



# ABB i-bus<sup>®</sup> KNX Energy Actuator SE/S 3.16.1 Product Information

# ABB i-bus® KNX Energy Actuator SE/S 3.16.1

The new ABB i-bus® KNX Energy Actuator SE/S 3.16.1 is a Switch Actuator that records the energy consumption of the connected electrical loads in the building.

With the intelligent power grids of tomorrow – the Smart Grids – the electrical building installations will be facing new challenges. In order to increase the energy efficiency of buildings and at the same time integrate the consumers in the load compensation, it is necessary to switch electrical devices in buildings on and off based on external signals such as time, consumption thresholds or similar.

The ABB i-bus® KNX provides the optimum prerequisites for intelligent buildings.

The new Energy Actuator determines the active energy consumption per switching output. Furthermore, it provides the total consumption of all three outputs. All meter values can be sent cyclically, on request or when a start or stop event has occurred such as a time,

operating period or when a defined consumption threshold is reached. Additionally, when a stop event occurs, the assigned output can be switched off.

For each channel, the active power, current and voltage as well as further electrical variables (apparent power, crest factor, power factor and frequency) can be measured. The measured values are made available via the KNX. They can be monitored with threshold values. Should an overshoot or undershoot of a defined threshold occur, a warning can be sent or a channel switched.

The ETS application also enables a simple load management functionality, where up to ten Energy Actuators can be interconnected. The electrical loads connected to the three floating switch outputs can be switched via the KNX or switched manually directly on the device.



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## Application

Active consumption measurement

Monitoring of electrical values

Load management through load control

Switch Actuator, 3-fold

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## Benefits

Detection and representation of energy consumption in buildings

Enhancement of the energy efficiency

Intelligent control of the loads in the end circuit

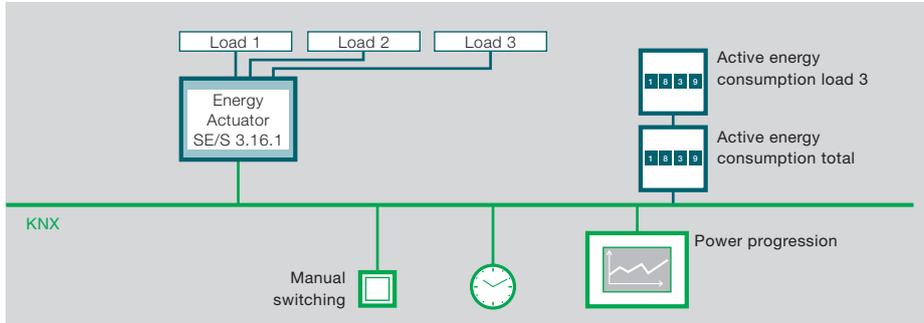
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## Product

Energy Actuator SE/S 3.16.1

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# The Individual Functions: Active Consumption Measurement



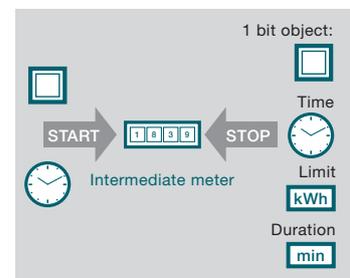
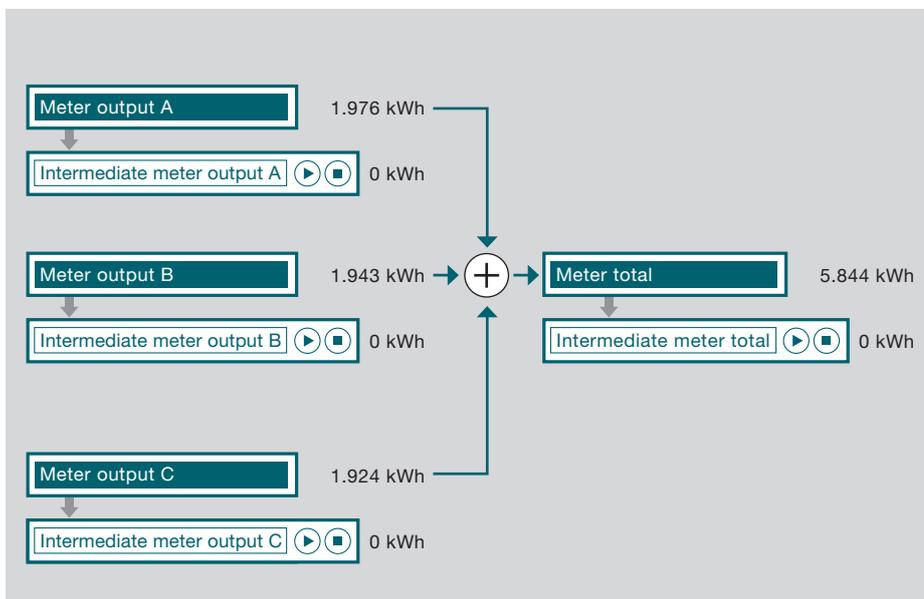
Overview

## Meters and intermediate meters

A meter (meter outputs A...C) successively measures the active energy consumption for every switching output. The total consumption for the device is determined by addition of all three channel meter readings and is also made available ([Meter readings total](#)).

