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Webinar "ABB i-bus® KNX Switch Actuators – Energy Functions"

Competence Center Europe - Smart Buildings

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Agenda

Range Overview Switch Actuators

ABB i-bus® KNX Switch Actuators – Professional Range with Energy Functions

Preview: ABB i-bus® Tool with ABB i-bus® KNX Switch Actuators

Introduction: ABB EQmatic Energy Analyzer QA/S KNX
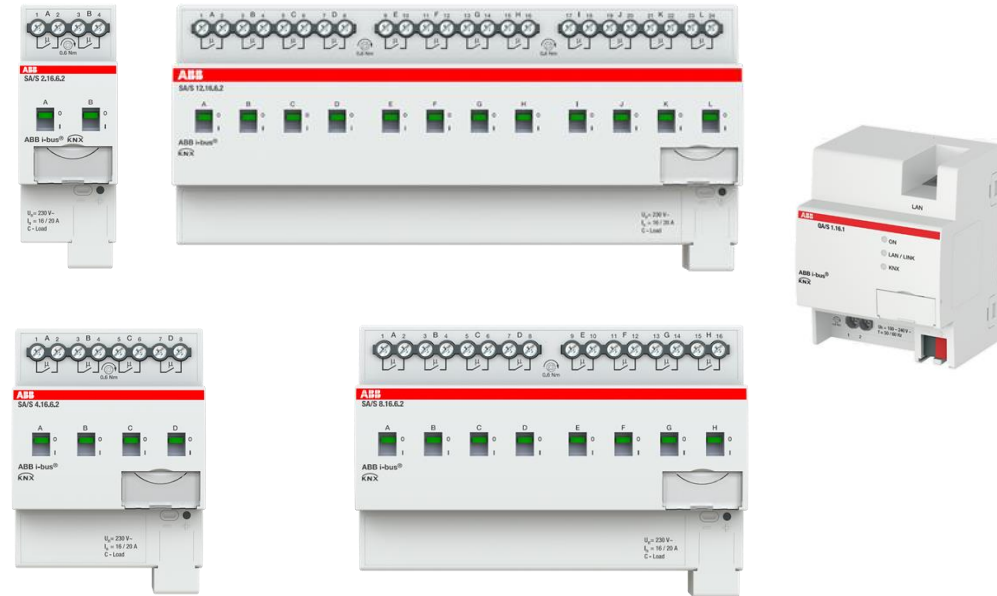
Commercial and Marketing Aspects

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ABB i-bus® KNX Switch Actuators – Professional Range with Energy Functions

Range Overview Switch Actuators

ABB i-bus® KNX Switch Actuators – Professional Range with Energy Functions

Next Generation Switching

Combi Switch Actuators

– The 9 combi devices are combining two applications: switching and shading. The products are ideally made for residential usage to offer greatest flexibility

Standard Switch Actuators

– These 12 devices are building the standard when it comes to switching applications for commercial buildings. During the development we focused on providing a cost optimized selection of products, that matches the needs of commercial projects

Professional Switch Actuators

– The professional series includes 8 switch actuators made for high switching capacity. This portfolio has been developed to suit the high requirements of industry standards
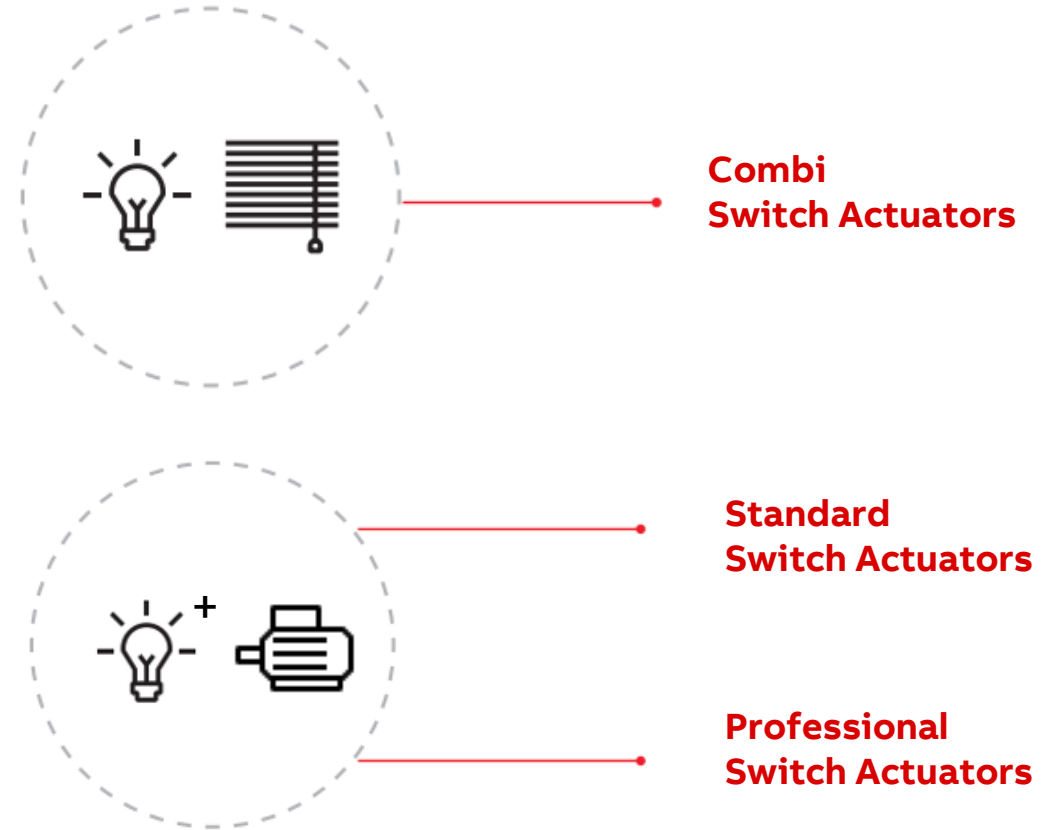
Combi Switch Actuators

Standard Switch Actuators

Professional Switch Actuators

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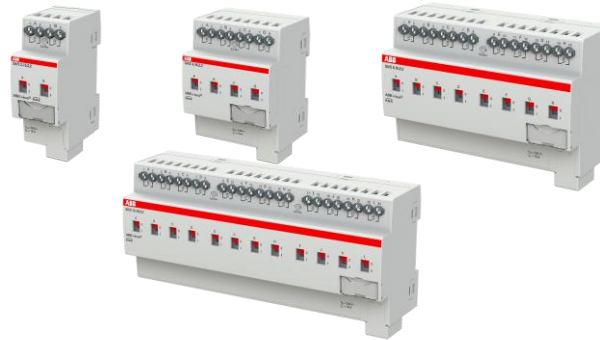
Next Generation Switching

Combi Switch Actuators

- Compact + switch/shutter modes
- 8 (4MW), 16 (8MW) & 24 (12 MW) channels
- 6A, 10A & 16A - AC1 ratings
- 3 x 3 devices

Standard Switch Actuators

- 2, 4, 8 & 12 channels
- 6A, 10A & 16A - AC1 ratings
- 3 x 4 devices

Professional Switch Actuators

- 2, 4, 8 & 12 channels
- 16/20A C-load + **Energy Functions**
- 4 professional Switch Actuators +
  4 professional Switch Actuators with Energy Functions

Residential ←————— Applications —————→ Commercial

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Professional Switch Actuators with Energy Functions

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Why Switch Actuators with Energy Functions?

Support of Applications

Sub metering
– Transparency and optimization of energy consumption
– Comparision of consumption bevaviour
– Detection of energy thieves

Allocation of costs
– Distribution and fair splitting of costs

Monitoring of connected loads
– Detection of malfunctions

Supervision of relay contact and the installation behind (cabling and circuit breaker)

ABB Smart Societies

Smarter Commercial Buildings
Hotels & Offices
Hospitals
Schools
Stadium & Concert
Shopping Malls

Smarter Homes
Single-family homes
Multi-family homes
Apartments
Villas

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Why Switch Actuators with Energy Functions?

Support of Applications

Load management

– Avoidance of load peaks

  • Reduction of costs to be paid for load peaks

  • Prevention of power cut off due to limited power availability

– Integration of the building into intelligent power network

– Operation of renewable energy
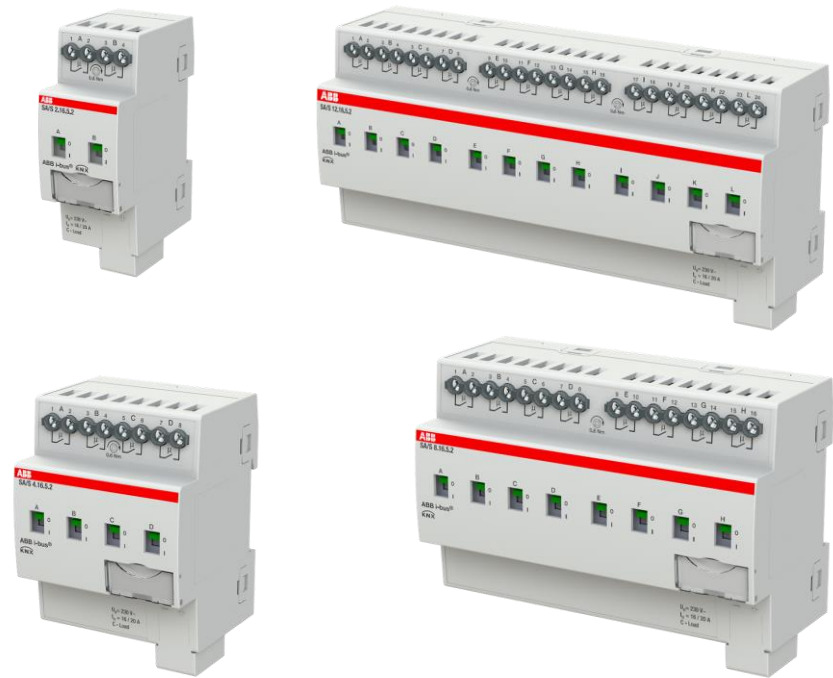
– Management of energy storage solution

– Reaction on different tariffs

→ **Intelligence, information and control down to individual loads and circuits if needed**

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Key Characteristics

– High-switching-capacity devices with extended functionality for industry standard applications

– Main features:

- 2 / 4 / 8 / 12 outputs
- 16/20A C-Load (high capacity)
- Manual operation (voltage independent)
- Combi screw-head terminals
- Single application, smart features
- New housing and label carrier
- Prepared for future developments (Software functions)

– Same functionality like Switch Actuators professional but with **additional Energy Functions**

– **Different hardware**, real current measurement per output

Key feature: High load capacity and energy function

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Selection Table

Overview about <u>hardware performance</u> (Relay, Power, Loads) and software features to select the right device

- Switch actuator Professional with 16/20A C-Load at 200uF

- Switch Actuator Professional prepared for high inrush current (ballast for LED or fluorescent lighting) and motor load

- The continuous current and finally the total current of each device is important for the design of the circuit, the line protection and the switch actuator

- The total current of each professional device is 20A multiplied with the number of channels

	SA/S 2.16.5.2 SA/S 4.16.5.2 SA/S 8.16.5.2 SA/S 12.16.5.2	SA/S 2.16.6.1 SA/S 4.16.6.1 SA/S 8.16.6.1 SA/S 12.16.6.1	SA/S 2.16.6.2 SA/S 4.16.6.2 SA/S 8.16.6.2 SA/S 12.16.6.2
Range	Professional	–	Professional with Energy Function
I_n rated current (A) [1]	16/20 A C-Load	16/20 AX C-Load	16/20 AX C-Load
U_n rated voltage (V)	230 V AC	250/440 V AC	250/440 V AC
AC1 operation (cos φ = 0.8) DIN EN 60947-4-1	20 A	20 A	20 A
AC3 operation (cos φ = 0.45) DIN EN 60947-4-1	16 A	16 A	16 A
C-Load switching capacity (200 μF)	20 A	20 A	20 A
Fluorescent lighting load AX to EN 60669-1	20 AX (200 μF) [5]	20 AX (200 μF) [5]	20 AX (200 μF) [5]
Minimum switching capacity	100 mA/12 V	100 mA/12 V	100 mA/12 V
DC current switching capacity (resistive load)	20 A/24 V =	20 A/24 V =	20 A/24 V =
Mechanical service life	> 10⁶	> 10⁶	> 10⁶
Electronic endurance to IEC 60947-4-1:			
– Rated current AC1 (240 V/0.8)	100,000	100,000	100,000
– Rated current AC3 (240 V/0.45)	30,000	30,000	30,000
– Rated current AC5a (240 V/0.45)	30,000	30,000	30,000
Incandescent lamp load at 230 V AC	3,680 W	3,680 W	3,680 W
Fluorescent lamp T5 / T8:			
– Uncorrected	3,680 W	3,680 W	3,680 W
– Parallel compensated	2,500 W	2,500 W	2,500 W
– DUO circuit	3,680 W	3,680 W	3,680 W
Low-voltage halogen lamps:			
– Inductive transformer	2,000 W	2,000 W	2,000 W
– Electronic transformer	2,500 W	2,500 W	2,500 W
Halogen lamp 230 V	3,680 W	3,680 W	3,680 W
Dulux lamps:			
– Uncorrected	3,680 W	3,680 W	3,680 W
– Parallel compensated	3,000 W	3,000 W	3,000 W
Mercury-vapour lamps:			
– Uncorrected	3,680 W	3,680 W	3,680 W
– Parallel compensated	3,000 W	3,000 W	3,000 W
Sodium-vapour lamps:			
– Uncorrected	3,680 W	3,680 W	3,680 W
– Parallel compensated	3,000 W	3,000 W	3,000 W
LED lamps/energy saving lamps	650 W		650 W
Motor load	3680 W	–	3680 W
Max. peak inrush-current Ip (150 μs)	600 A	600 A	600 A
Max. peak inrush-current Ip (250 μs)	480 A	480 A	480 A
Max. peak inrush-current Ip (600 μs)	300 A	300 A	300 A
Number of electronic ballasts (T5/T8, single element): [5]			
18 W (ABB ballasts 1 x 18 SF)	26 [5] ballasts	26 [5] ballasts	26 [5] ballasts
24 W (ABB ballasts 1 x 24 CY)	26 [5] ballasts	26 [5] ballasts	26 [5] ballasts
36 W (ABB ballasts 1 x 36 CF)	22 ballasts	22 ballasts	22 ballasts
58 W (ABB ballasts 1 x 58 CF)	12 [5] ballasts	12 [5] ballasts	12 [5] ballasts
80 W (Helvar EL 1 x 80 SC)	12 [5] ballasts	12 [5] ballasts	12 [5] ballasts

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Selection Table

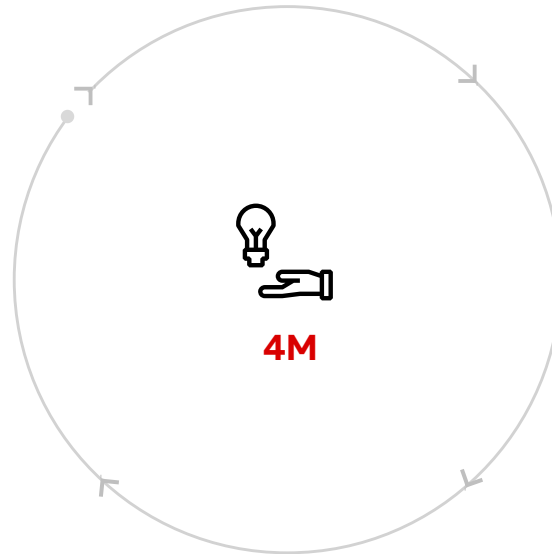Overview about hardware performance (Relay, Power, Loads) and software features to select the right device

– Differences to former Switch Actuator with current detection SA/S x.16.6.**1**

  • Central ON/OFF

  • All Energy functions

  • Logic independent of output, 1-bit inverter

  • Request status values

  • Template pages

	SA/S 2.16.5.2 SA/S 4.16.5.2 SA/S 8.16.5.2 SA/S 12.16.5.2	SA/S 2.16.6.1 SA/S 4.16.6.1 SA/S 8.16.6.1 SA/S 12.16.6.1	SA/S 2.16.6.2 SA/S 4.16.6.2 SA/S 8.16.6.2 SA/S 12.16.6.2
Range	Professional	–	Professional with Energy Function
Type of installation	DIN-Rail	DIN-Rail	DIN-Rail
Number of outputs	2/4/8/12	2/4/8/12	2/4/8/12
Module width (space unit)	2/4/8/12	2/4/8/12	2/4/8/12
Manual operation	■	■	■
Contact position display	■	■	■
I$_n$ rated current (A)	16/20 A C-Load	16/20 AX C-Load	16/20 A C-Load
Current detection	–	■	■
Switch function			
– Central ON/OFF	■	–	■
– Staircase light	■	■	■
– Warning before end of staircase lighting	■	■	■
– Staircase lighting time set via object	■	■	■
– Flashing	■	■	■
– Switch response can be set (N.O./N.C.)	■	■	■
– Switch On/Off delay	■	■	■
Energy Function	–	–	■
– Current measurement	–	–	■
– Power calculation	–	–	■
– Energy consumption calculation	–	–	■
– Load monitoring	–	–	■
– Load control integration	–	–	■
Function Scene	■	■	■
Function Logic & Threshold (independet of output)			
– Logic AND function	■	■	■
– Logic OR function	■	■	■
– Logic XOR function	■	■	■
– Gate function	■	■	■
– 1-Bit Inverter	–	–	■
– Threshold	■	■	■
Priority object/forced operation	■	■	■
Blind/Roller Shutter function	–	–	–
Special functions			
– Request status values	■	–	■
– Template pages	■	■	■
– Default position on bus voltage failure/recovery	■	■	■
– Status messages	■	■	■

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Overview
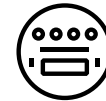
ETS Application with comprehensive functions and satisfying user experience

Application like standard and professional Switch Actuator

– Templates for switch functions

– Freely programmable logic independent of the output channels (AND, OR, Exclusive OR, GATE) and threshold functions

