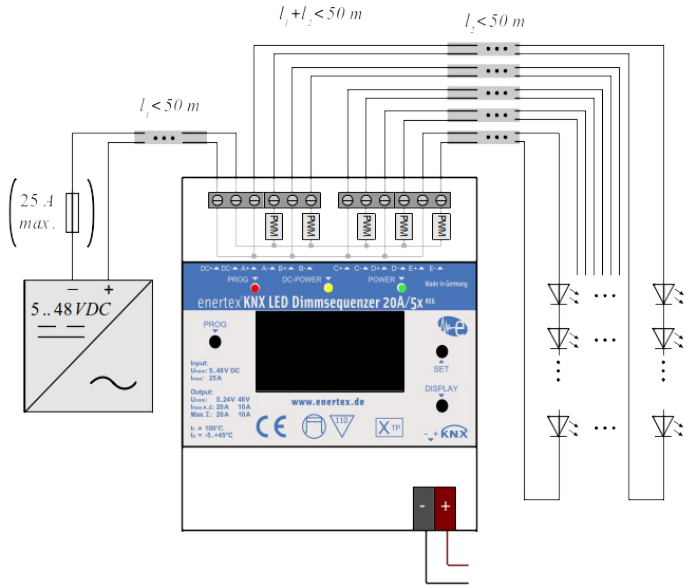


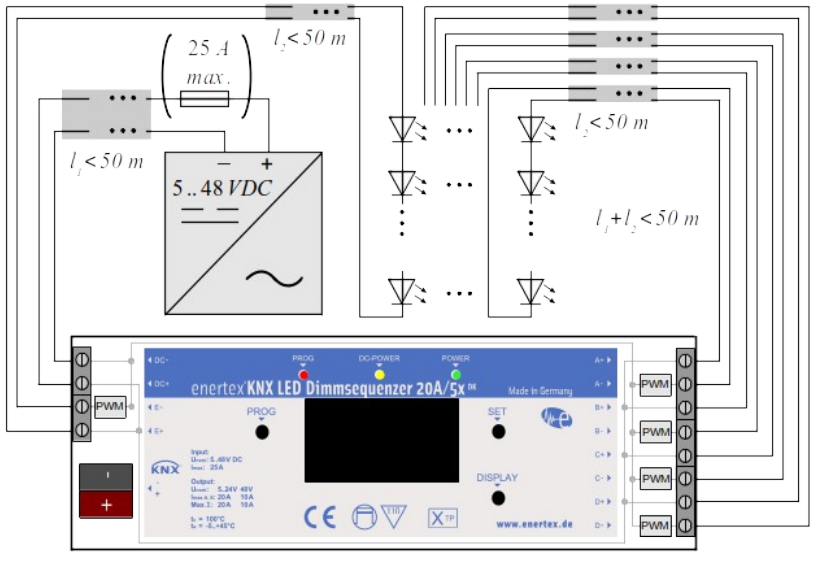
- switch-on-current often a few times higher than continious current
- optimized over-current-protection allows switch-on-impulse-currents up to 100 A

Enertex® KNX LED Dimmsequenzer 20A/5x REG or DK commissioning

Commissioning made easy

- one + and – connector for each channel → no external connectors required
- test of the whole installation (power supply, dimmer, lighting) without a PC only by the use of the display and buttons
- „1-click-commissioning“ with report

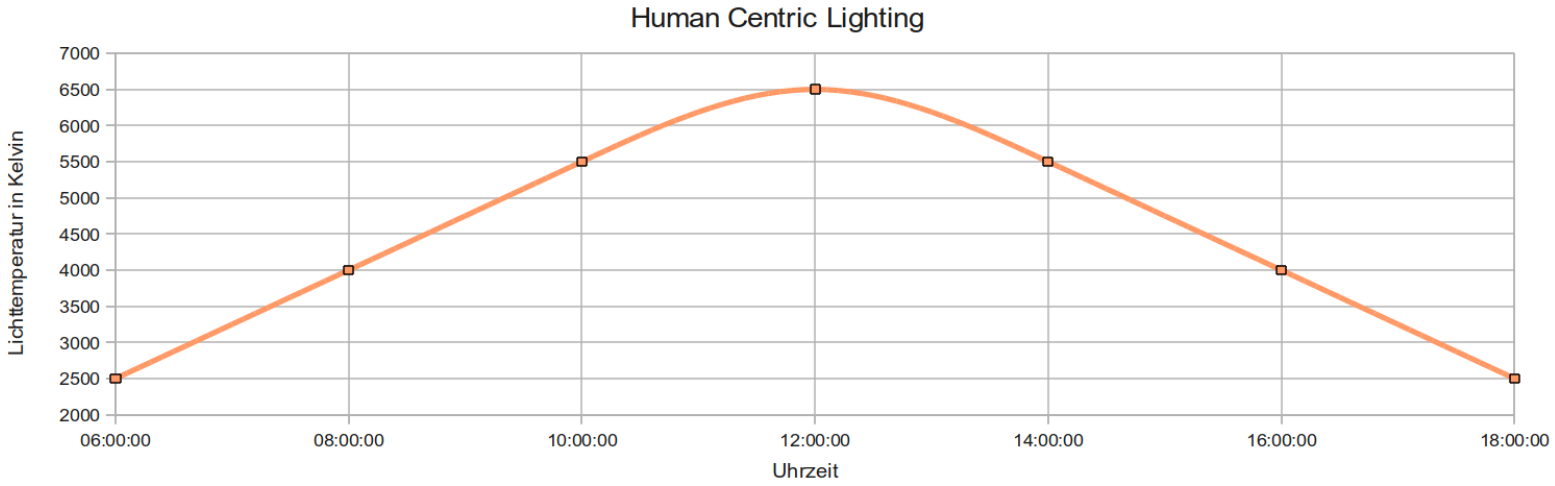




Enertex® KNX LED Dimmsequenzer 20A/5x REG or DK Human Centric Lighting

Human Centric Lighting

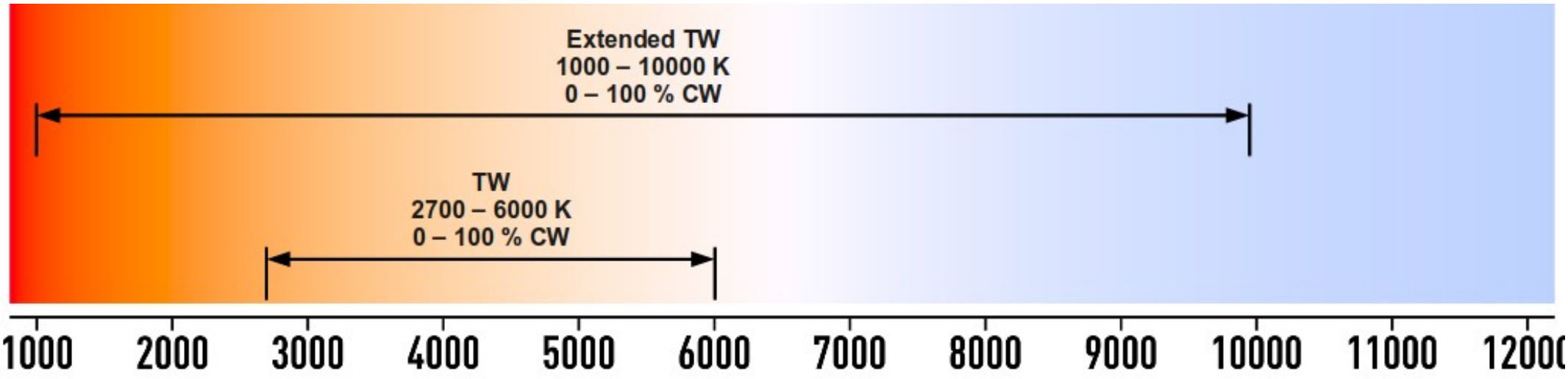
- daytime based tunable white brightness and colour temperature
- use of abs. times oder relative to sunset/sunrise
- use preset or customize by yourself
- time-based dimming also available for RGB or single channel operating modes