## The special feature in the Energy Actuator:

Every meter is assigned with an intermediate meter that can be programmed for individual measurement tasks. Each of the four intermediate meters can be started, stopped and reset via the KNX. The meter values can be sent cyclically, on request or when a start or stop event occurs.



## Benefits:

- Recording of the energy consumption right up to the end circuit
- Command, time and consumption dependent switching
- Data availability on the KNX

# The Individual Functions: Instruments and Power Values

The following values can be monitored by threshold values with the Energy Actuator:

## Instrument values

- Current (per output)
- Voltage (per output)
- Frequency

## Power values

- Active power (per output)
- Active power total (sum of outputs A...C)

Two thresholds are available for each of these values. Warnings can be sent, or a switch reaction can be parameterized, dependent on whether thresholds are exceeded or the value falls below the threshold.

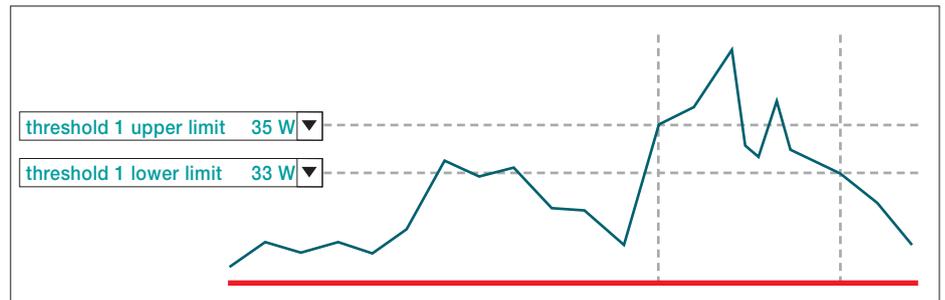
## Other values (without threshold monitoring)

- Apparent power
- Crest factor (current)
- Power factor

These values can be transferred or read via the KNX bus.

## Visualization example

Microcontroller active	
Active power total	88 W
Frequency	50.04 Hz
A: Current	0.14 A
A: Voltage	227 V
A: Apparent power	32 W
A: Power factor	093
A: Crest factor	151
A: Active power	30 W



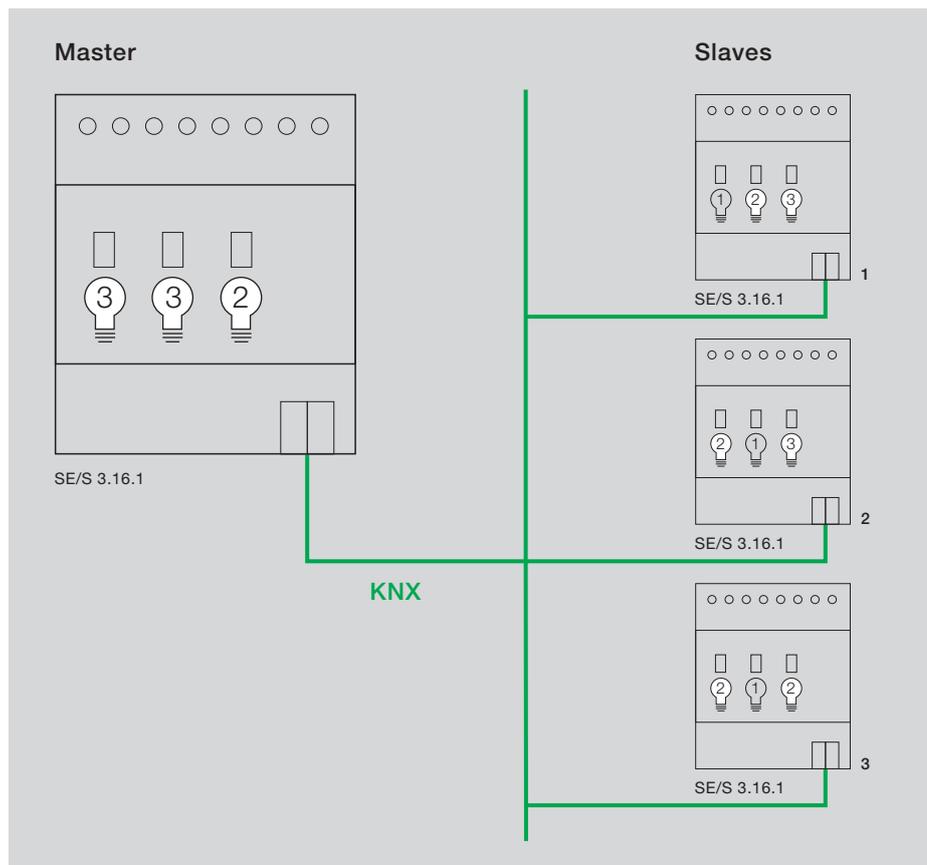
## Benefits:

- Monitoring and signalling of equipment malfunctions
- Detection of voltage failures and frequency fluctuations
- Evaluation of the load
- Threshold value dependent switching

# The Individual Functions: Load Control

With **load control**, an Energy Actuator can be parameterized as a master that can control up to ten further Energy Actuators as slaves. The master receives **power values** from the slaves that are added internally to the **total power** (sum of power values). If the **total power** exceeds a parameterized load limit, the master sends up to eight **load shedding stages** on the bus. The load limit can be modified via the bus, e.g. in dependence on the time or the currently active power tariff.

On the slave devices, every output can be assigned with its own **shedding stage**. When the slave receives the **shedding stage**, it then switches all outputs off with the respective **shedding stage**. Should the total power still exceed the load limit after shedding a load stage, the master will send the next load shedding stage until the **total load** is again below the permitted load limit. After the programmable waiting time, the master will attempt to reconnect the shedding stages in reverse sequence.



## Note:

In addition to the described functions, the renowned software functions of the ABB i-bus® KNX Switch Actuators (time, scene, safety, logic, forced operation) can be used with the Energy Actuator.

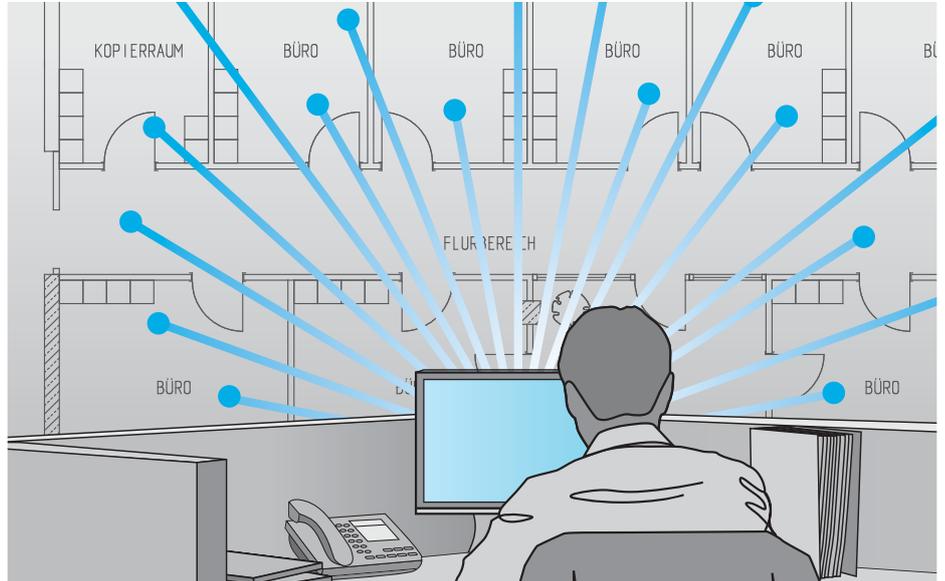
## Visualization example

Load control active	
Load limit	3000 W
Load limit exceeded	NO
Send load shedding stage	1
Sum of power values (master and slaves)	2650 W

## Benefits:

Limitation of the total power of up to 10 devices (30 channels)

Assigning priorities to the individual channels so that most important consumers can remain "on line" if the allowed load limit is exceeded.