– Switch outputs with time functions (staircase, delay, flashing), forced operation, blocking, 16 scenes (8 bit)

– Central objects (switching and scenes)

– Colored hints simplify work

– ETS5 required

Application Professional Switch Actuator with energy function contains further parameters

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4M: Measurement – Metering – Management - Monitoring

Measurement
Current measurement and contact status supervision for each output

Metering
Flexible and easy power and energy consumption calculation

4M

Management
Easy integration in an energy/load control system

Monitoring
User friendly monitoring of consumption and load status

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Overview of the Functions

Current is measured in each output

Power is calculated based on voltage and power factor parameters

Energy consumption is counted based on start/stop settings

The status of the load can be supervised in an easy and application-oriented way

The contact status supervision compares the output switching status and measured current. Faults can be reported

To monitor several outputs at the same time, groups of outputs can be easily created

The status of the group loads can be supervised in an easy and application-oriented way

The data can be shown visually and in real time via ABB i-bus® Tool

The outputs can be seamlessly integrated in an energy/load control system, e.g. ABB EQmatic Energy Analyzer KNX

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Current Measurement

Current is measured in each output

Measurement of current per channel like in energy meters

– Value on KNX bus in mA or A

– Measurement delay after contact change → to measure only in stable situation (after switch on or off)

– Sending value in case of change, cyclically or on request or combinations

→ true information about current of each output to evaluate the load also over a long time if needed

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Current Measurement

Current is measured in each output

Detection range	0.02 … 20 A
Accuracy	+/- 2 % of the act. current plus +/- 0.02 A
Measurement delay	approx. 2 s
Load current I_{Load} AC	0 … 20 A, sinusoidal
Load current I_{Load} DC	Is not acquired
Frequency range	50 … 60 Hz
Ambient temperature	-5 °C…+40 °C

Measurement of current per channel like in energy meters

The measured value is available as RMS (Root Mean Square)

– Detection range: 20mA … 20A

– Made for sinusoidal load current

- DC current can be switched (20A with 24V DC) but not measured

– Delay of 2s to measure correct current

– Accuracy in principle 2%, in addition +/-20mA, resulting in less accuracy with lower current

Current measured	Maximum measurement error
300 mA	+ / − 26 mA
2 A	+ / − 60 mA
16 A	+ / − 340 mA
20 A	+ / − 420 mA

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Current Measurement

Alternating Current (AC)

Current is measured in each output

Measurement of current per channel (excerpt from the manual)

The function Current measurement is based on a transformer measurement (conversion of sinusoidal load currents by means of a transformer). The current transmitted is rectified and smoothed by an RC element on the secondary side of the transformer. Interference is suppressed and the measured value stabilized.
The root mean square value is given by the measured value multiplied by the fixed factor $1 / \sqrt{2}$. The factor is given by the crest factor $\hat{U} / U_{rms} = \sqrt{2}$ for a sinusoidal waveform type.
If the waveform type is not sinusoidal, values are produced that can vary significantly from the actual root mean square value

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Power Calculation

Power is calculated based on voltage and power factor parameters

Calculation of power out of fixed or dynamic voltage and power factor (each with group object to receive changed values)

The measured value is available as RMS (Root Mean Square)

– Power factor is the ratio of active power to apparent power

→ apparent power is measured

→ with known power factor the active power is calculated

– Value on KNX bus in W or kW

– Sending value in case of change, cyclically or on request or combinations

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Energy Consumption

Energy consumption is counted based on start/stop settings

Calculation of energy consumption out of power multiplied with time

- Value on KNX bus in Wh or kWh

- Sending value in case of change, cyclically or on request or combinations

- Start/Stop time of energy consumption 3 byte or 8byte (date and time together)

- Intermediate meter, start/stop via 1 bit telegram with own object for consumption value

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Energy Consumption

Energy consumption is counted based on start/stop settings

This calculation of energy consumption is not made for external billing!

– Switch Actuator is not in accordance with MID (Measuring Instruments Directive)

– Possible to reset the energy consumption value via KNX telegram (not in normal energy meters!)

Channel A: Energy consumption	Reset total meter	1 bit

– Internal assignment of costs should be possible

1.1.28 SA/S8.16.6.2 Switch Actuator, 8f, 16A-C, Energy, MDRC > Switch Actuator A >   Energy consumption

Device settings	Parameter setting — Apply from template ⦿ Individual
+ Safety	Energy displaying unit — Wh (DPT 13.010) ⦿ kWh (DPT 13.013)
+ Energy group 1	Activate total meter ✓
+ Energy group 2	Send value of group object "Status total meter energy consumption" — At change
+ Energy group 3	Evaluation change of value ⦿ in % ○ Change absolute
+ Energy group 4	Change of value — 10 %
+ Logic/Threshold	ⓘ Calculated based on the last sent value
+ Switch Actuator template	Send time stamp of total meter start ✓
+ Energy Functions template	Data point type time stamp ⦿ Date (DPT 11.001)/Time (DPT 10.001) ○ Date/Time (DPT 19.001)
− Switch Actuator A	Reset total meter via group object ✓
	Reset total meter via i-bus Tool ☐
Functions	Activate intermediate meter ✓
Basic settings	ⓘ The "Start/Stop intermediate meter" group object has been activated. The calculated energy consumption is available after the intermediate meter has stopped.
Load shedding	
Current measurement	
Energy Functions	
Power calculation	
Energy consumption	
Load monitoring	
Contact status supervision	

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Load Monitoring

The status of the load can be supervised in an easy and application-oriented way

Evaluation of load regarding thresholds, up to 6 or single ranges can be enabled:

– A: ON/OFF

– B: Standby

– C: Underload

– D: Operation

– E: Overload

– F: Maximum threshold exceeded

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Load Monitoring

The status of the load can be supervised in an easy and application-oriented way

– Measurement unit is either current or power

– Up to 4 thresholds: Standby/underload, underload/operation, operation/overload, overload/max. threshold

– Thresholds changeable via bus or ABB i-bus® Tool

– Status as separate bits or 1 byte telegram

– Send status in case of change or request

→ Not only on/off status anymore but clear information about the typical operating conditions, e.g. if a load is in standby mode during the night it can be turned off completely
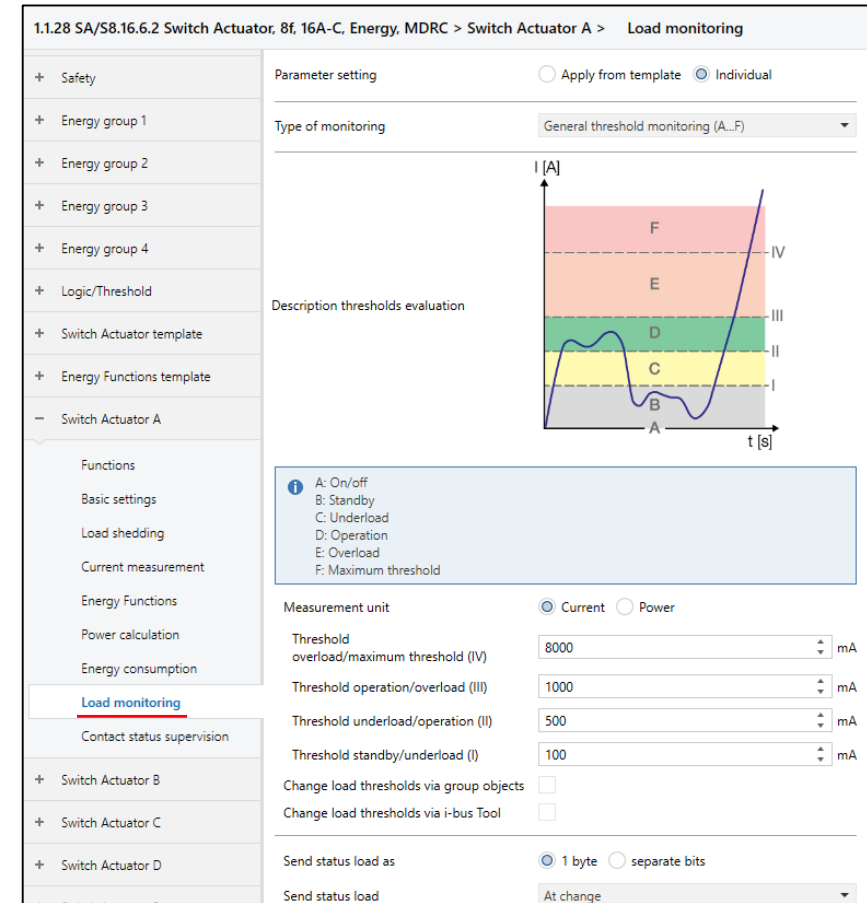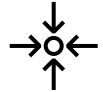
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Contact Status Supervision

The contact status supervision compares the output switching status and measured current. Faults can be reported

Comparison between switch status via KNX and the real contact position via current measurement

– Two 1 bit status objects:

- Contact closed and no current flows
  → cable interruption, circuit breaker tripped, device not connected or damaged, relay contact oxidized, phase failure

- Contact open and current flows
  → relay contact damaged (welded) or manual operation

– Reset alarm via KNX telegram

1.1.28 SA/S8.16.6.2 Switch Actuator, 8f, 16A-C, Energy, MDRC > Switch Actuator A > Contact status supervision

Configuration	Parameter setting ○ Apply from template ◉ Individual
+ Device settings	Value of group object when contact open and current flows ○ 0 ◉ 1
+ Safety	Send value of group object "Contact open and current flows" At change
+ Energy group 1	Value of group object when contact closed and no current flows ○ 0 ◉ 1
+ Energy group 2	Send value of group object "Contact closed and no current flows" At change
+ Energy group 3	Reset alarm via group object ✓
+ Energy group 4	
+ Logic/Threshold	ℹ The contact status supervision offers an actual comparison between the switch status via KNX and the real contact position detected via the current measurement.
+ Switch Actuator template	
+ Energy Functions template	
− Switch Actuator A	
Functions	
Basic settings	
Load shedding	
Current measurement	
Energy Functions	
Power calculation	
Energy consumption	
Load monitoring	
Contact status supervision	

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Energy Groups

To monitor several outputs at the same time, groups of outputs can be easily created

Creation of energy groups out of all channels in one device as needed

Example:

– Total consumption per department independent of load type
– Total consumption of all sockets independent of department and floor
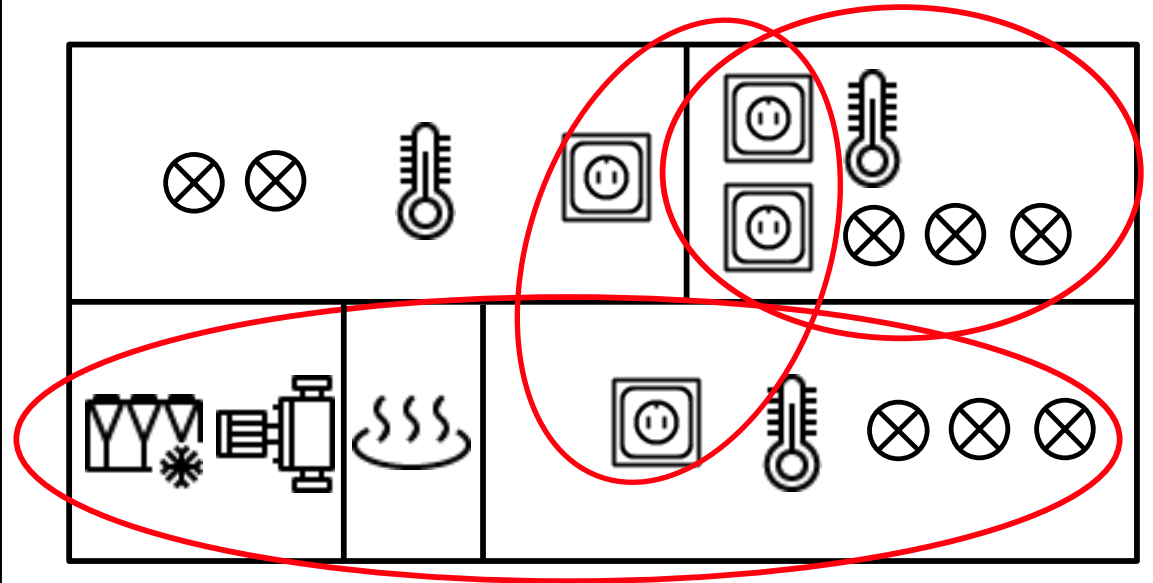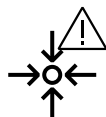– Total consumption of one floor

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Energy Groups

To monitor several outputs at the same time, groups of outputs can be easily created

The status of the group loads can be supervised in an easy and application-oriented way

Supervision of up to 4 energy groups regarding current, power, energy consumption and load monitoring

- Any output of the device can be a member of an energy group
- Assignment to energy groups at each channel
- Load Monitoring for energy groups (e.g. standby or overload) in the same way feasible as for individual outputs

1.1.28 SA/S8.16.6.2 Switch Actuator, 8f, 16A-C, Energy, MDRC > Energy group 1 > Current measurement

Current displaying unit	○ mA (DPT 9.021) ◉ A (DPT 14.019)	
Send value of group object "Status current"	At change	▼
Evaluation change of value	◉ in % ○ Change absolute	
Change of value	10	%

ⓘ Calculated based on the last sent value

1.1.28 SA/S8.16.6.2 Switch Actuator, 8f, 16A-C, Energy, MDRC > Switch Actuator A > Energy Functions

Enable function power calculation ✓
Enable function energy consumption ✓
Enable function load monitoring ✓
Enable function contact supervision ✓

Assign to energy group 1 ✓
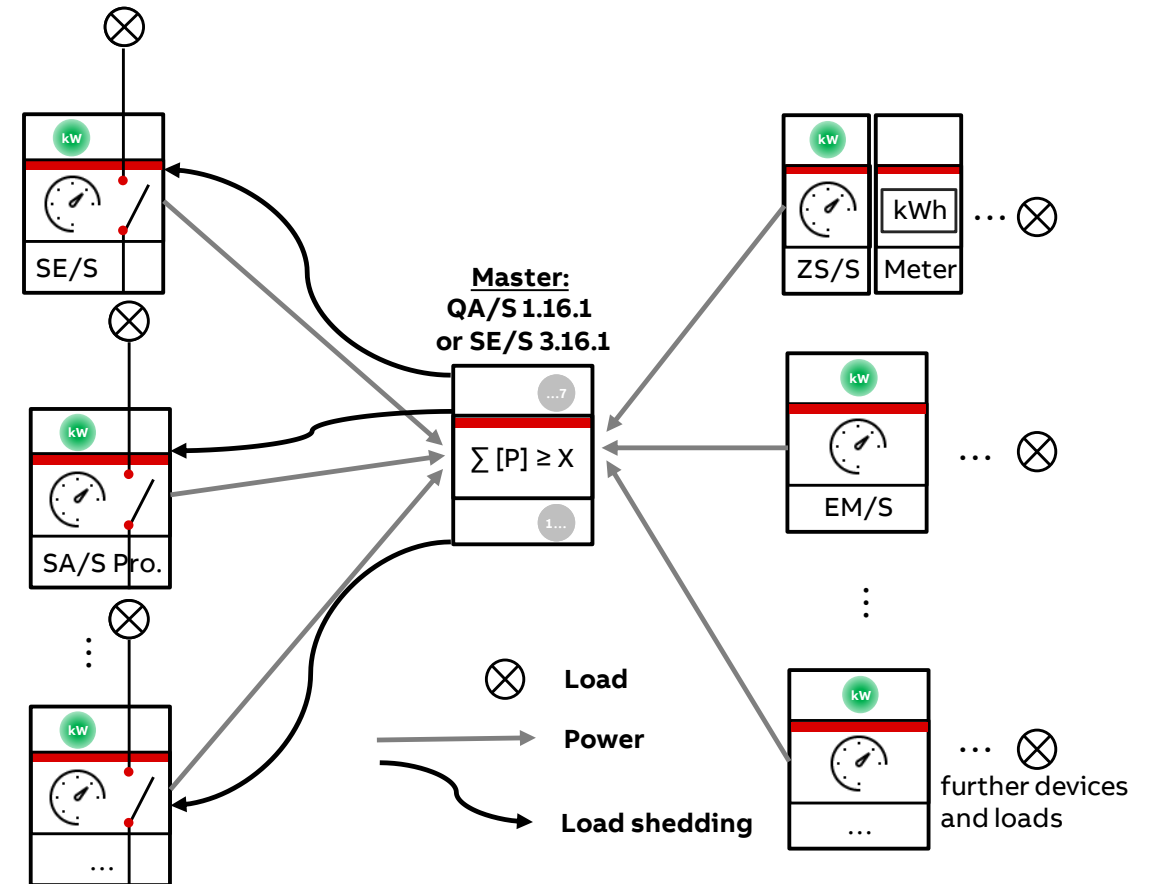Assign to energy group 2
Assign to energy group 3
Assign to energy group 4

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Load Shedding

Load Shedding - Principle

The outputs can be seamlessly integrated in an energy/load control system, e.g. ABB EQmatic Energy Analyzer KNX

Target: Prevention of electrical load peaks in a building due to limited power and installation availability or significant costs

- The master Energy Analyzer KNX QA/S (or also Energy Actuator SE/S) sums up all received power values and manages depending on adjusted load limit the connected loads (turn on/off) with priority

- Loads not able to send any direct energy consumption values can also be integrated into load shedding via an energy meter (Meter interface ZS/S 1.1 or KNX Energy Module EM/S 3.16.1)

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Load Shedding

Load Shedding - Reaction times and hysteresis

The outputs can be seamlessly integrated in an energy/load control system, e.g. ABB EQmatic Energy Analyzer KNX

– Reaction time (2…60s) when exceeding the load limit avoids that short term power peaks result in immediate switch off of loads

– Reaction time (30…65535s) when the power falls below the load limit avoids that short term power drops result in immediate switch on of loads

– An adjustable hysteresis when turning on (power below the limit) prevents a shedding stage from continuously switching on and off

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Load Shedding

The outputs can be seamlessly integrated in an energy/load control system, e.g. ABB EQmatic Energy Analyzer KNX

Loads on each output can listen to load shedding stages from a master (QA/S 1.16.1 or SE/S 3.16.1) to be turned off or on depending on load threshold

– 15 stages with priority (1 low … 15 high)

• Assignment of shedding stage in each output

• 1 byte telegram sent from the master with information active/ not active and stage number

• Central group object per device 'Receive load shedding stage'

1.1.28 SA/S8.16.6.2 Switch Actuator, 8f, 16A-C, Energy, MDRC > Switch Actuator A > Load shedding

Configuration	Parameter setting · Apply from template ⦿ Individual
+ Device settings	
	Load shedding stage · 1
+ Safety	Change load shedding stage via group object · ✓
+ Energy group 1	Change load shedding stage via i-bus Tool · ✓
+ Logic/Threshold	Overwrite load shedding stage at download · ✓
+ Switch Actuator template	Reaction on active load shedding stage · ⦿ Off ○ On
+ Energy Functions template	Reaction on revoke of load shedding stage · No reaction
– Switch Actuator A	
Functions	
Basic settings	
Load shedding	

⬛↯4	Central: Load shedding	Receive load shedding stage	1 byte	C
⬛↯239	Channel B: Load shedding	Set load shedding stage	1 byte	C
⬛↯200	Channel A: Load shedding	Set load shedding stage	1 byte	C

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Load Shedding

The outputs can be seamlessly integrated in an energy/load control system, e.g. ABB EQmatic Energy Analyzer KNX

– Load shedding stage is parametrizable and changeable via KNX telegram or ABB i-bus® tool

- Group object per channel 'Set load shedding stage' to change the shedding stage per telegram if required

– Reaction in case of active and inactive stage adjustable

- Active: on/off

- Not active: no reaction, on/off, refreshed KNX state (user tried to turn on when load shedding was active)

- Typically load off with active and on with not active

4	Central: Load shedding	Receive load shedding stage	1 byte	C
239	Channel B: Load shedding	Set load shedding stage	1 byte	C
200	Channel A: Load shedding	Set load shedding stage	1 byte	C

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Load Shedding

Load Shedding – How to integrate further devices?