Enertex® KNX LED Dimmsequenzer 20A/5x REG or DK RGBCCT

RGBCCT: Use of 5-channel lightings

- Extended TW
- Extended RGB



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Enertex® KNX LED Dimmsequenzer 20A/5x REG or DK safety

Available via KNX objects and integrated display

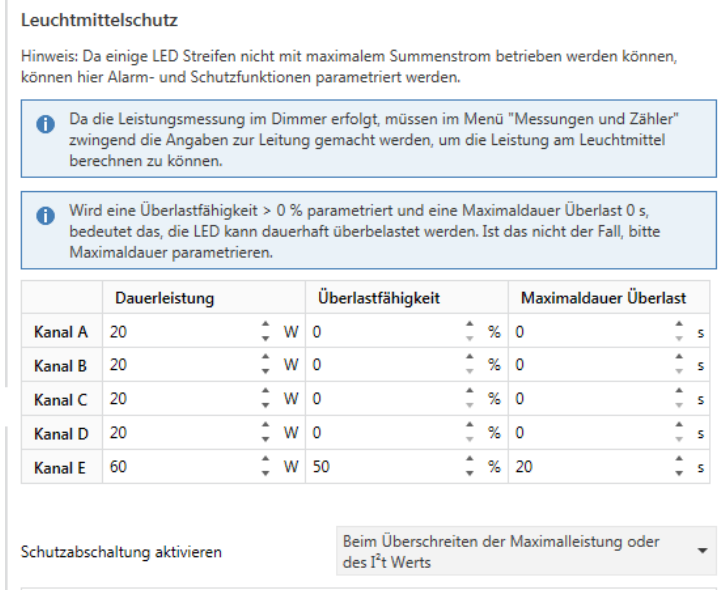
- reverse polarity protection
- overcurrent protection per channel and total
- over- and undervoltage protection
- overheating protection

In case of fault, the output will be switched off (self-healing)

Addional protection functionality for power supply and lighting

- by parameterization of continous power and overload capatibilities the dimmsequencer can also switch off the output(s) to protect the power supply and / or lighting(s)

Despite many features, very good overview due to ETS5 features as table layout



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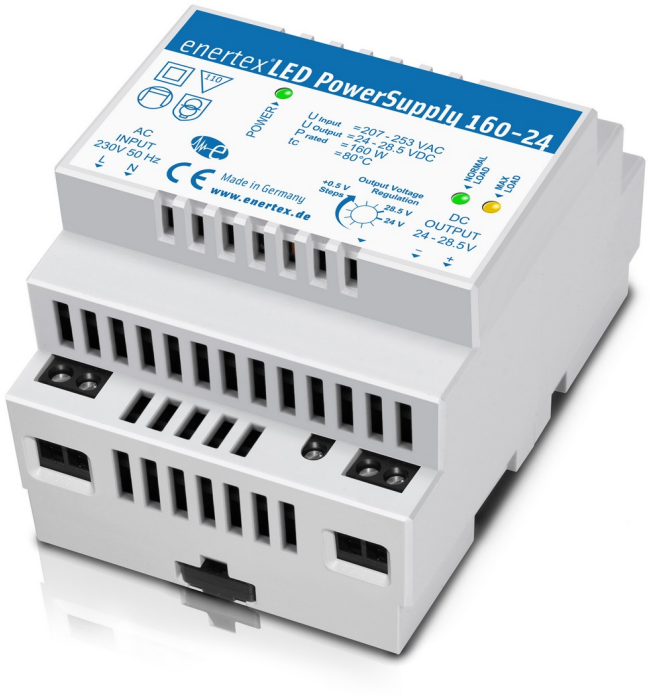
LED PowerSupply 160
LED power supply with 160W

A lot of power

- DIN rail mount (dimension: 4 SU)
- voltage input: 230 V AC (50 Hz)
- voltage output: 24 – 28.5 V DC (adjustable in 0.5 V steps)
- max. DC power: 160 W
- maximum efficiency: 94.5%; meets “80Plus Platinum” in all load conditions
- standby power consumption: typ. 0.1 W

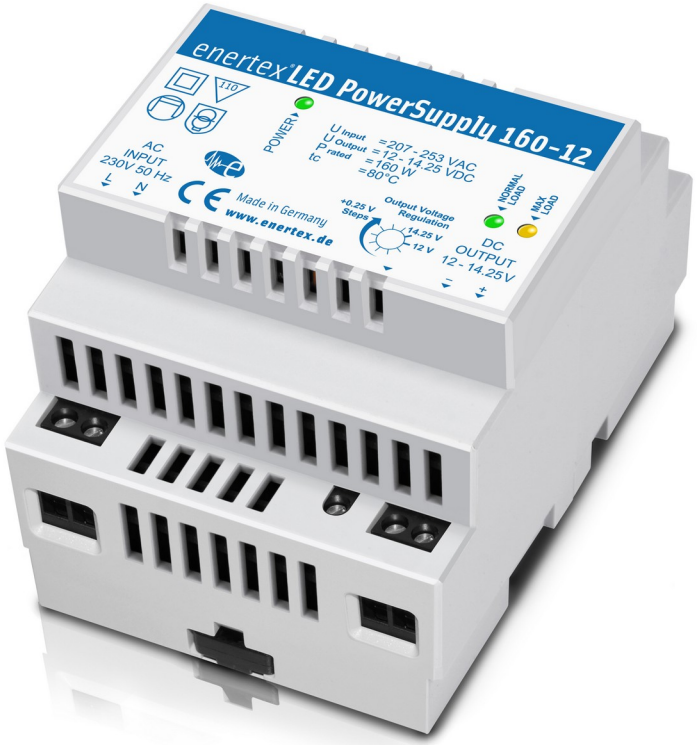
LED PowerSupply 160
LED power supply with 160W



and even more...