<b>Active consumption/ active power<sup>1)</sup></b>	Measuring range	5.7 W ... 4,600 W (U <sub>n</sub> = 230 V) 2.8 W ... 2,300 W (U <sub>n</sub> = 115 V)
	Accuracy (25 ... 500 mA)	± 6 % of measured value
	Accuracy (500 mA ... 5 A)	± 3 % of measured value
	Accuracy (5 A ... 20 A)	± 2 % of measured value
	Starting current	25 mA
<b>Current<sup>1)</sup></b>	Measuring range (AC)	0.025 ... 20 A
	Accuracy (0.025 ... 20 A)	± 1 % of actual value and ± 10 mA
<b>Voltage<sup>1)</sup></b>	Measuring range (AC)	95 ... 265 V
	Accuracy (95 ... 265 V)	± 1 % of actual value
<b>Frequency<sup>1)</sup></b>	Measuring range	45 ... 65 Hz
	Accuracy (45 ... 65 Hz)	± 1 % of actual value
<b>Output switching current</b>	AC3 operation (cos φ = 0.45) to EN 60 947-4-1	16 A/230 V AC
	AC1 operation (cos φ = 0.8) to EN 60 947-4-1	16 A/20 A/230 V AC
	C-load switching capacity	20 A
	Fluorescent lighting load to EN 60 669-1	16 A/20 AX/250 V AC (200 μF)
	Minimum switching performance	100 mA/12 V AC 100 mA/24 V AC
	DC current switching capacity (resistive load)	20 mA/24 V DC

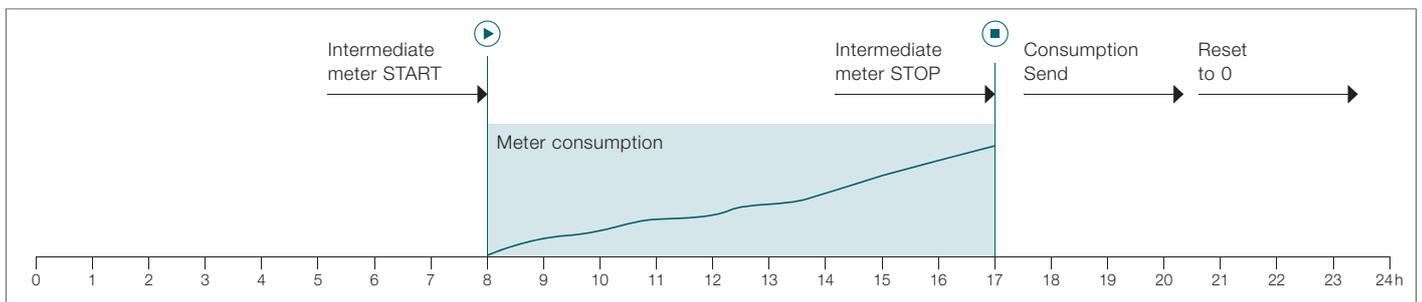
<sup>1)</sup> The specified values only apply where there is no DC component.  
A DC component distorts the measured result.

# Application Examples

The intermediate meter is started when a usage period commences by a bus telegram. The energy consumption of the connected devices is recorded during the usage period. The intermediate counter sends the meter reading and is reset, after a stop telegram is received.

This function can be applied to record and represent the energy consumption of IT workstations. Outside the usage period, the supply of energy to the IT devices can be switched off using the switching functionality of the Energy Actuator in order to avoid standby power consumption.

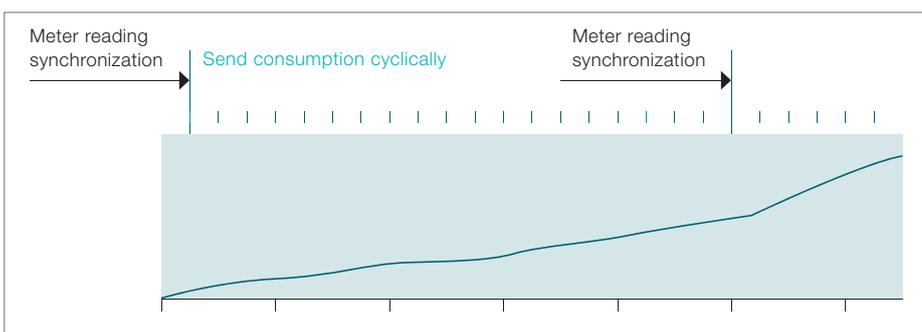
## Application example 1 Distributed consumption recording during the usage period



The intermediate meters of the individual energy actuators are synchronized once a day by a bus telegram. The meter reading is sent cyclically on the bus. Energy consumption curves can be represented in this way for all loads.

This function can be applied for the comparison of energy consumption in lighting or air-conditioning of manufacturing or storage facilities at freely definable intervals (week, month, year).

## Application example 2 Representation of the energy consumption curve on the load level



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