The outputs can be seamlessly integrated in an energy/load control system, e.g. ABB EQmatic Energy Analyzer KNX

Beside the 1 byte object load shedding stage the QA/S 1.16.1 can send also for each of the 8 stages individual 1 bit telegrams

This allows to integrate easily also further loads controlled via other actuators which have no 1 byte object load shedding stage

Best is to control it via group objects with higher priorities like forced operation to avoid any overwrite by local operation

SE/S

Master:
QA/S 1.16.1
or SE/S 3.16.1

∑ [P] ≥ X

ZS/S   Meter

SA/S Pro.

EM/S

further devices
and loads

Load

Power

Load shedding

ABB

ABB i-bus® KNX Switch Actuators - Switch to a smarter tomorrow

ABB i-bus® Tool with Switch Actuators

ABB i-bus® KNX Switch Actuators - Switch to a smarter tomorrow

ABB i-bus® Tool – Overview

- Unique Software tool for ABB i-bus® KNX devices
- It supports system integrators during commissioning and service
- Internal information and states of the device hardware and software applications available in a transparent manner
- Operation of functions
- The i-bus® Tool is optional, i.e. the ABB i-bus® KNX devices must still be commissioned using just the ETS
- No divergences to the ETS project can result through the i-bus® Tool as it does not change any programming
- To be downloaded from ABB homepage (LINK)
- Free of charge
- → **Soon also available for all new ABB Switch Actuators**

ABB i-bus® KNX Switch Actuators - Switch to a smarter tomorrow

Preview – ABB i-bus® Tool with Switch Actuators

Status & Operation

- Display of device and channel status

- Operation of device and individual channel functions

- Activation of superior functions like scenes or priority switching

ABB i-bus® KNX Switch Actuators - Switch to a smarter tomorrow

Preview – ABB i-bus® Tool with Switch Actuators

Device Diagnostics

– Display of device status

– Internal protocol, software and lifecycle status

– Update information

| General information | Software status | Protocol specific |

Product data

Brand	ABB
Type code	0xABCD
Description	SAH/S
Order code	1234567890
Hardware capabilities	Everything

Manufacturing data

Manufacturing country	Germany
Date/Time of manufacture	2020/02/05
Validation test result	Successfull
Production serial number	1222333
Hardware version	1.0

System data

Supply voltage	230 V
CPU temperature	34 °C
CPU load indication	27 %
Storage	32% used
Aboslute	100 MB
Used	27 MB
Free	73 MB

Time

Operating time	11:30:45
Since last reboot	01:30:32

ABB

ABB i-bus® KNX Switch Actuators – Professional Range with Energy Functions

Preview – ABB i-bus® Tool with Switch Actuators

Energy Functions

– Display of values, e.g. as line or bar graph

– Total energy consumption with start time and reset button

– Load monitoring with current power value and changeable thresholds
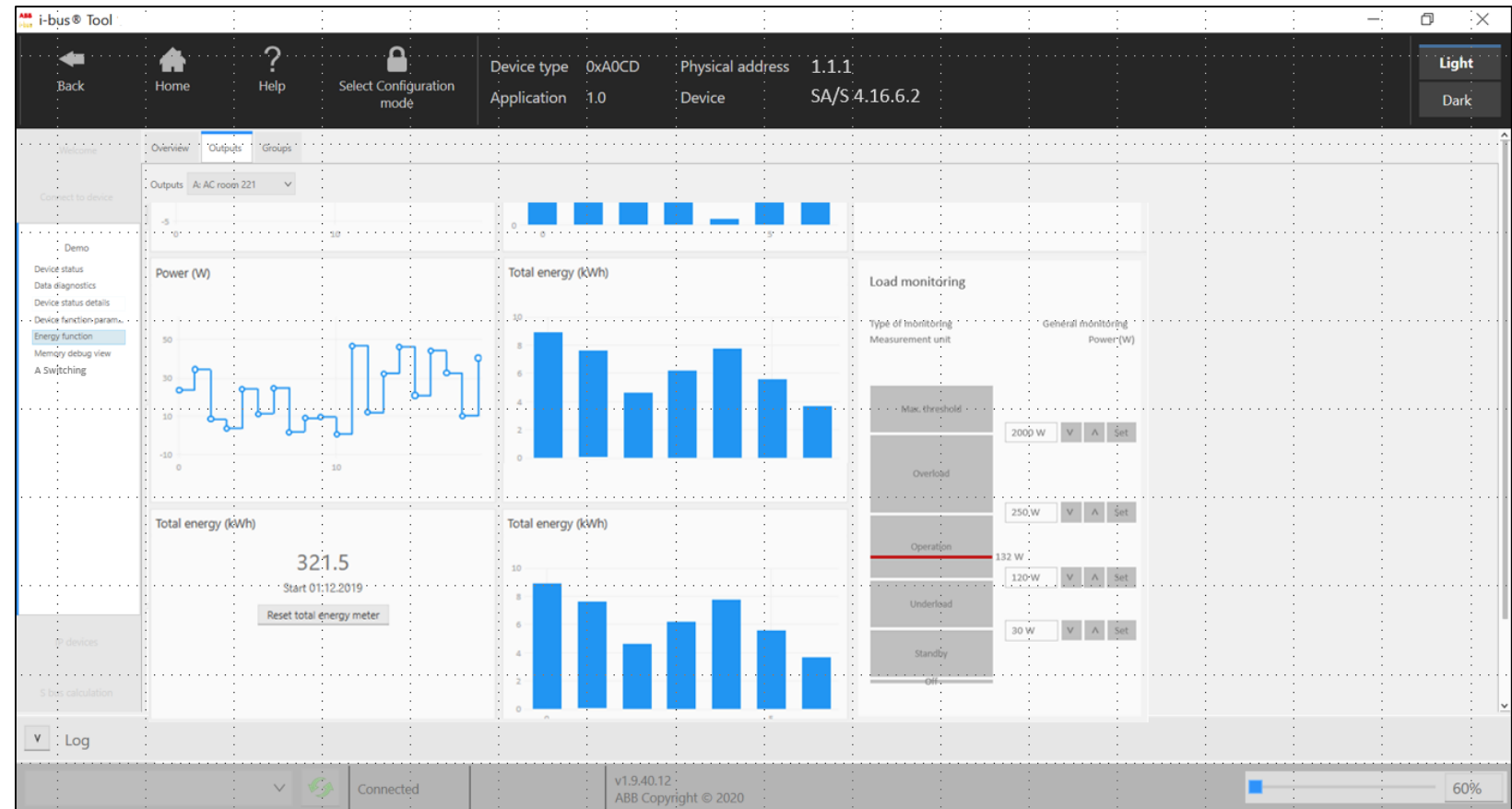
– Display of energy groups

– …

ABB i-bus® KNX Switch Actuators – Professional Range with Energy Functions
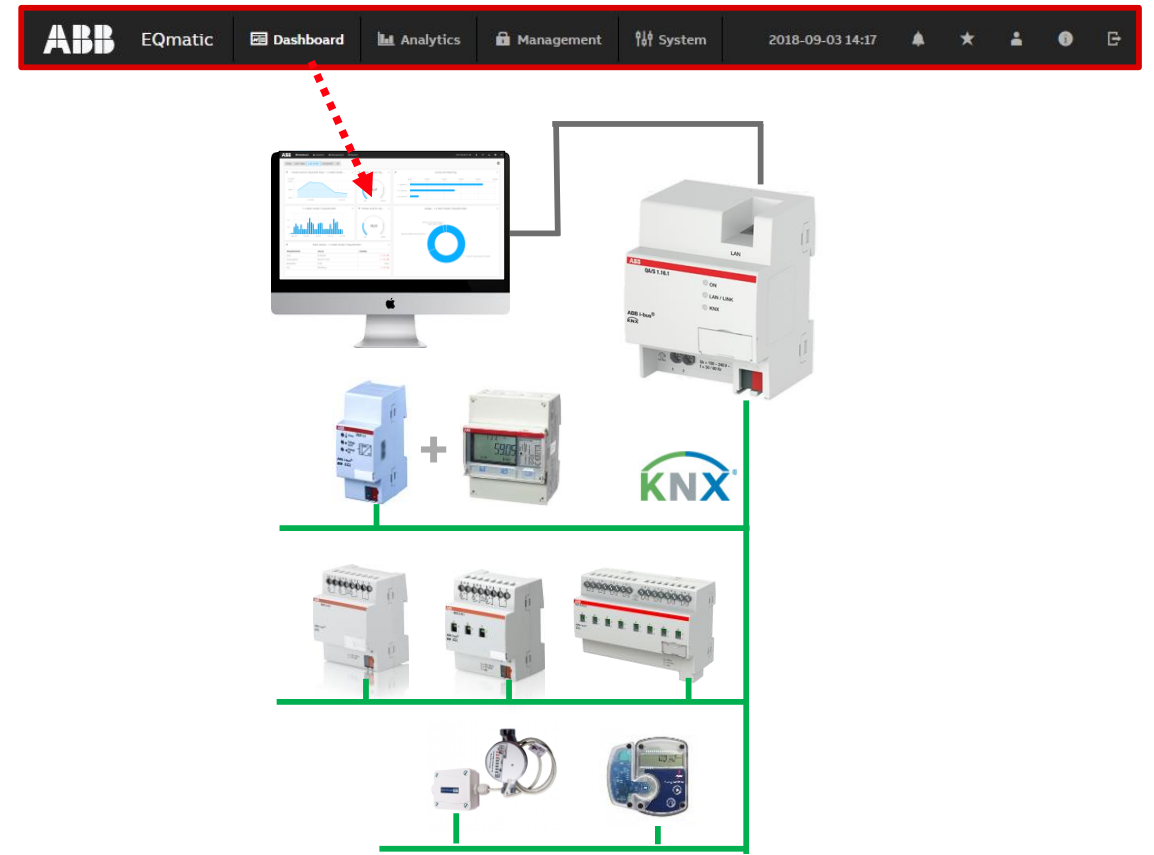ABB EQmatic Energy Analyzer QA/S 1.16.1 KNX

ABB i-bus® KNX Switch Actuators – Professional Range with Energy Functions

ABB EQmatic Energy Analyzer QA/S 1.16.1 KNX

Principle

ABB EQmatic Energy Analyzer are compact, web-based standalone devices for energy management applications

– Energy Analyzer QA/S 1.16.1 KNX

– Energy Analyzer QA/S 3.xx.1 M-Bus

– Energy Analyzer QA/S 4.xx.1 Modbus

They log, store, display and analyze consumption data for up to 16 (KNX) or 64 (M-Bus, Modbus) electricity, gas, water or heat meters

Device access is via web browser (integrated web server)

They automatically detect ABB A and B Series Energy Meters and Modbus Network Analyzer during commissioning

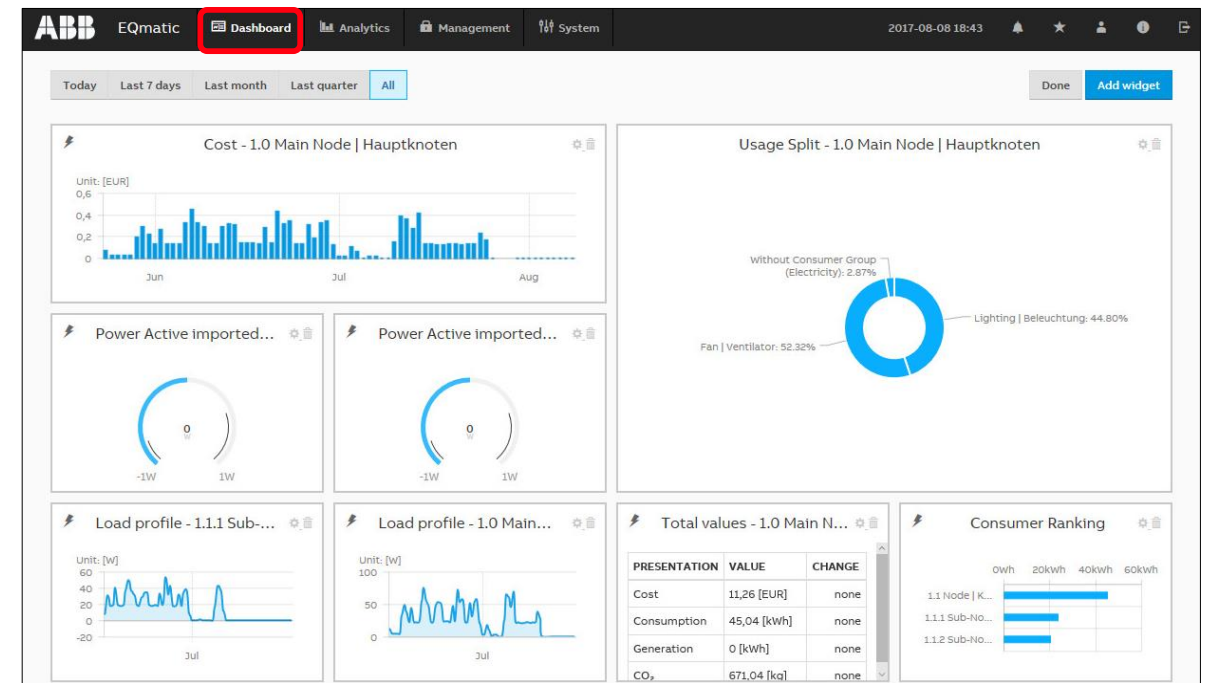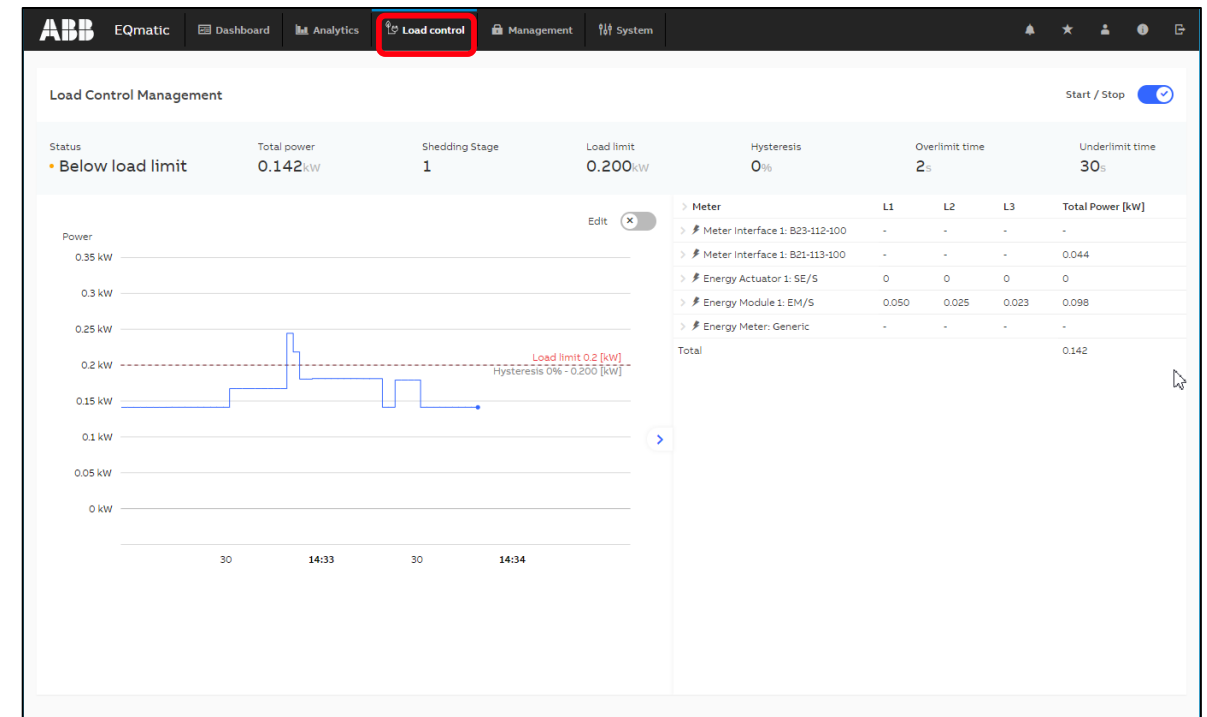Other meters (water, gas,…) or pulse adapters must be manually configured and added to the system