- parallel operation with automatic load balancing
- LEDs: power, partial load, full load
- Protection functions: Short-circuit protection, overload protection and overtemperature protection
- Active PFC function
- fulfills all requirements according to IEC 61347-1 and 61347-2-13

LED PowerSupply 160
- additional variants for 12 and 48V



Further Variants:

- 160W for 12 V (13.3 A)
- 160W for 48 V (3.3 A)

Enertex® ENA²

Enertex® ENA²

Remote access and network protection with IPv4/IPv6

- DIN rail, 4 SU
- bus powered
- low power consumption: typ. 1.8 W
- End-to-end encryption of remote access
- (Un)lock VPN with KNX group objects
- free and optional DDNS and relay service
- OpenVPN on demand on iOs

Two modes of operation

Switch-mode

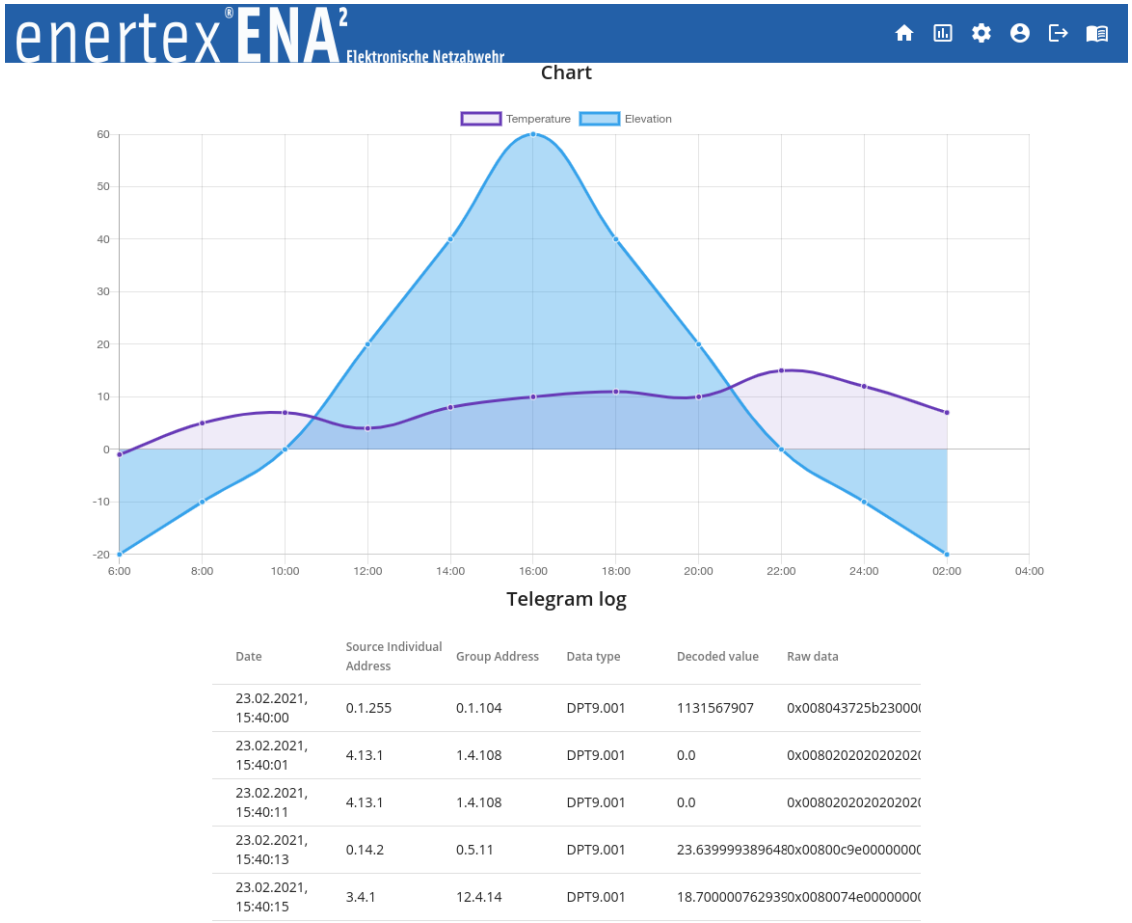
- normal client to your LAN
- ethernet ports work as switch
- remote access, DDNS

„Protected-network“ mode

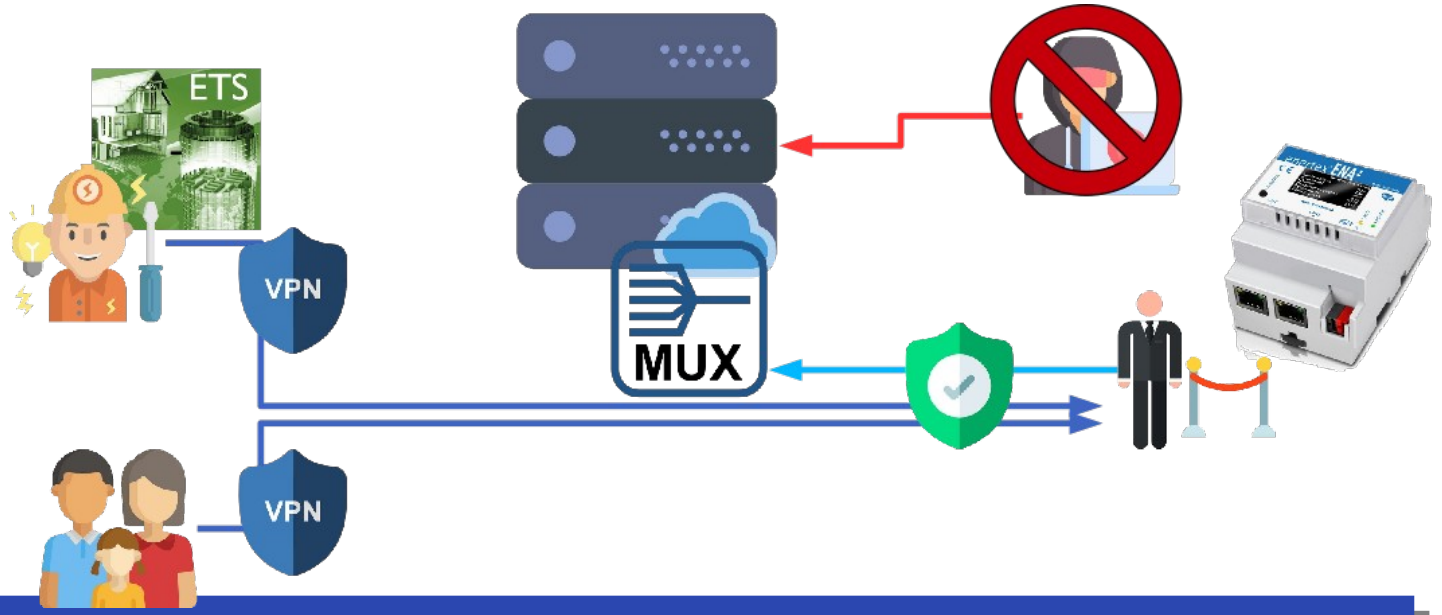
- two separate ethernet ports
- normal client to your LAN
- remote access, DDNS
- manage a private network for critical network devices (KNX IP secure router, KNX IP secure interface, EibPC², …)
- easy to configure firewall to control access in and out

Telegram logger

- logs all your KNX bus traffic into internal database
  - Database is stored in flash (up to ~7 GiB of telegrams)
  - minimal configuration – import your ETS project and „go“
  - on-device telegram analysis with predefined filters and graphical visualization of recorded values



Relay server



- no port forwarding and local router configuration required
- avoid problems with IPv4, IPv6, DS-Lite
- ENA² and VPN client both connect to relay server and send encrypted data
- Server forwards encrypted data
- data can only be decrypted by ENA² and VPN client
- End-to-End – E2E encryption
- optional

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Enertex DDNS Service

my-customer.ddns.enertex.de

192.168.178.15

- easy to configure and change in device configuration
- device keeps your domain name automatically up-to-date
- no additional costs, no registration process, no time limits
- IPv4, IPv6 optional

Enertex® ENA²
OpenVPN on demand

Only the App needs to be opened (e.g. Gira App, JUNG App, Mobotix App, ...) –
“openVPN“ connection opens immediately in the background,
which greatly **simplifies** the use of apps in everyday use.

Enertex® ENA²
KNX remote maintenance made easy

Via the integrated KNX bus connection the user can grant and supervise remote access.

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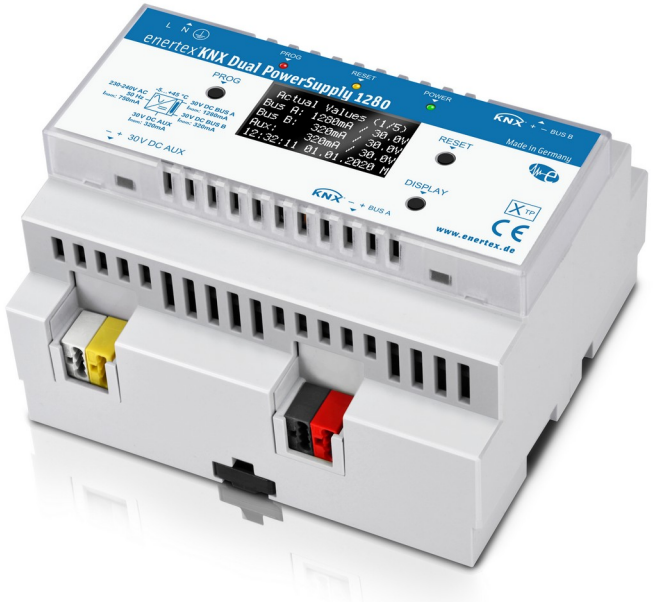
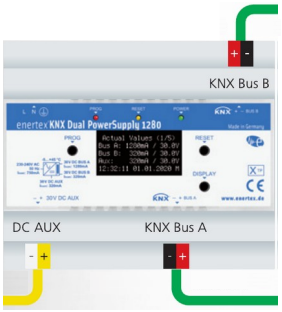
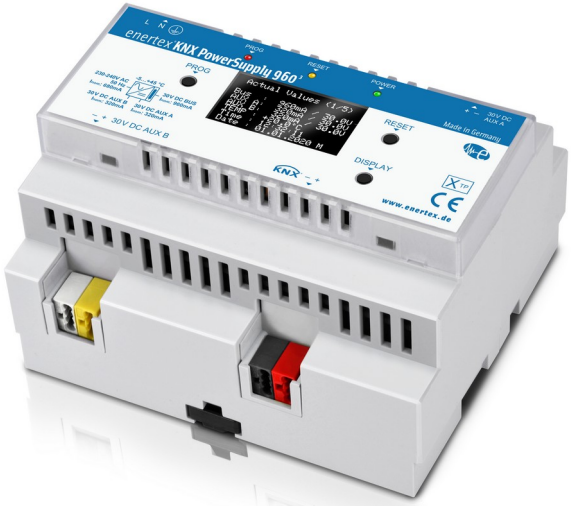
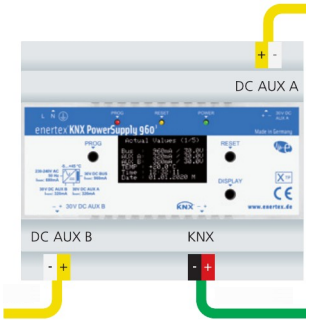
KNX PowerSupply 960³ and KNX Dual PowerSupply 1280









A lot of power

- Three outputs, each with separate overcurrent protection
- PowerSupply 1280:
  - Bus A: 1280 mA (choked)
  - Bus B: 320 mA (choked)
  - AUX: 320 mA (unchoked)
- PowerSupply 960³ :
  - Bus A: 960 mA (choked)
  - AUX A: 320 mA (unchoked)
  - AUX B: 320 mA (unchoked)
- Size: 6 SU

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KNX PowerSupply 960³ and KNX Dual PowerSupply 1280

Integrated bus coupler:

- Measuring and diagnostic functions
- OLED-Display shows important Information:
  - current U, I at each output
  - max. current at each output
  - telegram rate, phys. address, software version, serial no., ...
- KNX Data Secure communication
- Separate remote reset function for both KNX lines
- Energy meter for KNX buses

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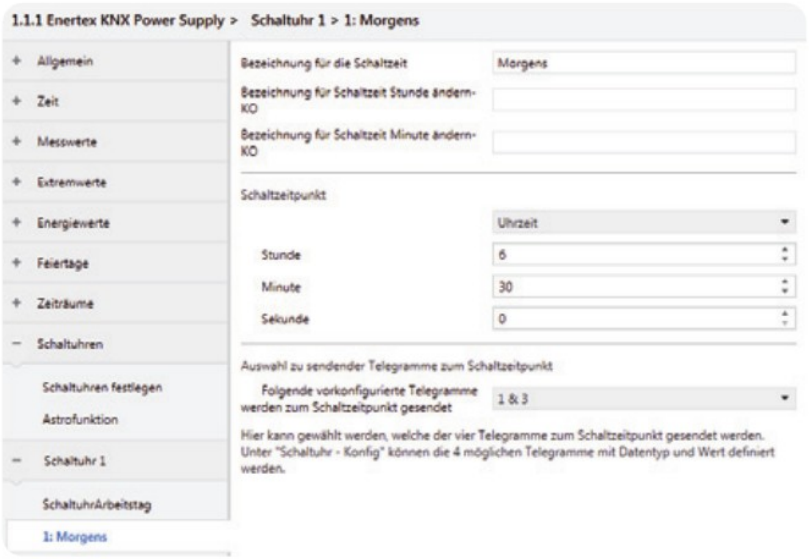
KNX PowerSupply 960³ and KNX Dual PowerSupply 1280



timer application

- integrated KNX clock, buffered against power failure (power reserve 36 h)
- 64 switching times
- extensive logic functions
- holiday calendar
- astro function
- integrated easter calculation
- timer can trigger telegrams for: switching, dimming, blinds, scene, colour RGB, heating controller's operating mode

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Enertex® KNX IP Secure Router

KNX IP Secure Router

- dimension: 2 SU
- authenticates and encrypts KNX and IP telegrams
- up to eight tunnel connections
- up to 49 telegrams per second
- can be used encrypted or unencrypted
- suitable as a line or area couple
- buffered real-time clock and SNTP server
- OLED display
- telnet interface for diagnostics and configuration
- bus powered

Enertex® KNX IP Secure Interface

KNX IP Secure Interface

- dimension: 2 SU
- authenticates and encrypts KNX and IP telegrams
- up to eight tunnel connections
- up to 49 telegrams per second
- can be used encrypted or unencrypted
- buffered real-time clock and SNTP server
- OLED display
- telnet interface for diagnostics and configuration
- bus powered