ABB i-bus® KNX Switch Actuators – Professional Range with Energy Functions

ABB EQmatic Energy Analyzer QA/S 1.16.1 KNX

User interface via integrated Web Server

The dashboard provides a rapid overview of costs and consumers

In the dashboard you can configure user-defined views using widgets (graphical display elements) and alarms (e.g. measured value is exceeded)

Further functions:

Analysis and display of historical measured data

Displays of instantaneous values of a single data point in real time

Benchmark period to compare a consumer or node referred to two time intervals (e.g. current month and previous month)

Benchmark consumers to compare up to five consumers or nodes

Report can be sent as analyzes and evaluations to different recipients, either by email or to an FTP server

Alarm ranges can be configured for any data point, in case of exceeding value notification is sent to e-mail recipients and to the alarm log

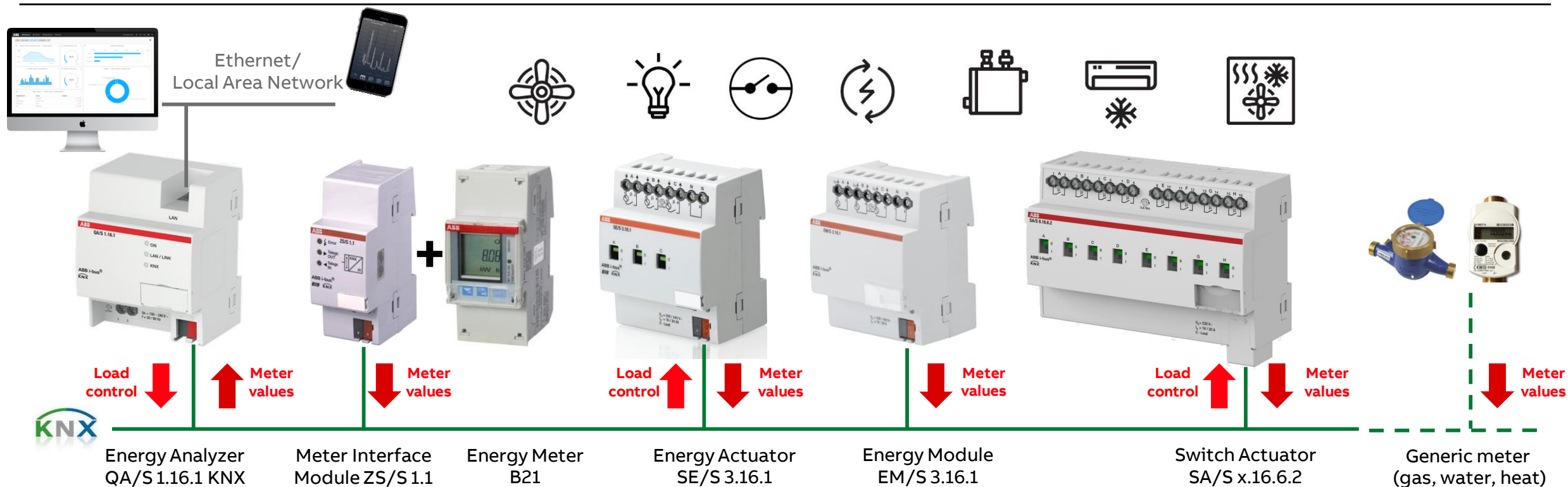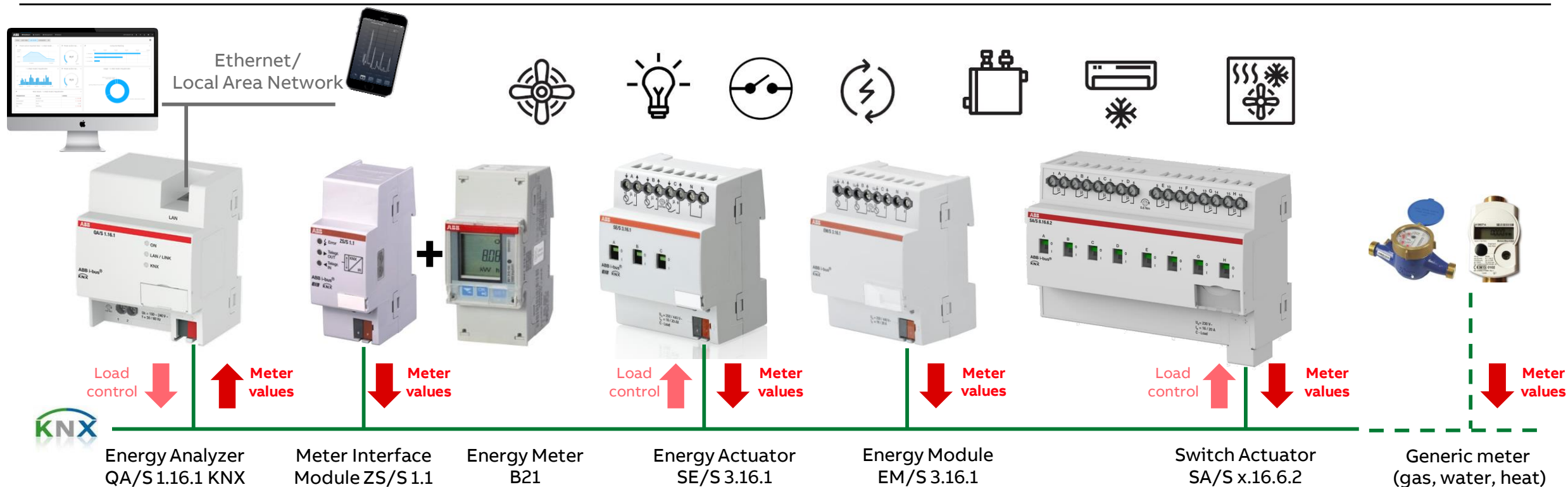# ABB i-bus® KNX Switch Actuators – Professional Range with Energy Functions

ABB EQmatic Energy Analyzer QA/S 1.16.1 KNX

Load Control (QA/S 1.16.1 KNX)

With the Load Control Management function, load shedding sequences can be prioritized based on the electrical power values received from electricity meters or KNX actuators

The load control parameter must be activated in the ETS so that the load control can be displayed and operated via the user interface

Webinar "ABB EQmatic Energy Analyzer QA/S KNX" (January 2020)

– Presentation → Link
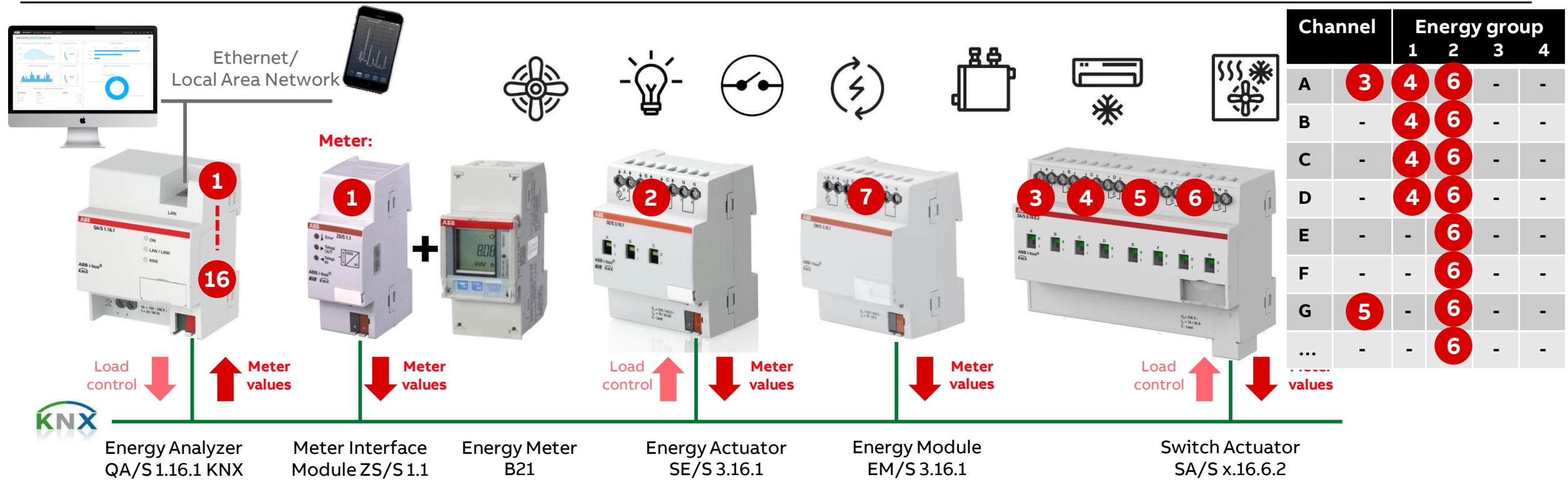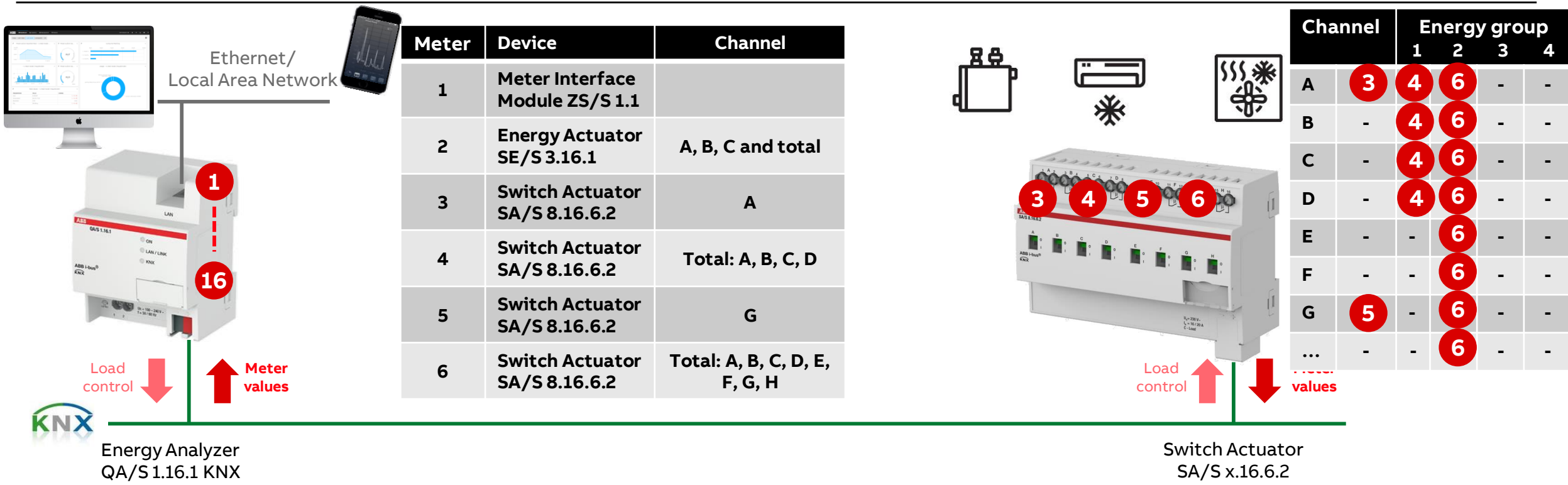
– Video recording → Link

Product is now available!

ABB i-bus® KNX Switch Actuators – Professional Range with Energy Functions

ABB EQmatic Energy Analyzer QA/S 1.16.1 KNX and KNX Meters

Overview Energy Analyzer QA/S 1.16.1 KNX and KNX Meters – Meter Values and Load Control

Ethernet/
Local Area Network

Load control | **Meter values** | **Meter values** | **Load control** | **Meter values** | **Meter values** | **Load control** | **Meter values** | **Meter values**

Energy Analyzer
QA/S 1.16.1 KNX

Meter Interface
Module ZS/S 1.1

Energy Meter
B21

Energy Actuator
SE/S 3.16.1

Energy Module
EM/S 3.16.1

Switch Actuator
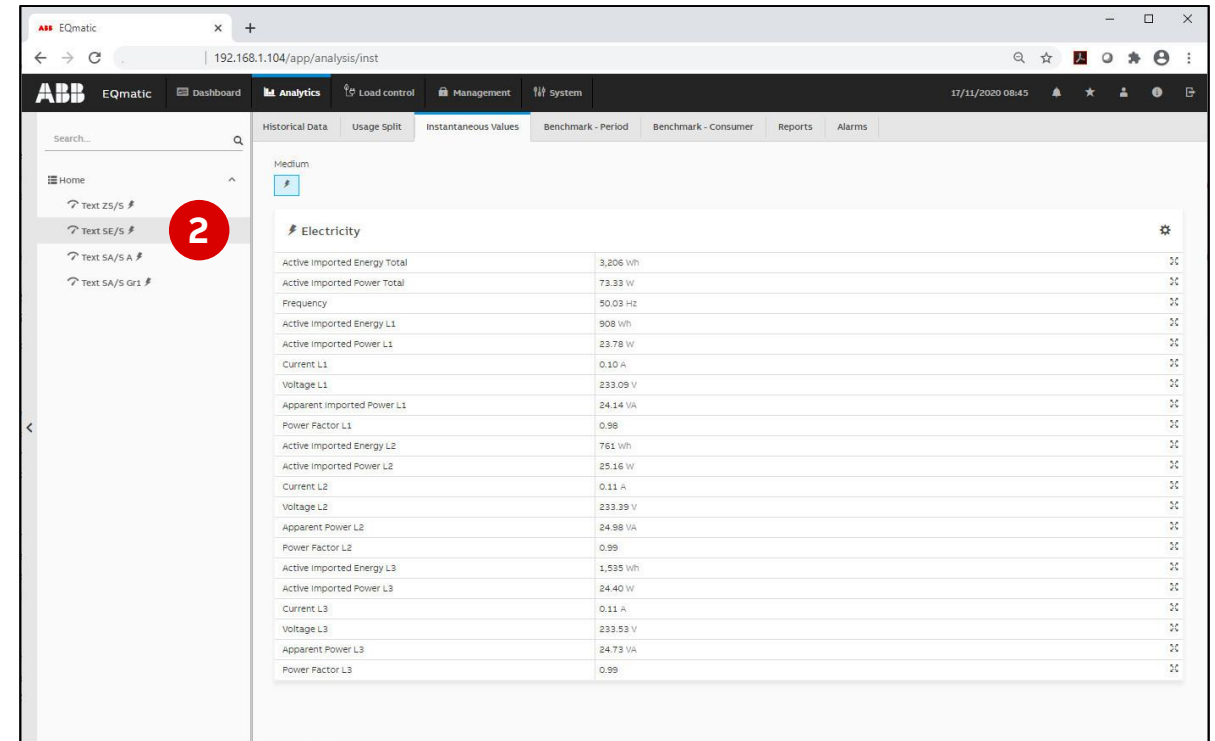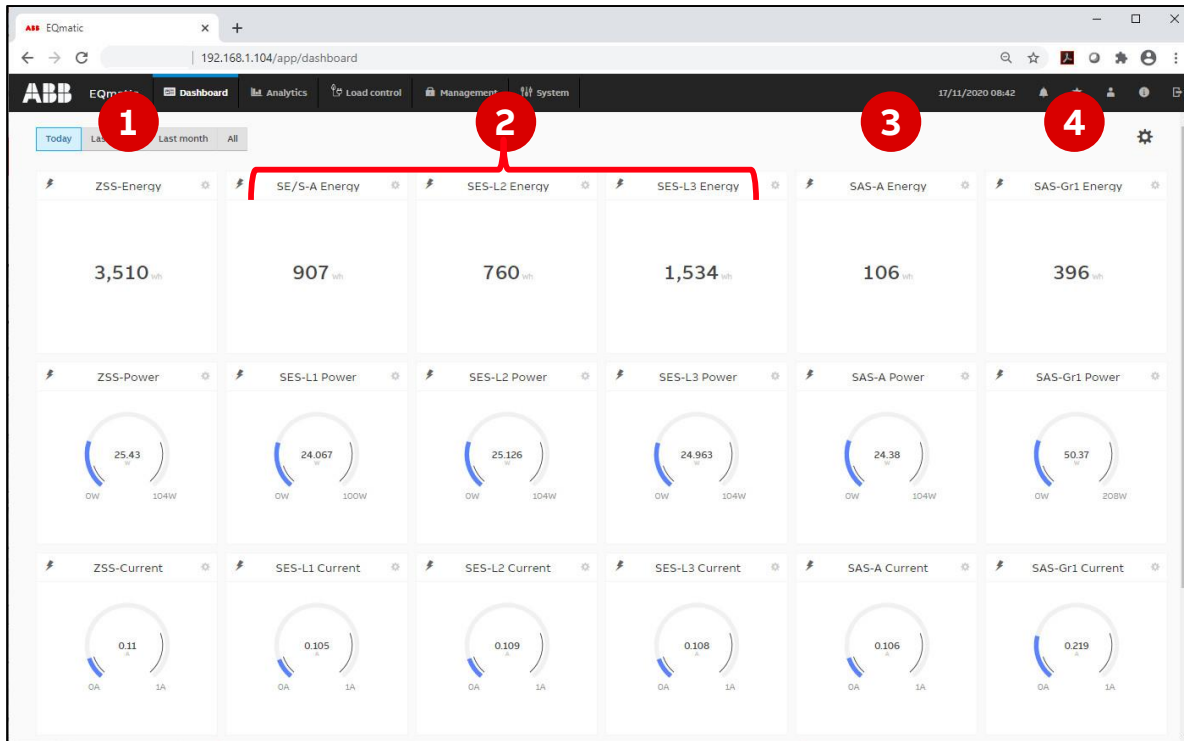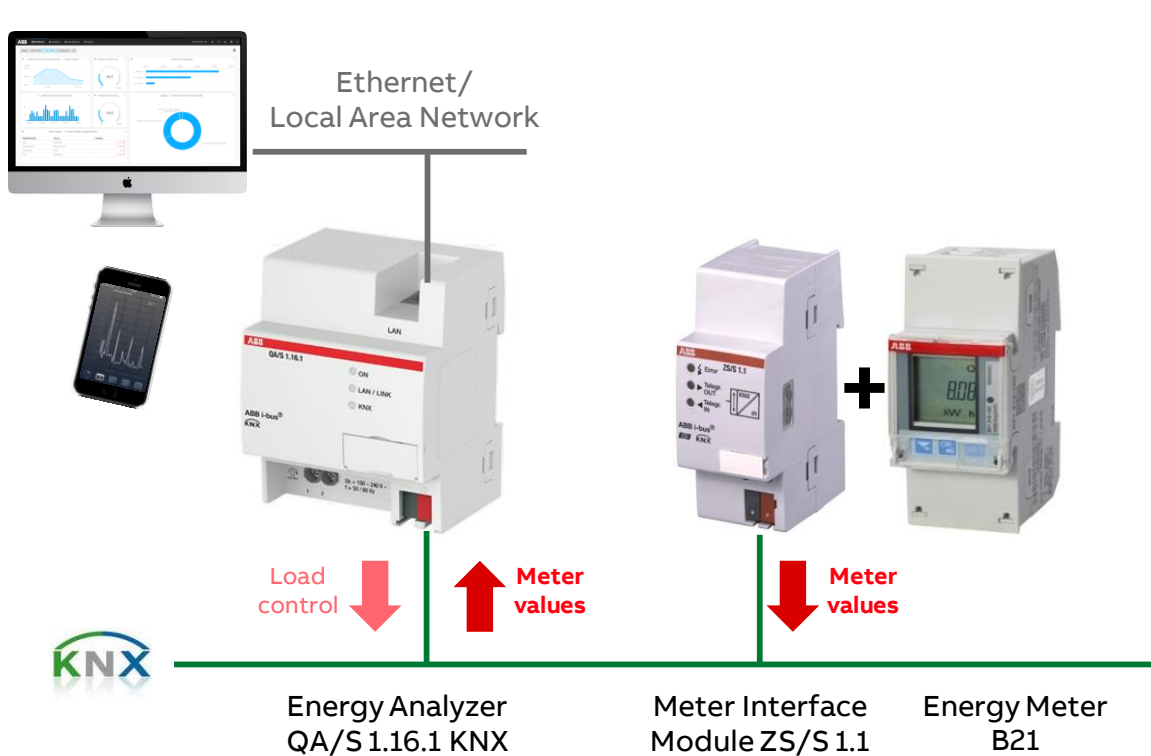SA/S x.16.6.2