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Enertex® KNX TP Secure Coupler

KNX TP Secure Coupler

- dimension: 2 SU
- authenticates and encrypts KNX TP telegrams
- can be used encrypted or unencrypted
- area/line coupler
- up to 49 telegrams per second
- switchable telegramrate limitation
- max. telegram length up to 248 bytes
- up to 64 group address filters
- topology error detection
- temporary filter deactivation
- OLED display
- bus powered

SynOhr® MultiSense KNX

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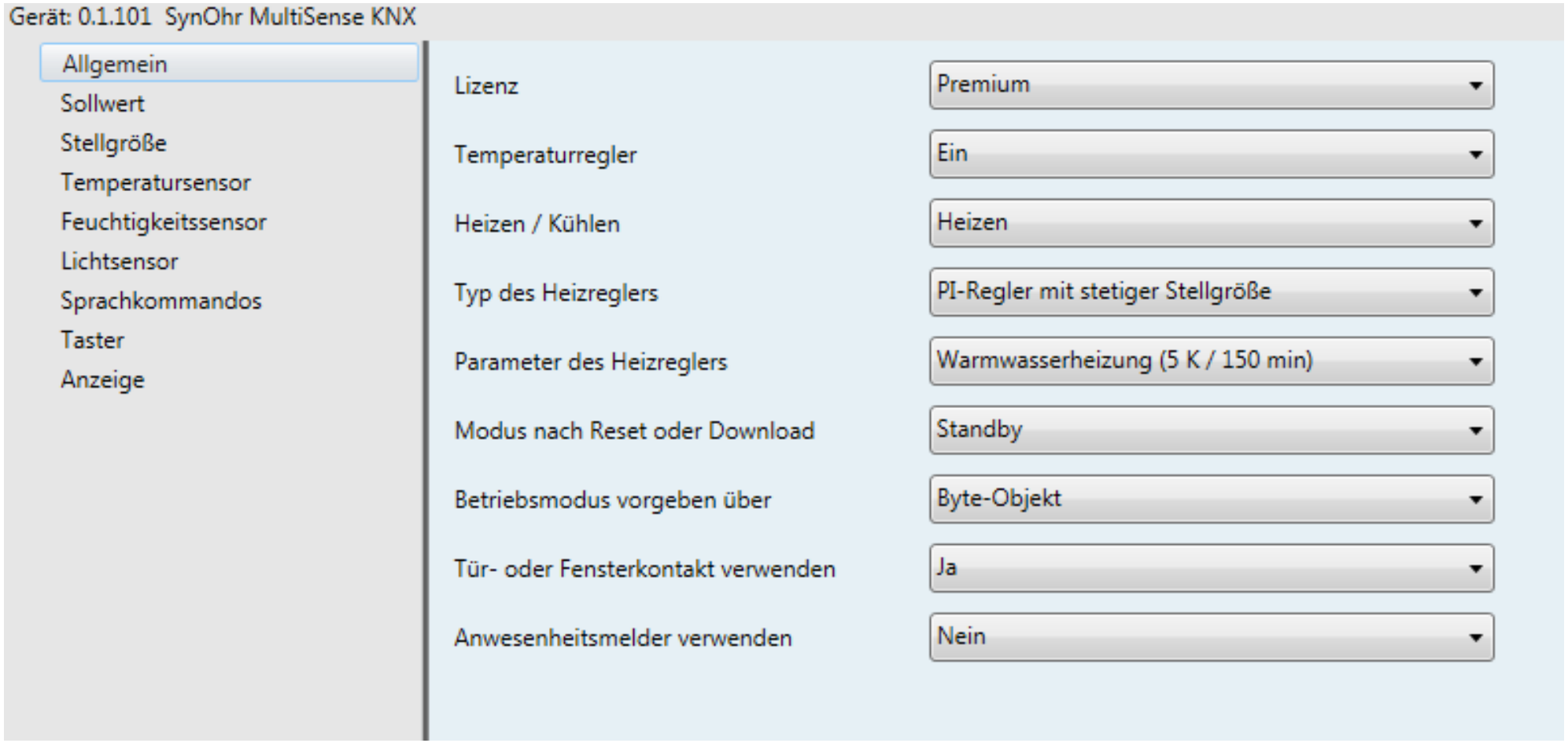
SynOhr® MultiSense KNX

KNX room controller with built in voice recognition

- built-in voice recognition
- low power consumption
  80..450 mW (160..900 mW) from KNX bus
- humidity measurement
- temperature measurement
- RGB-light intensity measurement
- built-in speaker (to play wav-sounds)
- SD card
- RGB light ring
- LCD with dot matrix
- certified KNX device / ETS parameterized

ETS Application



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Vommands

„Slots“ for detection:

- KNX telegrams switching, dimming, values, scenes ...
- linking the language in SynOhrStudio

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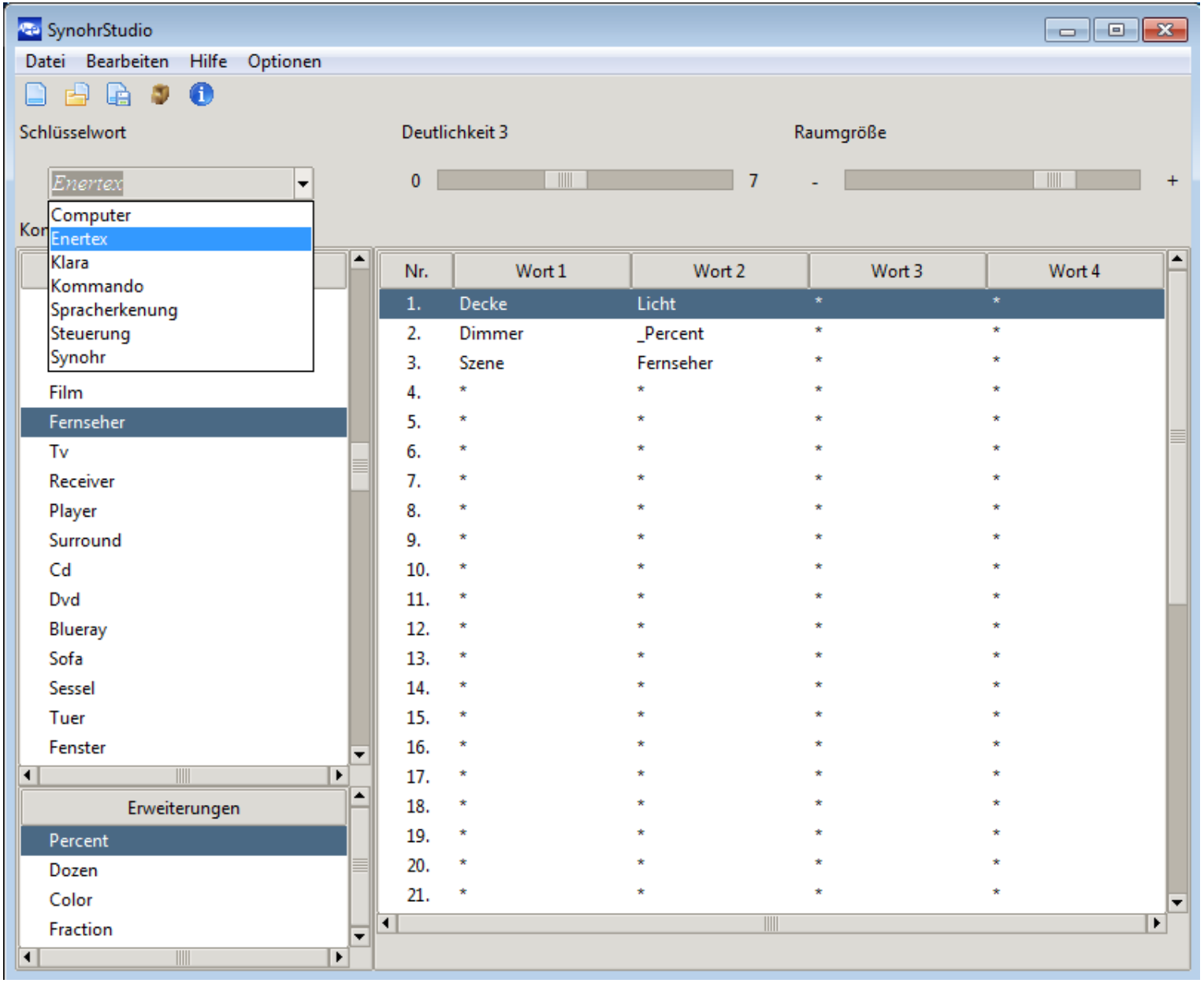
SynOhrStudio