Generic meter
(gas, water, heat)

ABB i-bus® KNX Switch Actuators – Professional Range with Energy Functions

ABB EQmatic Energy Analyzer QA/S 1.16.1 KNX and KNX Meters – Meter Values

Overview Energy Analyzer QA/S 1.16.1 KNX and KNX Meters

Ethernet/ Local Area Network

| Load control | Meter values | Meter values | Load control | Meter values | Meter values | Load control | Meter values | Meter values |

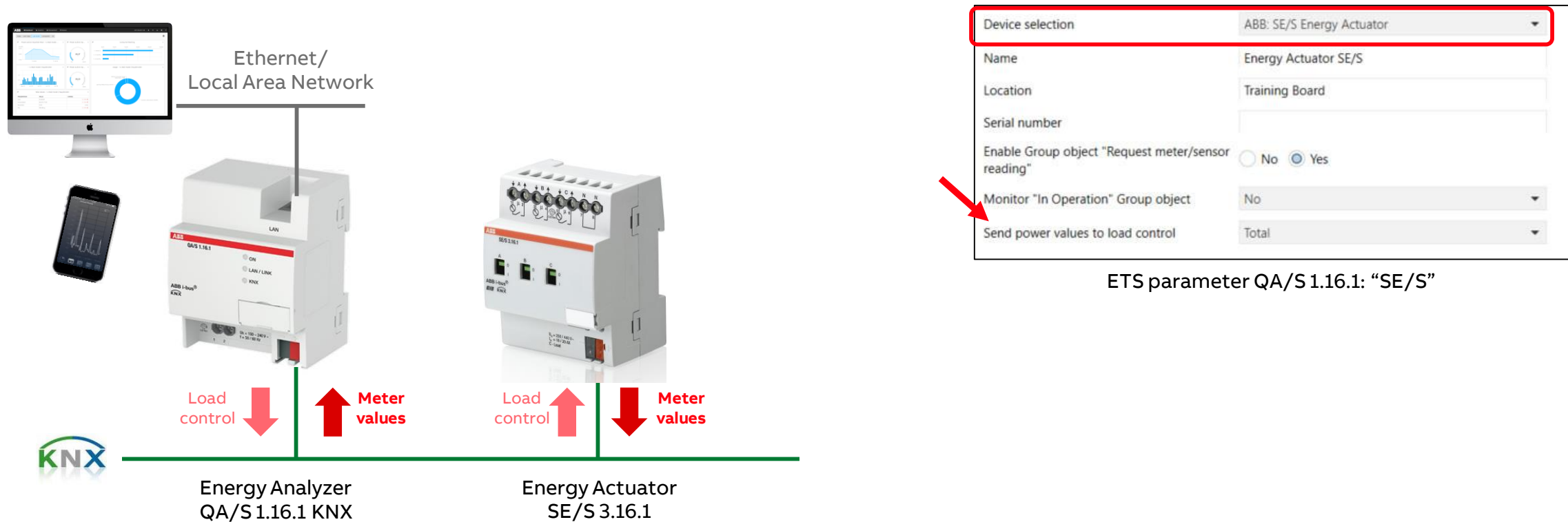| Energy Analyzer QA/S 1.16.1 KNX | Meter Interface Module ZS/S 1.1 | Energy Meter B21 | Energy Actuator SE/S 3.16.1 | Energy Module EM/S 3.16.1 | Switch Actuator SA/S x.16.6.2 | Generic meter (gas, water, heat) |

ABB i-bus® KNX Switch Actuators – Professional Range with Energy Functions

ABB EQmatic Energy Analyzer QA/S 1.16.1 KNX and KNX Meters – Meter Values

Overview Energy Analyzer QA/S 1.16.1 KNX and KNX Meters

Energy Analyzer
QA/S 1.16.1 KNX

Meter Interface
Module ZS/S 1.1

Energy Meter
B21

Energy Actuator
SE/S 3.16.1

Energy Module
EM/S 3.16.1

Switch Actuator
SA/S x.16.6.2

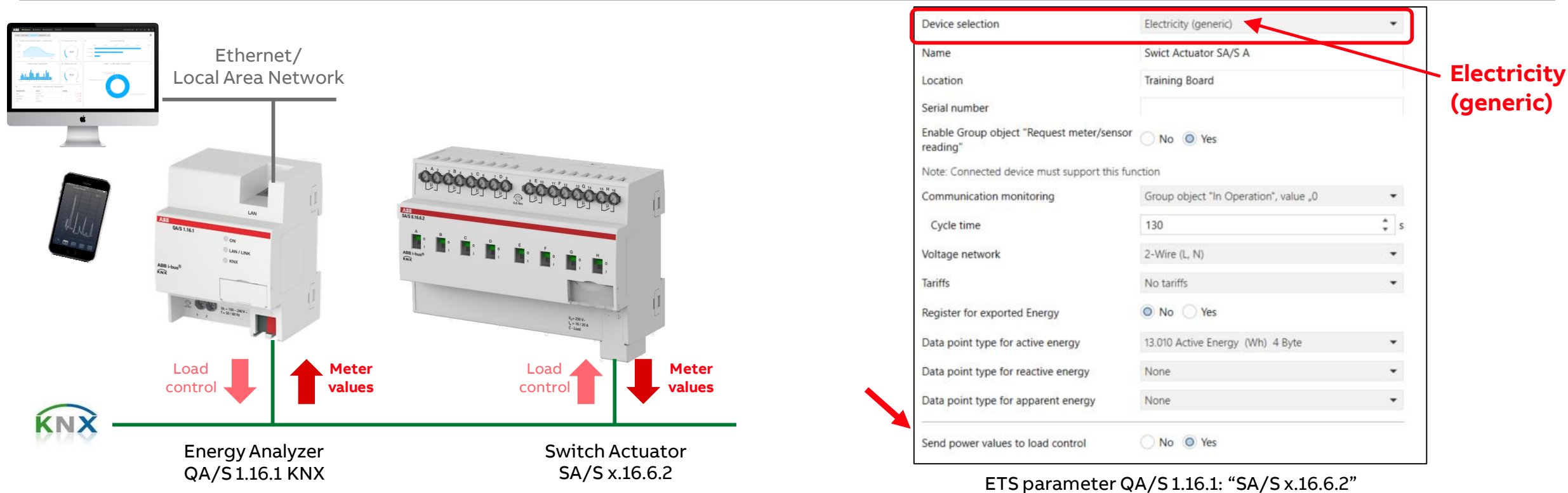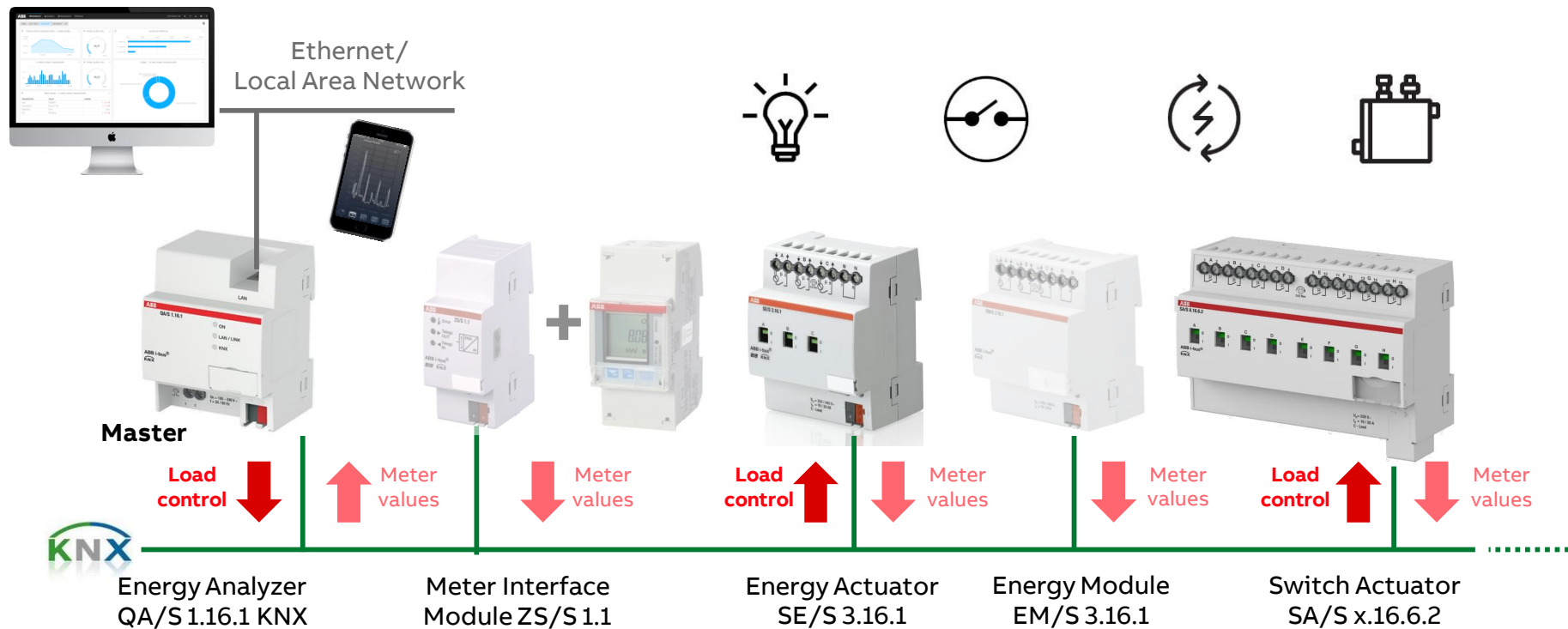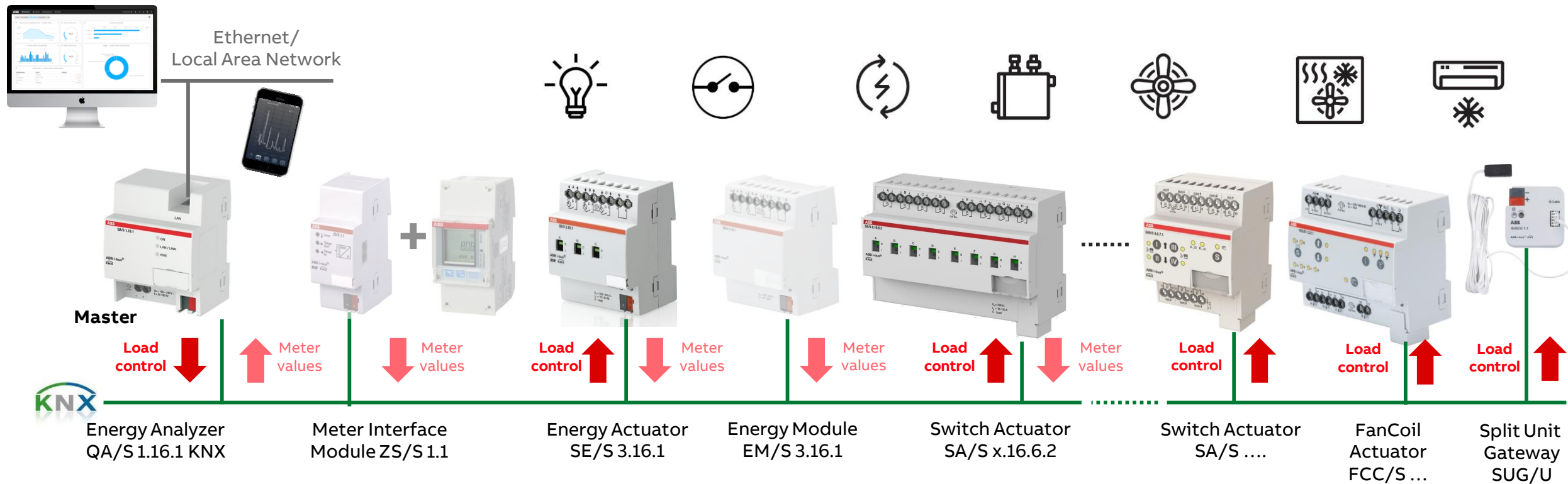| Channel	Energy group			
	1	2	3	4
A	4	6	-	-
B	4	6	-	-
C	4	6	-	-
D	4	6	-	-
E		6	-	-
F		6	-	-
G		6	-	-
…	-	6	-	-

ABB i-bus® KNX Switch Actuators – Professional Range with Energy Functions

ABB EQmatic Energy Analyzer QA/S 1.16.1 KNX and KNX Meters – Meter Values

Overview Energy Analyzer QA/S 1.16.1 KNX and KNX Meters

Ethernet/
Local Area Network

Meter	Device	Channel
1	Meter Interface Module ZS/S 1.1	
2	Energy Actuator SE/S 3.16.1	A, B, C and total
3	Switch Actuator SA/S 8.16.6.2	A
4	Switch Actuator SA/S 8.16.6.2	Total: A, B, C, D
5	Switch Actuator SA/S 8.16.6.2	G
6	Switch Actuator SA/S 8.16.6.2	Total: A, B, C, D, E, F, G, H

Channel	Energy group			
	1	2	3	4
A	3 4	6	-	-
B	- 4	6	-	-
C	- 4	6	-	-
D	- 4	6	-	-
E	-	6	-	-
F	-	6	-	-
G	5 -	6	-	-
…	- -	6	-	-