keyword

vocabulary

„wildcards“



SynOhr® MultiSense KNX

Starter:	368 € LP, PG1
Standard:	478 € LP, PG2
Premium:	537 € LP, PG2

Complete, with bus coupler, cover etc.

"Standalone" - "only" bus connection, no ext. power

"High quality" housing made of full aluminum

Made in Germany

SynOhr® MultiSense KNX
Design variants

White powder-coated (RAL9010) | black anodized | brushed aluminum

In premium version without extra costs - **Made in Germany**

Enertex® MeTa® KNX
Der multilevel Raumcontroller

Enertex® MeTa® KNX – the multilevel room controller

Enertex® MeTa Raumcontroller Premium

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Enertex® META Raumcontroller
Starter / Standard

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Enertex® MeTa® KNX Premium

MeTa Premium

- sensors for temperature, humidity, light intensity (RGBW)
- room controller
- 32-way buttons / 16 rockers
- dynamically labelable by ETS or GA
- produced from solid aluminium (black anodized / white powder coated / brushed aluminum)
- external switching contact (input)
- 4x (dynamic) inscribable rockers in four levels plus menu button
- intuitive operation

LP 477 € PG2

Warum MeTa?

MeTa =
menu button

switching through
the menu levels

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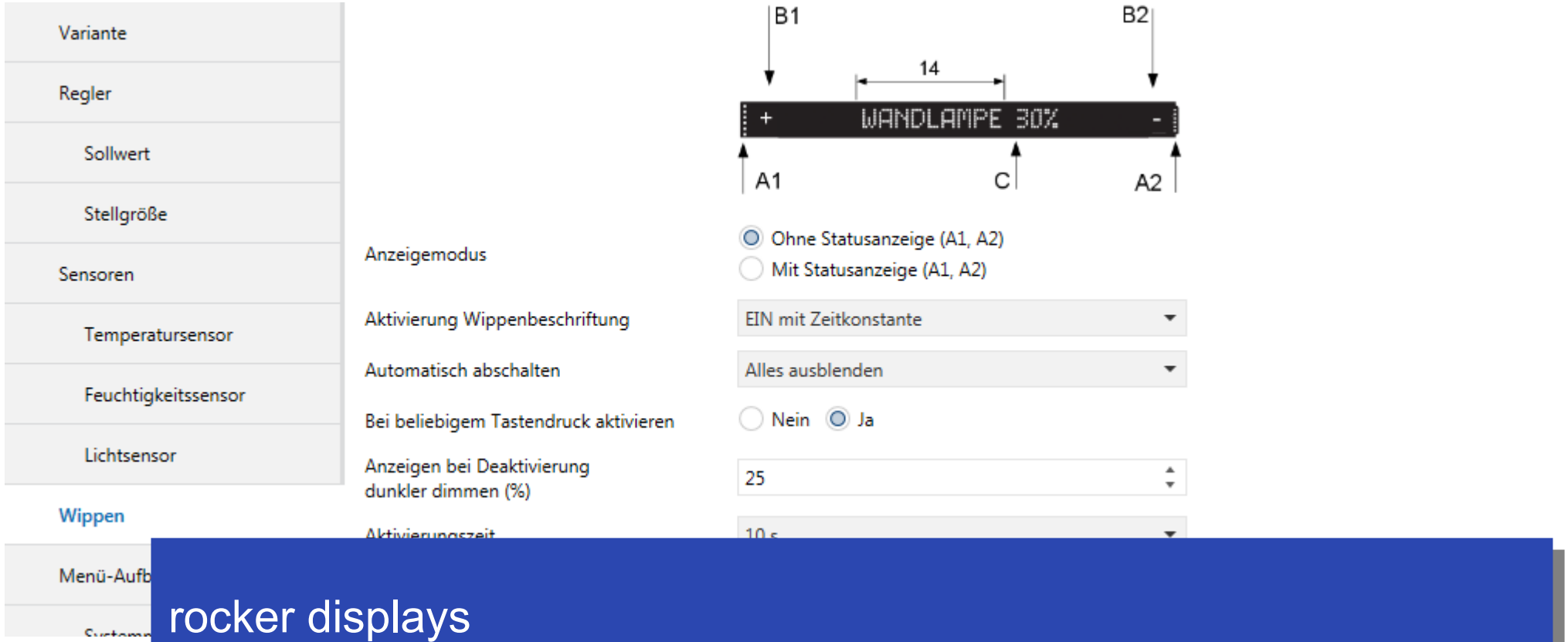
Enertex® MeTa® KNX



rocker displays

+ intuitive operation with feedback, operator displays and labeling

+ automatic brightness control

+ automatic dimming function

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Enertex® META room controller Starter / Standard

MeTa Standard/Starter

- sensors for temperature (only standard), humidit (only standard), light intensity
- room controller application
- 16-way buttons / 8 rockers
- dynamically labelable by ETS or GA
- produced from solid aluminium (black anodized / white powder coated / brushed aluminum)
- external switching contact (input)
- 2x (dynamic) inscribable rockers in four levels plus menu button
- intuitive operation

Stanard LP 309 € PG2, Starter LP 276 PG1

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Enertex® META

	Starter	Standard	Premium
Roomcontroller Heating and Coolung	-	yes	yes
Measurement Temperature and humidity	-	yes	yes
Measurement of light intensity and light color	yes	yes	yes
Rocker/Switch, one Menuswitch	2/4	2/4	4/8
Number of rockers/switches	8/16	8/16	16/32
Display-Label for each rocker	yes	yes	yes
LCD Display with symbols and dotmatrix for roomcontroller etc.	-	-	yes
Auto scroll with max. 28 character at dotmatrix	-	-	yes
Dotmatrix with graphical support	-	-	yes
External switch	yes	yes	yes
Bus powered	yes	yes	yes
Length/Width (mm)	90/90	90/90	180/90
Height (mm)	8,6	8,6	8,6