Load control

Meter values

Load control

values

Energy Analyzer
QA/S 1.16.1 KNX

Switch Actuator
SA/S x.16.6.2

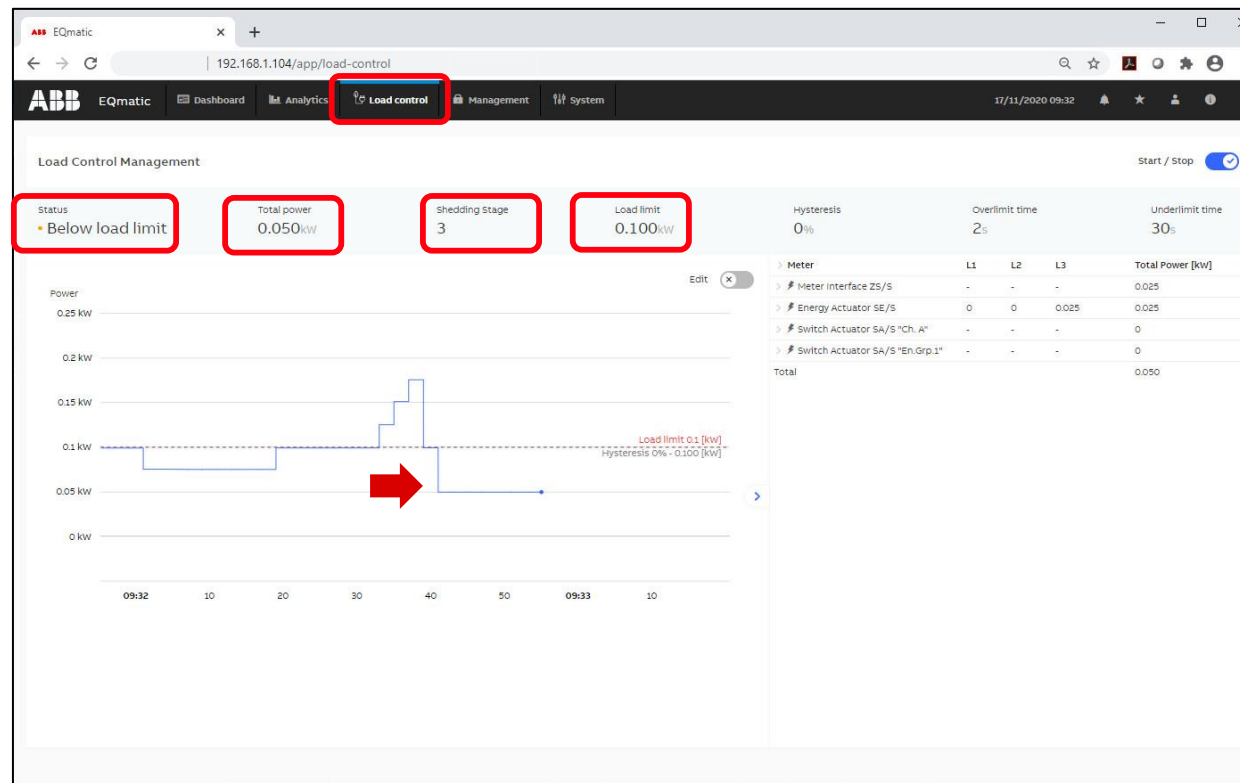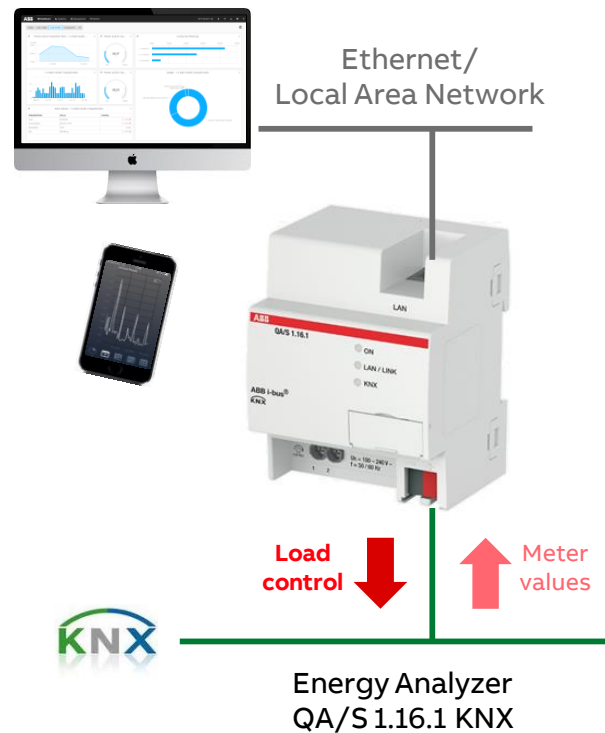# ABB i-bus® KNX Switch Actuators – Professional Range with Energy Functions

ABB EQmatic Energy Analyzer QA/S 1.16.1 KNX and KNX Meters – Meter Values

Energy Analyzer QA/S 1.16.1 KNX – Dashboard and Instantaneous Values (Meter 1 …4)

ABB i-bus® KNX Switch Actuators – Professional Range with Energy Functions

ABB EQmatic Energy Analyzer QA/S 1.16.1 KNX and KNX Meters – Meter Values

Energy Analyzer QA/S 1.16.1 KNX and Meter Interface Module ZS/S 1.1

Device selection	ABB: ZS/S Meter Interface Module ▼
Name	Meter Interface ZS/S
Location	Training Board
Serial number	
Enable Group object "Request meter/sensor reading"	○ No ● Yes
Monitor "In Operation" Group object	No ▼
Meter type	A4x (A-Series), B2x (B-Series)
Version	Active energy meter (direct connected) ▼
Voltage network	2-Wire (L, N) ▼
Tariffs	● No tariffs ○ 4 tariffs
Register for exported energy	● No ○ Yes
Send power values to load control	○ No ● Yes

ETS parameter QA/S 1.16.1: "ZS/S"

Ethernet/
Local Area Network

Load control

Meter values

Meter values

Energy Analyzer
QA/S 1.16.1 KNX

Meter Interface
Module ZS/S 1.1

Energy Meter
B21

ABB i-bus® KNX Switch Actuators – Professional Range with Energy Functions

ABB EQmatic Energy Analyzer QA/S 1.16.1 KNX and KNX Meters – Meter Values

Energy Analyzer QA/S 1.16.1 KNX and Energy Actuator SE/S 3.16.1

Ethernet/
Local Area Network

| Load control | Meter values | Load control | Meter values |

Energy Analyzer
QA/S 1.16.1 KNX

Energy Actuator
SE/S 3.16.1

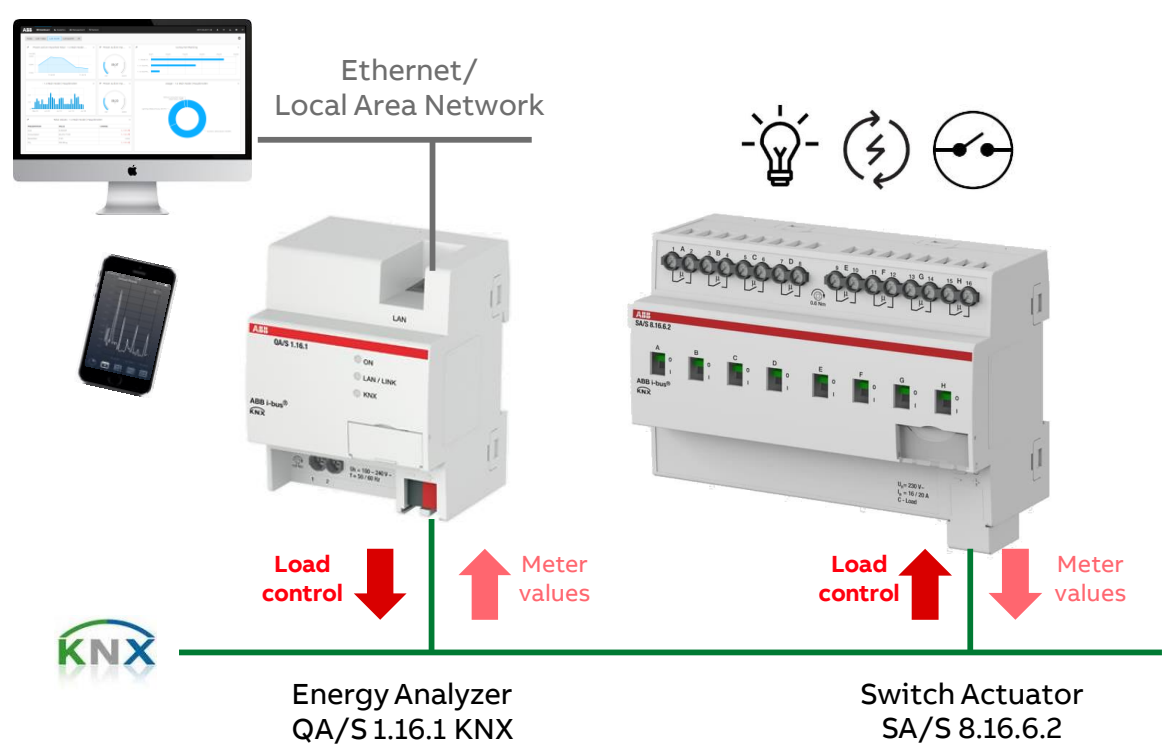| Device selection | ABB: SE/S Energy Actuator |
Name	Energy Actuator SE/S
Location	Training Board
Serial number	
Enable Group object "Request meter/sensor reading"	No ○ ● Yes
Monitor "In Operation" Group object	No
Send power values to load control	Total

ETS parameter QA/S 1.16.1: "SE/S"

ABB i-bus® KNX Switch Actuators – Professional Range with Energy Functions

ABB EQmatic Energy Analyzer QA/S 1.16.1 KNX and KNX Meters – Meter Values

Energy Analyzer QA/S 1.16.1 KNX and Switch Actuator SA/S x.16.6.2 with Energy Functions

Ethernet/
Local Area Network

Load
control   Meter
values

Load
control   Meter
values

Energy Analyzer
QA/S 1.16.1 KNX

Switch Actuator
SA/S x.16.6.2

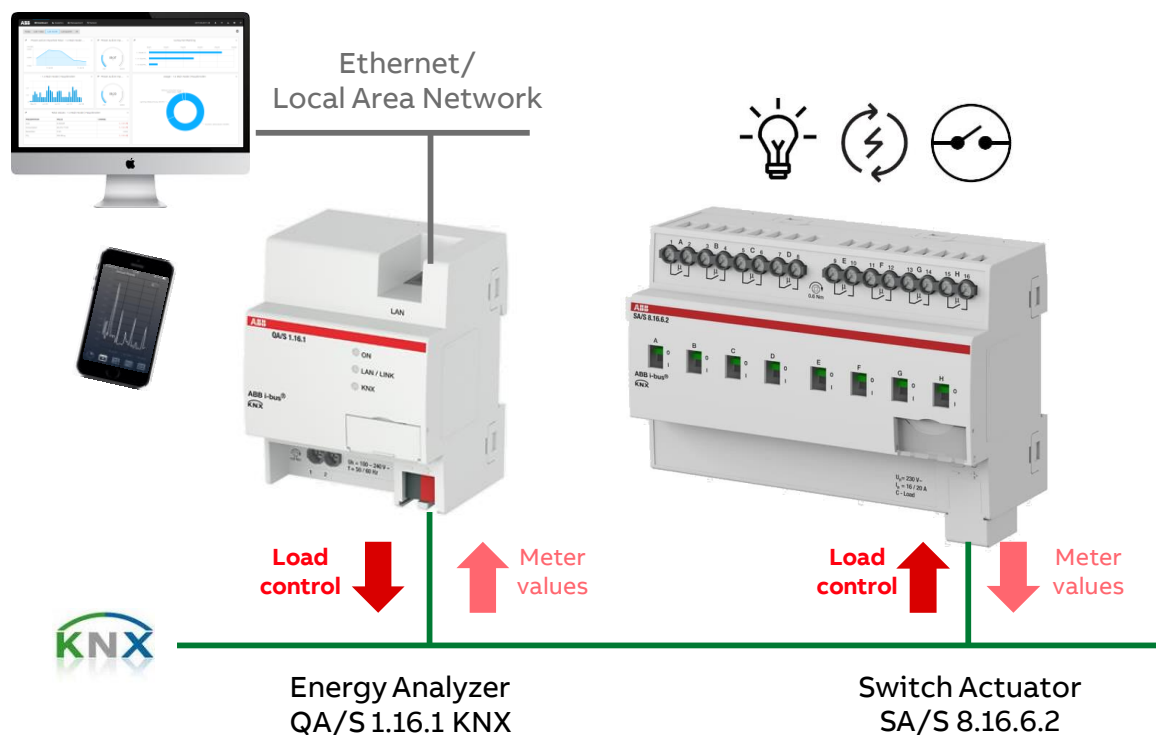| Device selection	Electricity (generic)
Name	Swict Actuator SA/S A
Location	Training Board
Serial number	
Enable Group object "Request meter/sensor reading"	No ● Yes
Note: Connected device must support this function	
Communication monitoring	Group object "In Operation", value „0
Cycle time	130 s
Voltage network	2-Wire (L, N)
Tariffs	No tariffs
Register for exported Energy	● No Yes
Data point type for active energy	13.010 Active Energy (Wh) 4 Byte
Data point type for reactive energy	None
Data point type for apparent energy	None
Send power values to load control	No ● Yes

Electricity (generic)

ETS parameter QA/S 1.16.1: "SA/S x.16.6.2"

ABB i-bus® KNX Switch Actuators – Professional Range with Energy Functions

ABB EQmatic Energy Analyzer QA/S 1.16.1 KNX and KNX Meters – Load Control

Overview Energy Analyzer QA/S 1.16.1 KNX and KNX Meters

Ethernet/
Local Area Network

Master

Load control | Meter values | Meter values | **Load control** | Meter values | Meter values | **Load control** | Meter values

Energy Analyzer
QA/S 1.16.1 KNX

Meter Interface
Module ZS/S 1.1

Energy Actuator
SE/S 3.16.1

Energy Module
EM/S 3.16.1

Switch Actuator
SA/S x.16.6.2

ABB i-bus® KNX Switch Actuators – Professional Range with Energy Functions

ABB EQmatic Energy Analyzer QA/S 1.16.1 KNX and KNX Meters – Load Control

Overview Energy Analyzer QA/S 1.16.1 KNX and KNX Meters

Ethernet/
Local Area Network

Master

Load control ⬇   Meter values ⬆   Meter values ⬇   Load control ⬆   Meter values ⬇   Meter values ⬇   Load control ⬆   Meter values ⬇   Load control ⬆   Load control ⬆   Load control ⬆

KNX

| Energy Analyzer QA/S 1.16.1 KNX | Meter Interface Module ZS/S 1.1 | Energy Actuator SE/S 3.16.1 | Energy Module EM/S 3.16.1 | Switch Actuator SA/S x.16.6.2 | Switch Actuator SA/S …. | FanCoil Actuator FCC/S … | Split Unit Gateway SUG/U |

ABB

ABB i-bus® KNX Switch Actuators – Professional Range with Energy Functions

ABB EQmatic Energy Analyzer QA/S 1.16.1 KNX and KNX Meters – Load Control

Energy Analyzer QA/S 1.16.1 KNX "Load Control"

ABB i-bus® KNX Switch Actuators – Professional Range with Energy Functions

ABB EQmatic Energy Analyzer QA/S 1.16.1 KNX and KNX Meters – Load Control
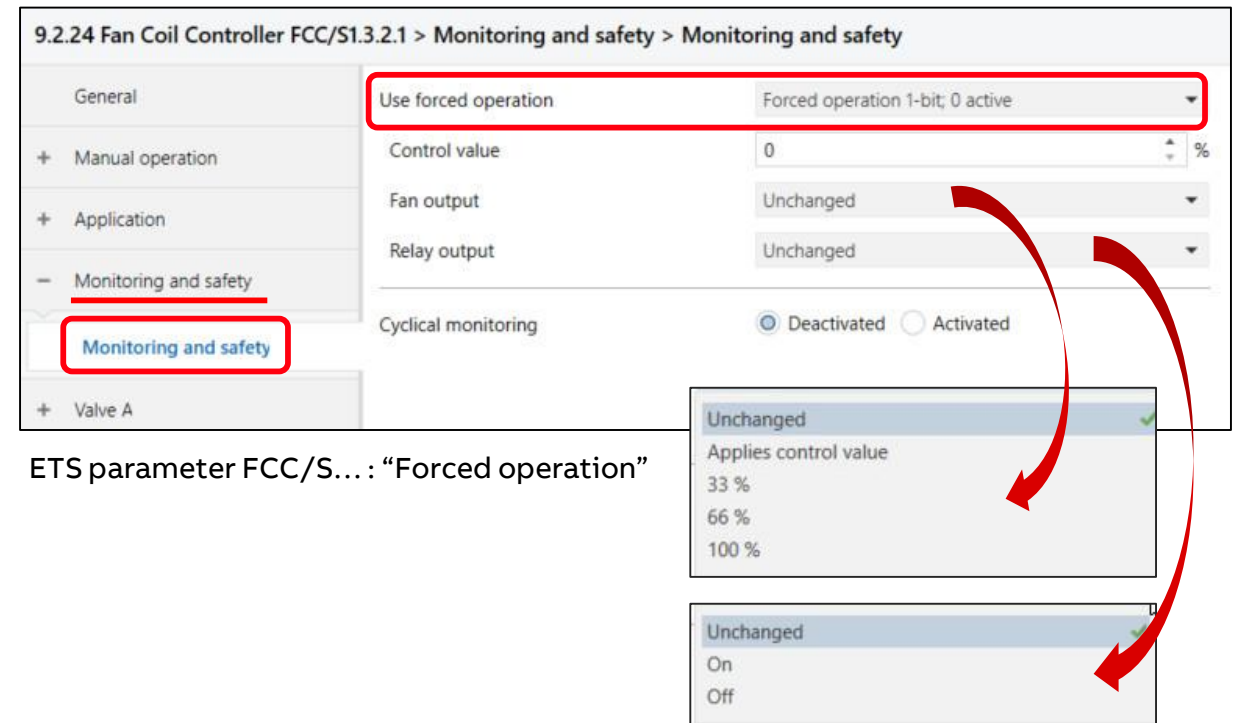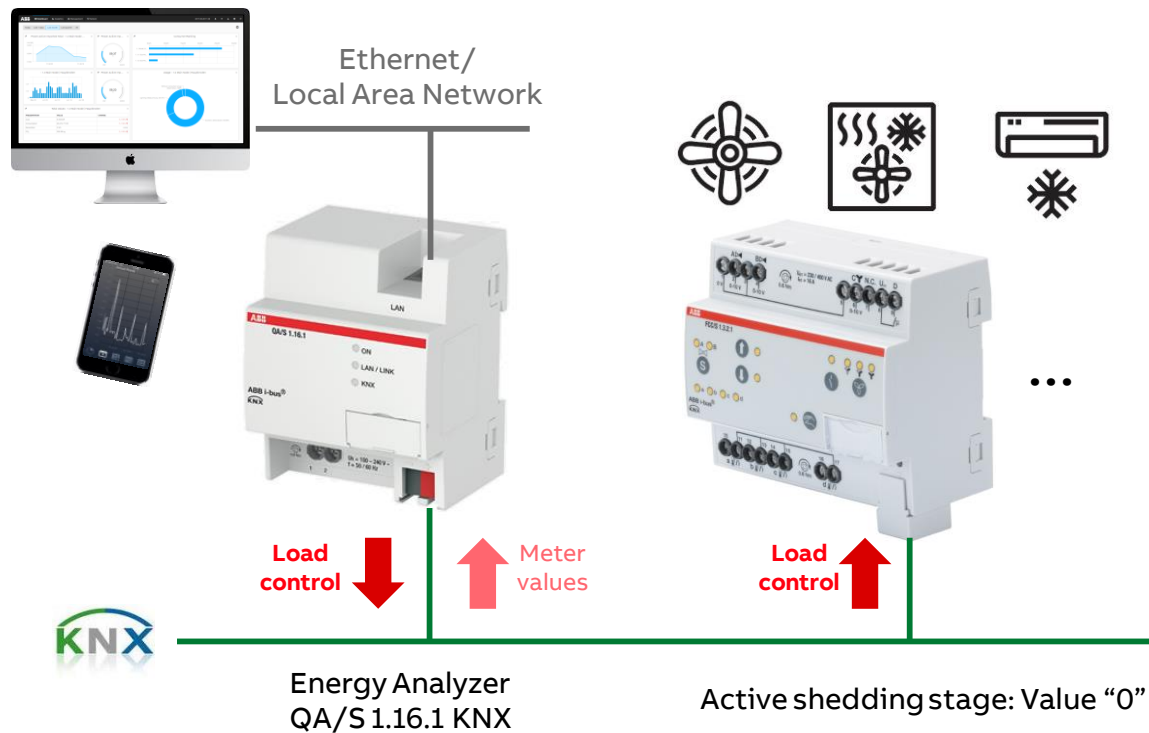
Energy Analyzer QA/S 1.16.1 KNX

Ethernet/
Local Area Network

Load control

Meter values

Energy Analyzer
QA/S 1.16.1 KNX

9.2.1 Energy Analyzer QA/S1.16.1 > Load Control

General	Enable load control ○ No ◉ Yes
Load Control	Note: At least one electricity meter must send power values to load control. Set parameter "Send power values to load control" in corresponding electricity meter(s).
+ Meter 1	Number of load shedding stages — 8
+ Meter 2	Load limit — 100 W
+ Meter 3	Change load limit via Group object ○ No ◉ Yes
+ Meter 4	Reaction time when exceeding load limit — 2 s
+ Meter 5	Reaction time when falling below load limit — 30 s
	Hysteresis at restart attempt in % of load limit — 0 %
+ Meter 6	Change load limit, hysteresis and reaction times via user interface ○ No ◉ Yes
+ Meter 7	Overwrite load limit, hysteresis and reaction times with download ○ No ◉ Yes
+ Meter 8	Value Group object "Deactivate load control" at restart ◉ 0 = load control activated
+ Meter 9	○ 1 = load control deactivated

ETS parameter QA/S 1.16.1: "Load Control"

ABB

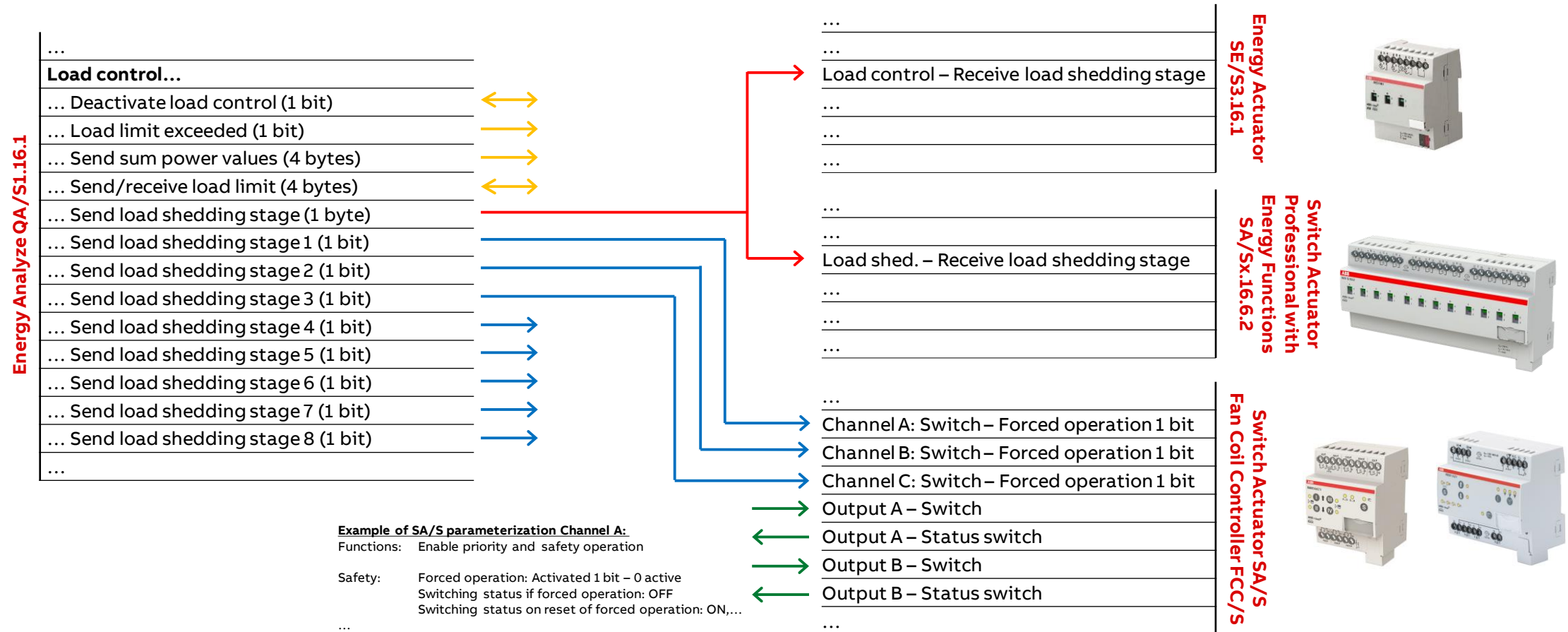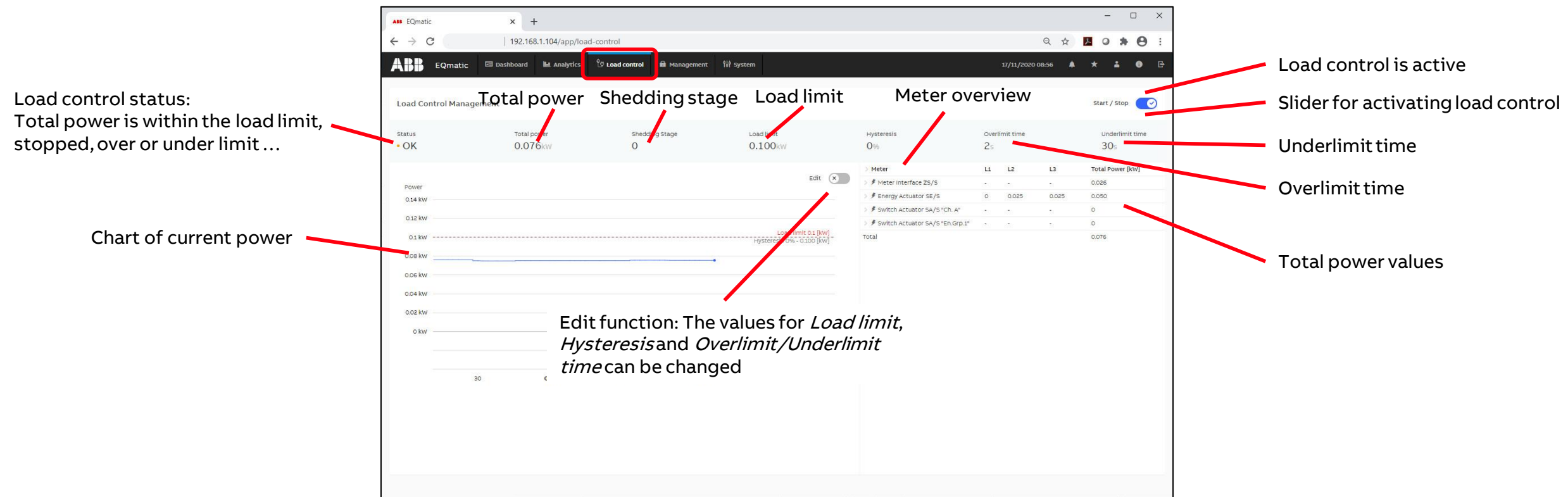# ABB i-bus® KNX Switch Actuators – Professional Range with Energy Functions

ABB EQmatic Energy Analyzer QA/S 1.16.1 KNX and KNX Meters – Load Control

Energy Analyzer QA/S 1.16.1 KNX and Energy Actuator SE/S 3.16.1

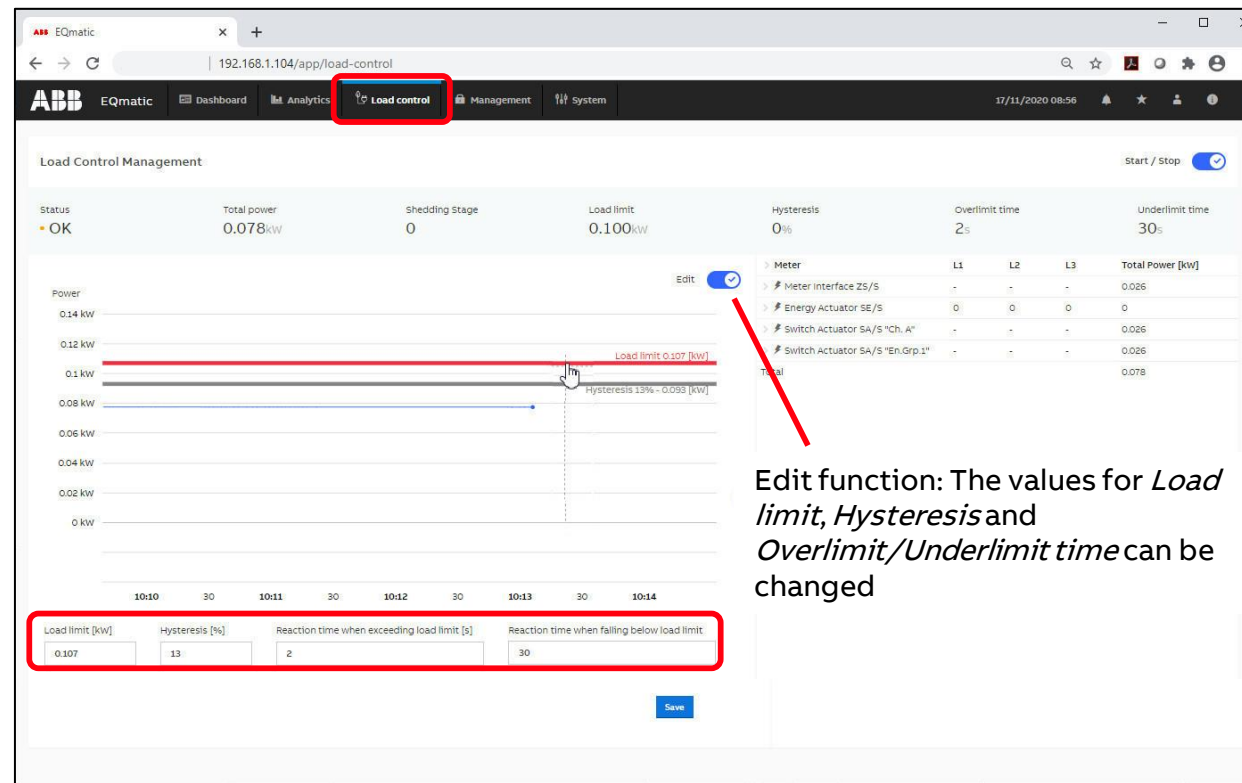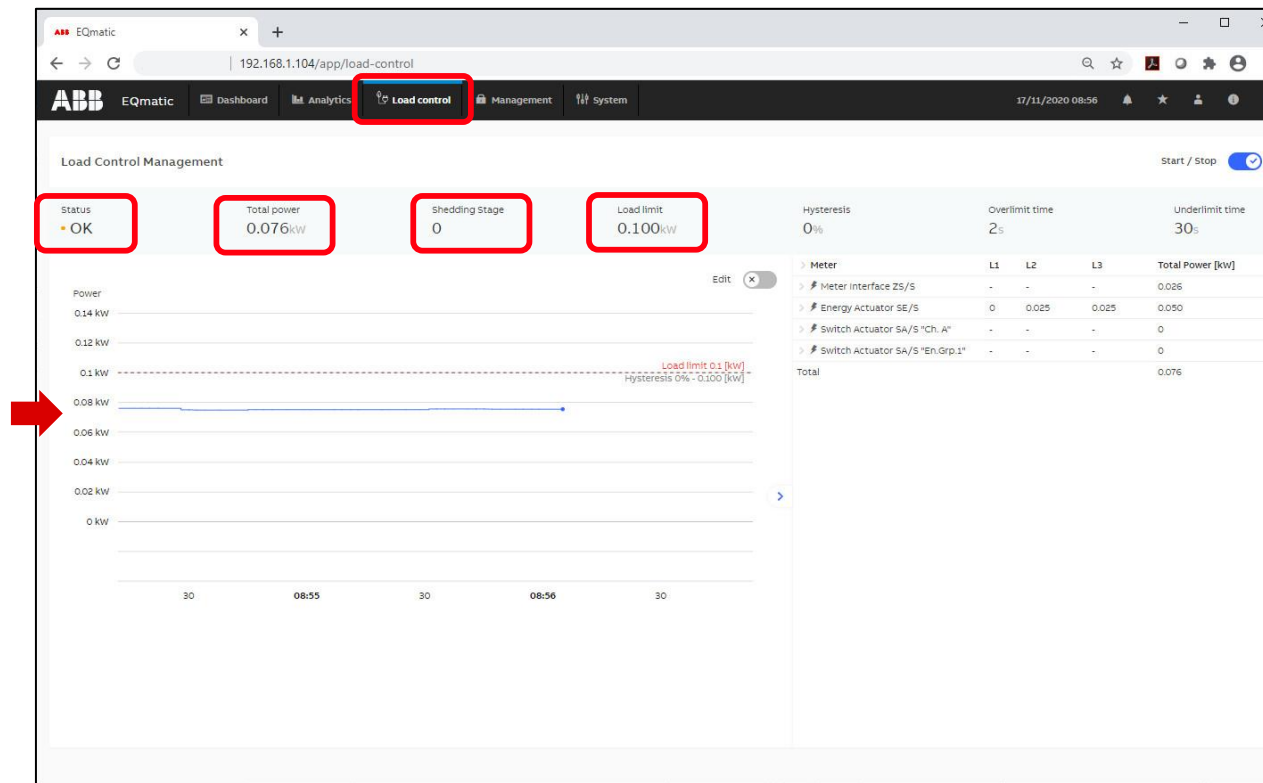ETS parameter SE/S: "Load control slave"

ABB i-bus® KNX Switch Actuators – Professional Range with Energy Functions

ABB EQmatic Energy Analyzer QA/S 1.16.1 KNX and KNX Meters – Load Control

Energy Analyzer QA/S 1.16.1 KNX and Switch Actuator SA/S x.16.6.2 with Energy Functions – "Channel A...X"

Ethernet/
Local Area Network

Load control (down)   Meter values (up)

Load control (up)   Meter values (down)

Energy Analyzer
QA/S 1.16.1 KNX

Switch Actuator
SA/S 8.16.6.2

ETS parameter SA/S x.16.6.2: "Configuration"

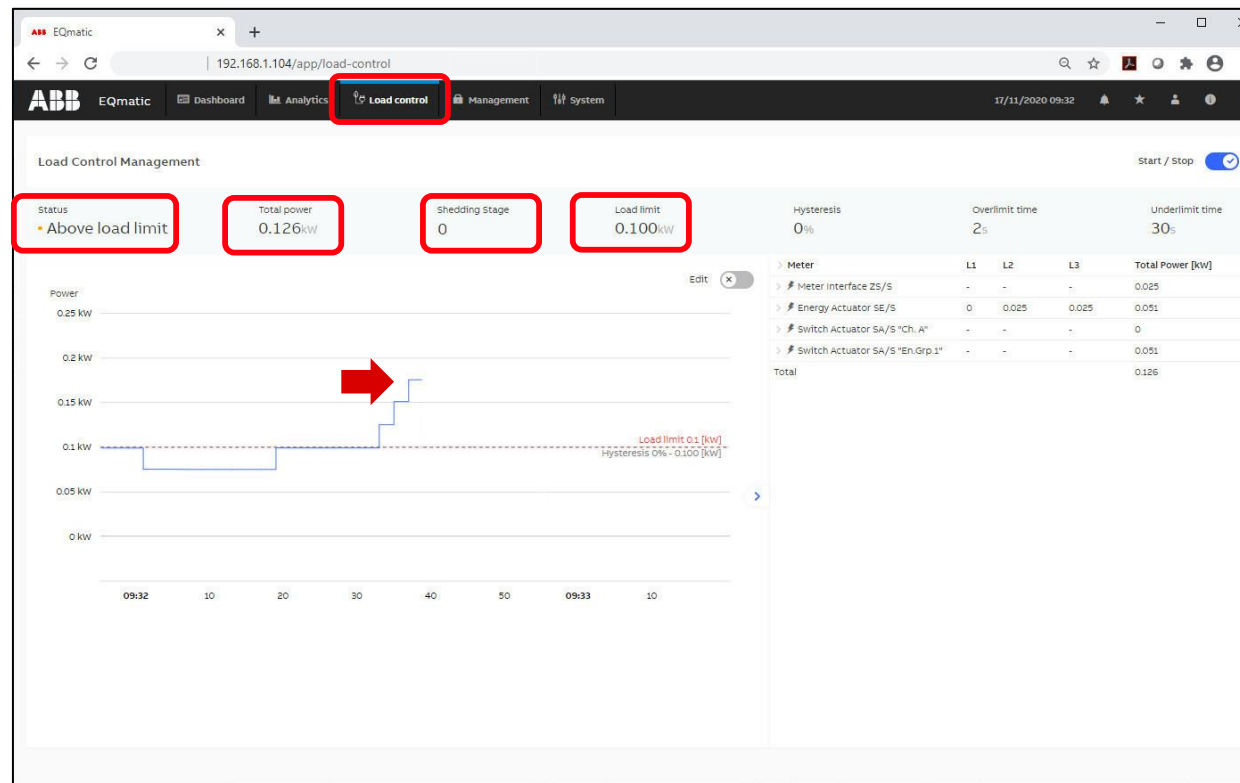| Configuration		
+ Device settings	Enable output A	✓
	Enable energy function A	✓
+ Safety	Enable output B	✓
	Enable energy function B	✓
− Energy group 1	Enable output C	✓
	Enable energy function C	✓
	Enable output D	✓
Current measurement	Enable energy function D	✓
Energy Functions	Enable output E	
Power calculation	Enable output F	
Energy consumption	Enable output G	
	Enable output H	
− Switch Actuator template		
	Enable energy group 1	✓
Basic settings	Enable energy group 2	✓
Safety	Enable energy group 3	
Load shedding	Enable energy group 4	