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Enertex® META room controller - Our product family

Enertex® AluRa

Aluminium frame:	Alu / SW / WS
Single	
Double	
Triple	

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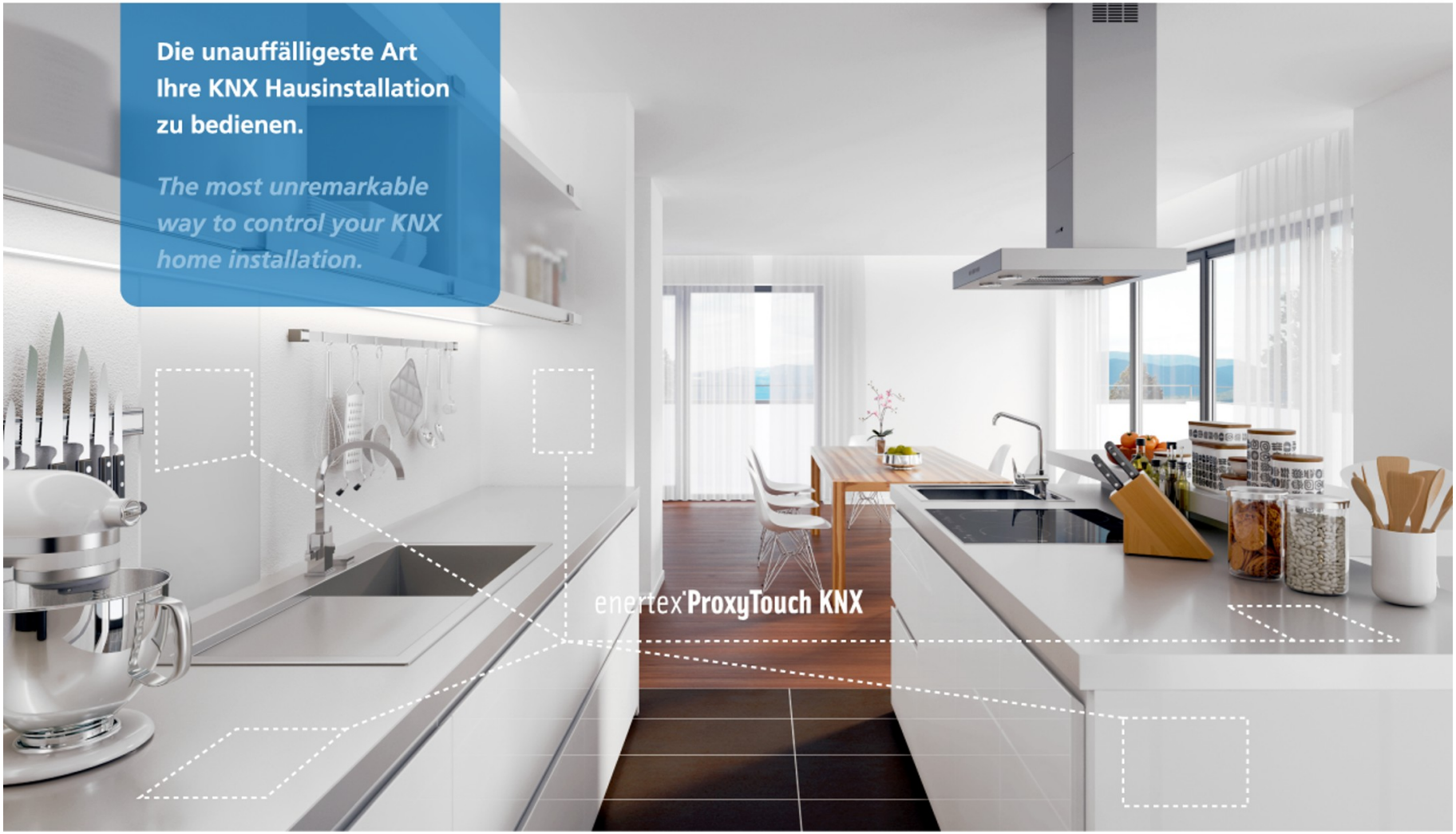
Enertex® ProxyTouch KNX
Der «unsichtbare» Berührungssensor



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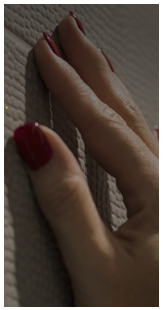
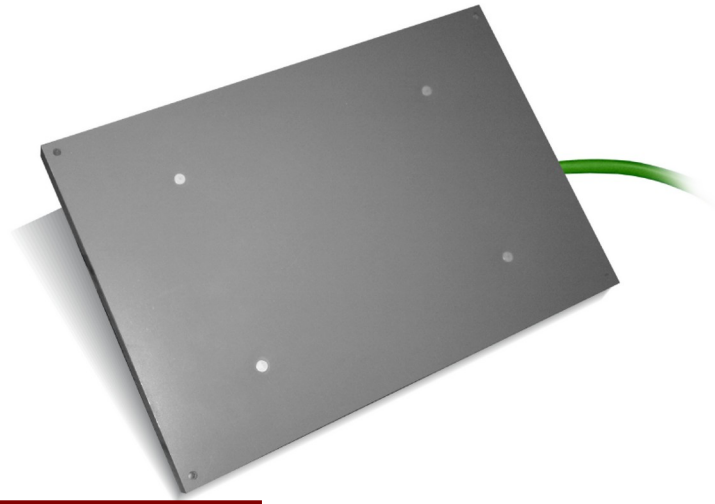
Enertex® ProxyTouch KNX



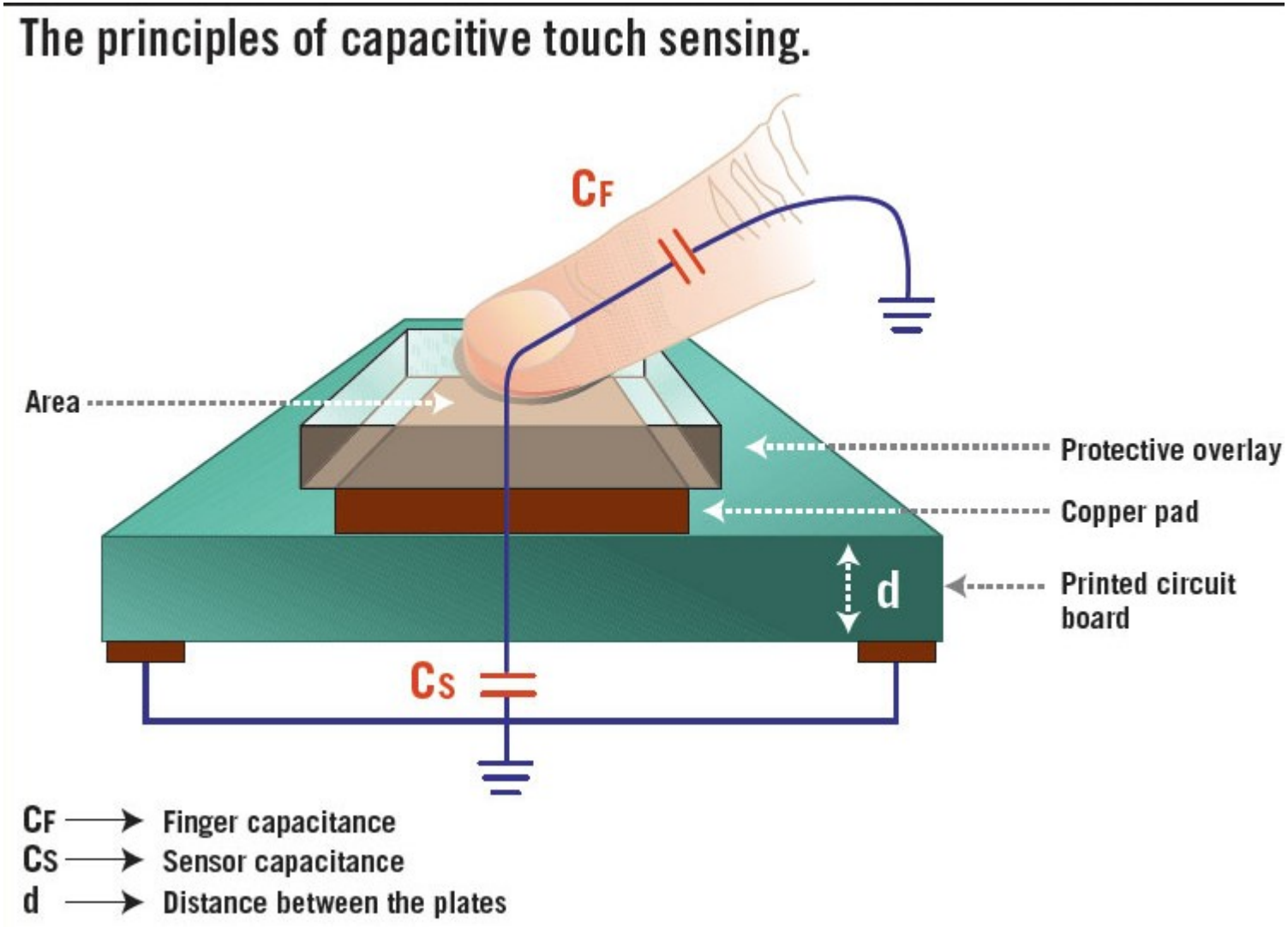


swipe and/or button

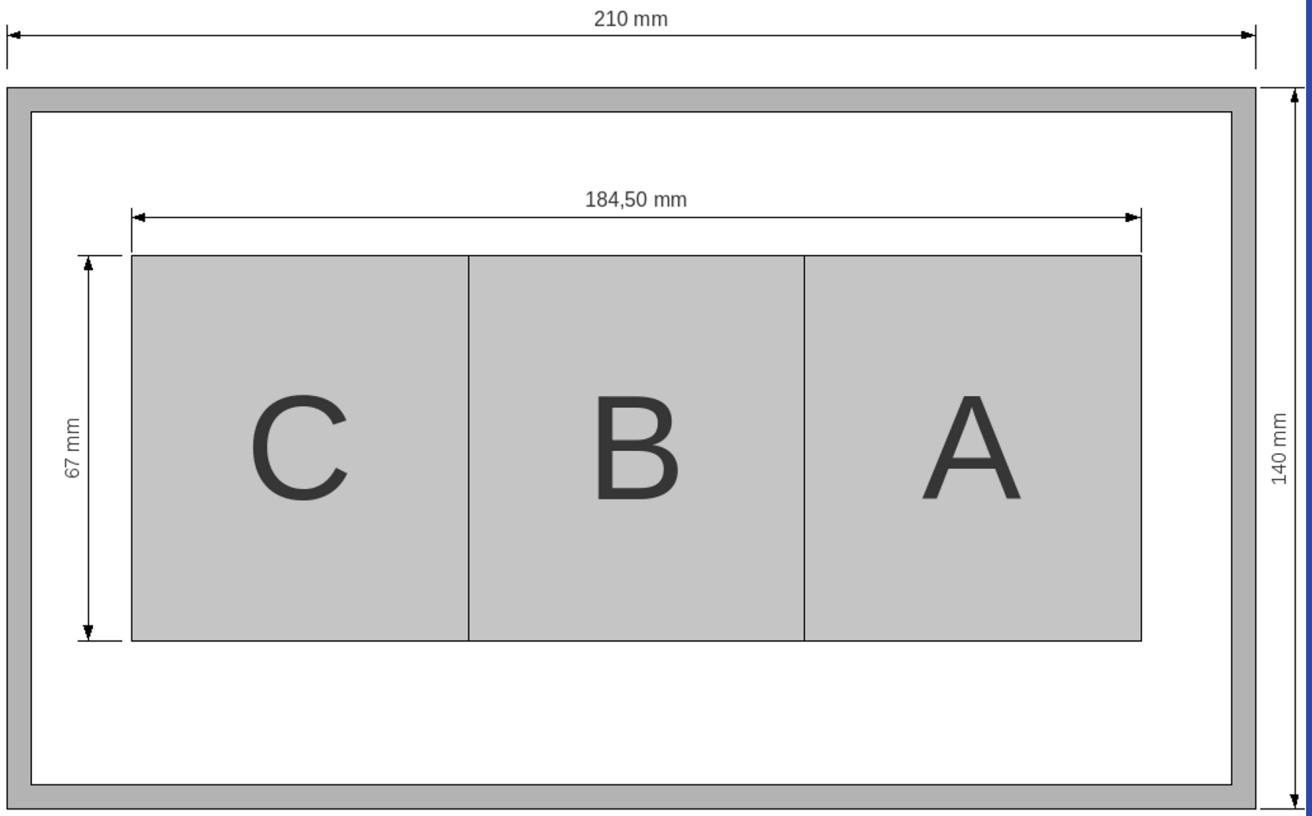
software

- single-click, double-click, swipe
- blocking object for cleaning with sound information on actuation
- Feedback objects (buzzer) for each operation
- splash-proof IP54
- 210x140x12mm
- bus powered
- 25 mm max. reach
- 238 € LP, PG2

Enertex® ProxyTouch KNX
"Switch" under tile, glass, wood ...



Enertex® ProxyTouch KNX fields and operation



Hardware

- bus powered
- prog-mode by magnet

Handling

- 1-click and double click as total field
- 1-click and double click as 3 single fields
- max. configuration: 2x swipe, 1x one-click and 3x double click
- glass, wood, tile

surfaces

surfaces

	Standard	PE connected
wood:	14mm	20 mm
glass:	10mm	25 mm
tile:	10mm	25 mm

Surroundings

Humidity (wet fingers, water on the surface) is not a problem.

Direct water jet should be avoided (false-triggers possible).

Housing is splash-proof.

Device

Bus powered (no problems with electrical safety)

Programming via magnetic button

Suitable adhesive (tile, glass) and screws (wood) are included

1m cable supply