ABB i-bus® KNX Switch Actuators – Professional Range with Energy Functions

ABB EQmatic Energy Analyzer QA/S 1.16.1 KNX and KNX Meters – Load Control

Energy Analyzer QA/S 1.16.1 KNX and Switch Actuator SA/S x.16.6.2 with Energy Functions – "Channel A…X"

Ethernet/
Local Area Network

Load control ↓   ↑ Meter values

Load control ↑   ↓ Meter values

Energy Analyzer
QA/S 1.16.1 KNX

Switch Actuator
SA/S 8.16.6.2

Switch Actuator A		
	Description	SA/S Channel "A"
Functions	Enable function Safety	
Basic settings	Enable function Time	No
Load shedding	Enable function Scenes	
Current measurement	Enable function Load shedding	✓

Switch Actuator A		
	Parameter setting	○ Apply from template ● Individual
Functions	Load shedding stage	1
Basic settings	Change load shedding stage via group object	☑
Load shedding	Overwrite load shedding stage at download	✓
Current measurement	Reaction on active load shedding stage	● Off ○ On
Energy Functions	Reaction on revoke of load shedding stage	No reaction
Power calculation		

No reaction ✓
On
Off
Refreshed KNX state

ETS parameter SA/S x.16.6.2: "Load shedding"

ABB i-bus® KNX Switch Actuators – Professional Range with Energy Functions

ABB EQmatic Energy Analyzer QA/S 1.16.1 KNX and KNX Meters – Load Control

Energy Analyzer QA/S 1.16.1 KNX and Switch Actuator SA/S <u>without</u> Energy Functions (Combi, Standard, …)

Ethernet/
Local Area Network

Load control →
Meter values ↑
Load control ↑
Load control ↑

Energy Analyzer
QA/S 1.16.1 KNX

Active shedding stage: Value "0"

Switch actuator A	Application	◯ Shutter actuator ⦿ Switch actuator
Functions	Enable function Scene	☐
Basic settings	Enable functions Priority and safety operation	☑
Safety	Enable function Time	No ▾

Switch actuator A	Parameter setting	◯ Apply from template ⦿ Individual
Functions	ⓘ The objects "Safety priority 1-3" are enabled on the Safety/weather alarms page. The order specifies the priority of the safety functions.	
Basic settings		
Safety	Forced operation (1 bit/2 bit)	Activated 1 bit - 0 active ▾
	Switching status if forced operation	OFF ▾
Switch actuator B		
Functions	Block	No reaction/deactivated ▾
Basic settings		
Safety	Switching status on reset of blocking, forced operation and safety priority	Refreshed KNX state ▾

ETS parameter SA/S… : "Forced operation"

ABB i-bus® KNX Switch Actuators – Professional Range with Energy Functions

ABB EQmatic Energy Analyzer QA/S 1.16.1 KNX and KNX Meters – Load Control

Energy Analyzer QA/S 1.16.1 KNX and Fan Coil Controller FCC/S

Ethernet/
Local Area Network

Load control

Meter values

Load control

Energy Analyzer
QA/S 1.16.1 KNX

Active shedding stage: Value "0"

ETS parameter FCC/S… : "Forced operation"

ABB i-bus® KNX Switch Actuators – Professional Range with Energy Functions

Example: ABB EQmatic Energy Analyzer and KNX Meters – Load Control – Assignment of Group Addresses

Energy Analyze QA/S1.16.1

...

Load control...

... Deactivate load control (1 bit) ⟷

... Load limit exceeded (1 bit) ⟷

... Send sum power values (4 bytes) →

... Send/receive load limit (4 bytes) ⟷

... Send load shedding stage (1 byte)

... Send load shedding stage 1 (1 bit)

... Send load shedding stage 2 (1 bit)

... Send load shedding stage 3 (1 bit)

... Send load shedding stage 4 (1 bit) →

... Send load shedding stage 5 (1 bit) →

... Send load shedding stage 6 (1 bit) →

... Send load shedding stage 7 (1 bit) →

... Send load shedding stage 8 (1 bit) →

...

Energy Actuator SE/S3.16.1

...

...

Load control – Receive load shedding stage

...

...

...

Switch Actuator Professional with Energy Functions SA/Sx.16.6.2

...

...

Load shed. – Receive load shedding stage

...

...

...

Switch Actuator SA/S Fan Coil Controller FCC/S

...

Channel A: Switch – Forced operation 1 bit

Channel B: Switch – Forced operation 1 bit

Channel C: Switch – Forced operation 1 bit

Output A – Switch

Output A – Status switch

Output B – Switch

Output B – Status switch

...

Example of SA/S parameterization Channel A:

Functions: Enable priority and safety operation

Safety: Forced operation: Activated 1 bit – 0 active
               Switching status if forced operation: OFF
               Switching status on reset of forced operation: ON,...
...

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Energy Analyzer QA/S 1.16.1 KNX and KNX Meters – Load Control

Energy Analyzer QA/S 1.16.1 KNX: Load Control – Overview

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Energy Analyzer QA/S 1.16.1 KNX and KNX Meters – Load Control

Energy Analyzer QA/S 1.16.1 KNX: Load Control – Function "Edit"

Edit function: The values for *Load limit*, *Hysteresis* and *Overlimit/Underlimit time* can be changed

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Energy Analyzer QA/S 1.16.1 KNX and KNX Meters – Load Control

Energy Analyzer QA/S 1.16.1 KNX: Load Control – Status "OK"

<u>Load control status:</u>
Total power (76W) is within the load limit (100) and no shedding stage (0) is active

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Energy Analyzer QA/S 1.16.1 KNX and KNX Meters – Load Control

Energy Analyzer QA/S 1.16.1 KNX: Load Control – Status "Above Load Limit"

Load control status:
Total power (126W) is above the
load limit (100) and no shedding
stage (0) is active

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Energy Analyzer QA/S 1.16.1 KNX and KNX Meters – Load Control

Energy Analyzer QA/S 1.16.1 KNX: Load Control – Status "Below Load Limit"

Load control status:
Total power (126W) is below the load limit (100) and a shedding stage (3) is active → reduced total power (50W)

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Overview

Switch Actuator with energy functions – Part of ABB's Building Automation world

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ABB i-bus® KNX Switch Actuators – Professional Range with Energy Functions

Commercial and Marketing Aspects

ABB i-bus® KNX Switch Actuators – Professional Range with Energy Functions

Range

ABB Version

Switch Actuator with Energy Functions	Order Code
SA/S 2.16.6.2	2CDG110269R0011
SA/S 4.16.6.2	2CDG110270R0011
SA/S 8.16.6.2	2CDG110271R0011
SA/S 12.16.6.2	2CDG110272R0011

All products are available and on stock

ABB i-bus® KNX Switch Actuators – Professional Range with Energy Functions

Range Overview

Update:

Smarter Solutions for Home and Building Automation

ABB i-bus® KNX

Product Range Overview 2020

Including Switch Actuators Professional with Energy Functions

LINK

ABB i-bus® KNX Switch Actuators – Professional Range with Energy Functions

Microsite

Product page with the first main information and links to further related pages

LINK

ABB i-bus® KNX Switch Actuators – Professional Range with Energy Functions

Homepage

www.abb.com/KNX

→ Products and Downloads

    → Outputs

        → Switch Actuatiors 16/20A

Product Manual

CAD Drawing

Installation and Operating Instructions

Specification Text

ETS Application

Selection Table

CE & RoHS Declaration of Conformity

• • •

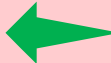# ABB i-bus® KNX Switch Actuators – Professional Range with Energy Functions

Transformation table

	New			com-patible	Old		
Brand	**Order Code**	**NGS Type**	**Product Name** Switch Actuator, MDRC		**Order Code**	**Type**	**Product Name** Switch Actuator, MDRC
ABB	2CDG 110 269 R0011	SA/S2.16.6.2	2-f, 16 A, C-Load, Energy Function		2CDG110112R0011	SA/S2.16.6.1	2-f, 16 A, C-Last, Current Det.
	2CDG 110 270 R0011	SA/S4.16.6.2	4-f, 16 A, C-Load, Energy Function		2CDG110113R0011	SA/S4.16.6.1	4-f, 16 A, C-Last, Current Det.
	2CDG 110 271 R0011	SA/S8.16.6.2	8-f, 16 A, C-Load, Energy Function		2CDG110114R0011	SA/S8.16.6.1	8-f, 16 A, C-Last, Current Det.
	2CDG 110 272 R0011	SA/S12.16.6.2	12-f, 16 A, C-Load, Energy Function		2CDG110138R0011	SA/S12.16.6.1	12-f, 16 A, C-Last, Current Det.

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November 19, 2020 | Slide 72 * Depending on actual stock level.

ABB i-bus® KNX Switch Actuators – Professional Range with Energy Functions

Training Material

Training Board

- New training board "Energy" with Energy Actuator SE/S, Energy Analyzer KNX QA/S 1.16.1, Meter Interface ZS/S plus meter and SA/S 2-fold with energy functions to train the whole solution

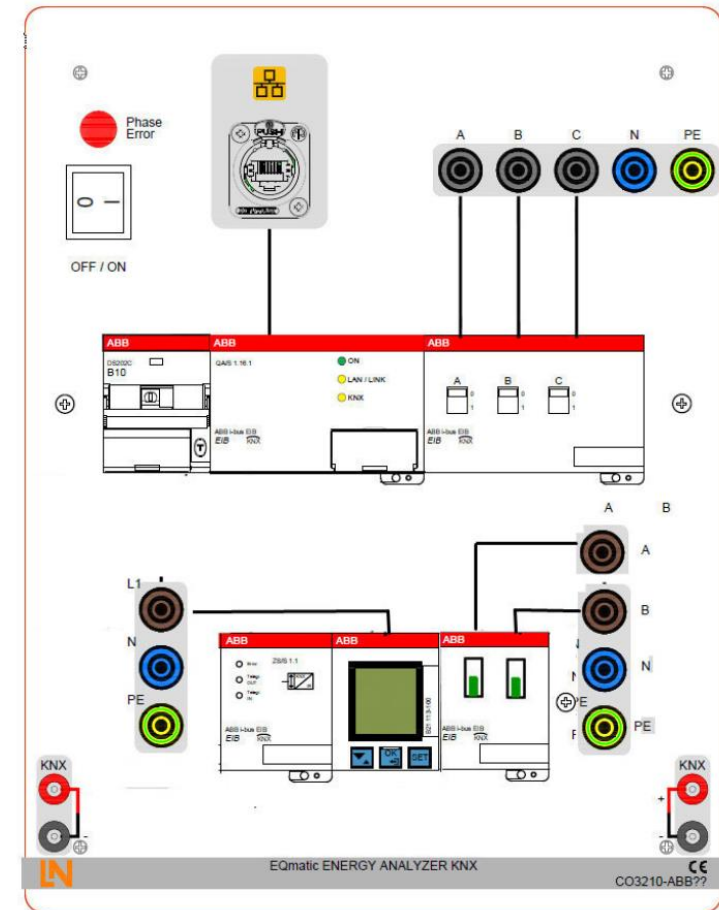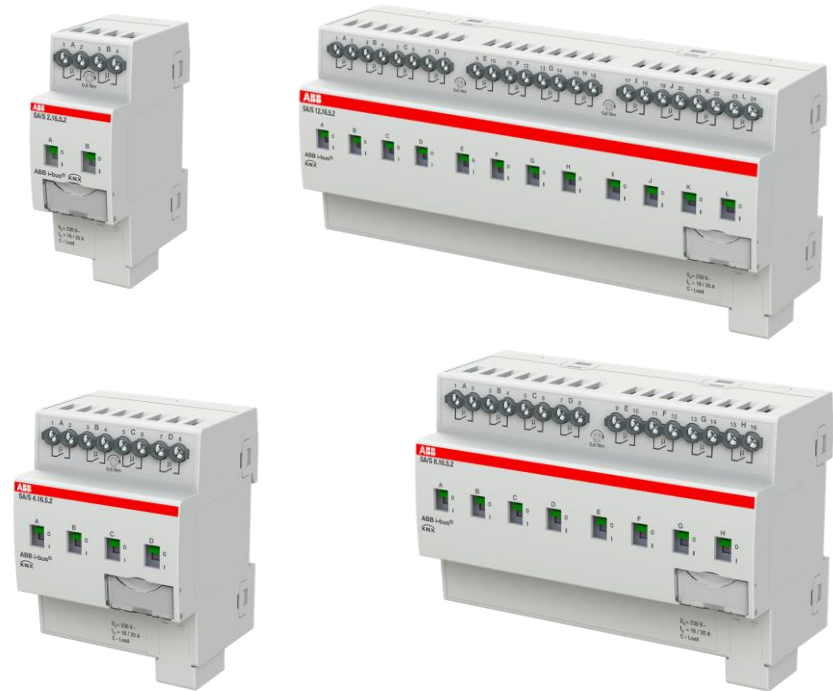- Available in Q1 2021 including training package

ABB i-bus® KNX Switch Actuators – Professional Range with Energy Functions

Summary of the Features and Advantages

– Switch Actuators Professional with 16/20A relay and high inrush current
  → prepared for challenging loads

– Classic manual operation
  → simple and well known, no bus voltage needed

– Proven connection terminals with screws, on the same level
  → easy and stress-free wiring for the panel builder

– Optimized ETS Application
  → easy to operate, safes time and satisfies the programmer, same look and feel for all new Switch Actuators

– Prepared for ABB i-bus® Tool connection
  → operation, status information, simulation and more

– New hardware platform and digital ready components
  → allows in future feature extensions

– Designed and produced in Germany
  → highest quality standard

ABB i-bus® KNX Switch Actuators – Professional Range with Energy Functions

Summary of the Features and Advantages

Energy Functions

– Current Measurement

– Power- and energy consumption calculation

– Different load status information (e.g. Standby, overload, …)

– Contact status supervision (e.g. Lamp failure, installation monitoring, …)

– Energy groups

– Load shedding

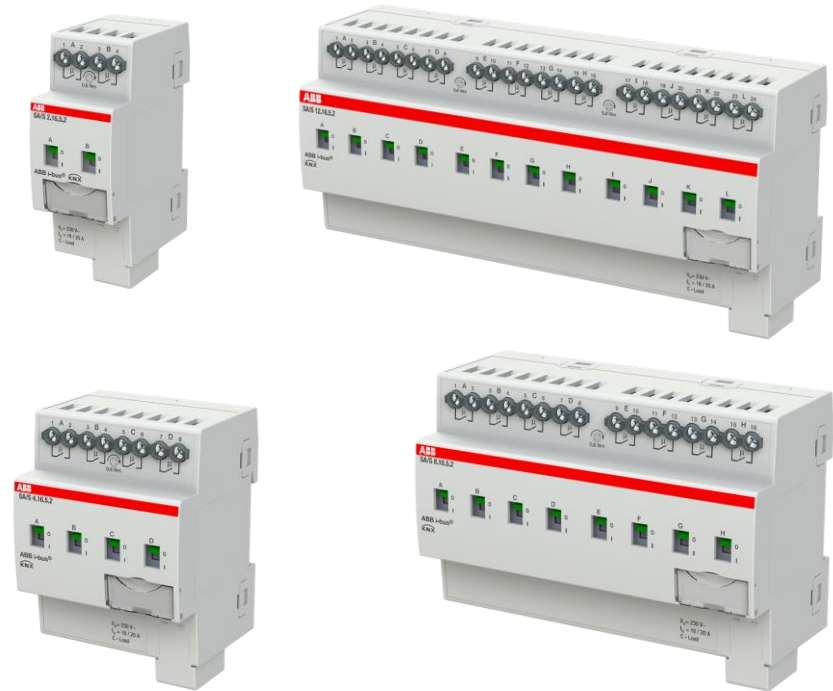→ **Intelligence, information and control down to individual loads and circuits**

ABB i-bus® KNX Switch Actuators – Professional Range with Energy Functions
Webinar

Training Material

Training & Qualification Database

– The database contains extensive training content

- Presentations

- Video tutorials

- Webinar slides and videos

- and more …

- https://go.abb/ba-training

- ww.abb.com/knx (→ Services & Tools → Training and Qualification → Training Database)
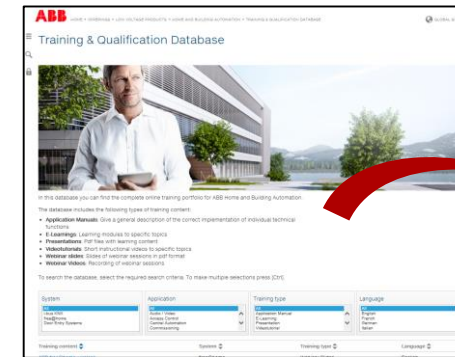
YouTube

– Channel "ABB Home and Building Automation"

- https://www.youtube.com/user/ABBibusKNX

Training and Qualification

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ABB i-bus® KNX Switch Actuators – Professional Range with Energy Functions
Webinar

Training & Qualification Calendar

In addition to the online modules and the traditional training programs offered by your local ABB sales team, we offer a variety of on-site trainings conducted by our specialists at different ABB training facilities

In this Training & Qualification Calendar you can find the educational events that are taking place during 2020

If you are interested in a training please click the training und you will be forwarded to register in "ABB MyLearning"

www.abb.com/knx or https://go.abb/ba-training

→ Services & Tools

   → Training and Qualification

      → Training Calendar

Training and Qualification

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