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

Power and productivity
for a better world™

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1 General

With the intelligent power grids of tomorrow – the Smart Grids – 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 based on external signals such as time, consumption thresholds or similar. The ABB i-bus® KNX provides the optimum prerequisites for intelligent buildings.

By combining energy management with illumination and shutter control, heating, ventilation and surveillance, the use of the ABB i-bus® KNX enhances the living quality, comfort and safety and can be easily combined with cost-effectiveness and environmental awareness with minimal planning and installation effort. Furthermore, the flexible usage of rooms and the continuous adaptation to changing requirements are simple to realise.

The ABB i-bus® KNX Energy Actuator SE/S 3.16.1 is a switch actuator, which records the energy consumption of the connected electrical loads.

The active energy consumption per switching output is determined. Furthermore, the total consumption of all three outputs is also available. 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. Furthermore, when a stop event occurs, the assigned output can be switched.

For each output 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 ABB i-bus® KNX. They can be monitored with threshold values. Should an overshoot or undershoot of a defined threshold occur, a warning can be sent or the output switched.

The ETS application also enables simple load management (load control), where up to ten Energy Actuators can be interconnected.

Furthermore, the switch actuator functionality of the ABB i-bus® KNX Switch Actuators is available for every output.

The electrical loads connected to the three floating switch outputs can be switched via KNX or manually with manual actuation directly on the device.

1.1 Using the product manual

This manual provides you with detailed technical information relating to the function, installation and programming of the ABB i-bus® KNX Energy Actuator SE/S 3.16.1. The application of the device is described using examples.

This manual is divided into the following sections:

Chapter 1	General
Chapter 2	Device technology
Chapter 3	Commissioning
Chapter 4	Planning and application
Chapter A	Appendix

1.1.1 Structure of the product manual

All parameters are described in chapter 3.

Note
The Energy Actuator has 3 outputs. However, as the functions for all outputs are identical, only the functions of output A will be described.

1.1.2 Note

Notes and safety instructions are represented as follows in this manual:

Note
Tips for usage and operation

Examples
Application examples, installation examples, programming examples

Important
These safety instructions are used as soon as there is danger of a malfunction without risk of damage or injury.

Caution
These safety instructions are used if there is a danger of damage with inappropriate use.

Danger
These safety instructions are used if there is a danger for life and limb with inappropriate use.

Danger
These safety instructions are used if there is a danger to life with inappropriate use.

1.2 Product and functional overview

The ABB i-bus® KNX Energy Actuator SE/S 3.16.1 is a modular installation device with module widths of 4 space units in Pro *M* design for installation in a distribution board.

The connection to the ABB i-bus® KNX is established using the front side bus connection terminal. The assignment of the physical addresses as well as the parameterization is carried out with Engineering Tool Software ETS from version ETS3.0f.

The Energy Actuator can switch three independent electrical AC current loads or one three-phase current load via KNX using floating contacts. The outputs can be manually switched on and off. The switching states are displayed.

Important
The Energy Actuator cannot guarantee precise simultaneous switching of all three outputs. For this reason, the SE/S is not suitable, for example, for switching three-phase motors as they would be destroyed by the voltage peaks that occur.

The device is especially suitable for switching loads with high peak inrush currents such as lighting equipment with compensation capacitors or fluorescent lamp loads (AX) to EN 60669.

The following functions are available:

- Recording of the active consumption with a main meter and a flexibly programmable intermediate meter for each output. The intermediate meter can be started and stopped in dependence on defined events (1 bit telegrams, time, and consumption). Warnings can be sent on the KNX or the output can be switched depending on these events.
- Current, voltage, active power and frequency can be recorded and monitored with the aid of threshold values. Warnings can be sent on the KNX or the output can be switched depending on these events. The recording of apparent power, power factor and crest factor are also available.
- A simple load control can be implemented. Every Energy Actuator can be configured as a master, and the total power of a system by up to ten further Energy Actuators can be recorded. Load shedding stages are sent on the bus, and the devices are shutdown according to their own load shedding stage.
- Function *Time*: Staircase lighting, switch ON and OFF delay and flashing
- Recall 8 bit scenes
- Logical functions AND, OR, XOR and GATE
- Functions forced operation and safety
- Selection of the default position at bus voltage failure and bus voltage recovery

Individual outputs can be copied or exchanged to reduce the programming effort.

2 Device technology

2.1 Energy Actuator SE/S 3.16.1, MDRC

2CDC 071 021 S0010

SE/S 3.16.1

The Energy Actuator is a modular installation device in Pro *M* design for installation in the distribution board. The device is especially suitable for switching loads with high peak inrush currents such as lighting equipment with compensation capacitors or fluorescent lamp loads (AX) to EN 60 669.

Manual operation is possible using a keypad on the device. This simultaneously indicates the switching state.

The Energy Actuator can switch up to 3 independent electrical loads via floating contacts. The maximum load current per output is 20 A.

The connection of the outputs is implemented using universal head screw terminals. Each output is controlled separately via the KNX.

Individual outputs can be copied or exchanged to reduce the programming effort.

The parameterization is undertaken via the ETS. The connection to the KNX is implemented using the bus connection terminal on the front.

2.1.1 Technical data

Supply	Bus voltage	21…30 V DC
	Current consumption via bus	< 12 mA
	Power consumption via bus	Maximum 250 mW
	Power consumption on mains	≤ 0.7 W
Rated output value	Number of switch outputs (floating)	3
	U_n rated voltage	250/440 V AC (50/60 Hz)
	I_n rated current	16/20 AX, C-Load
	Leakage loss per device at max. load 3 x 16 A	3.0 W
	Leakage loss per device at max. load 3 x 20 A	4.2 W
Switching current	AC3[2] operation (cos j = 0.45) to EN 60 947-4-1	16 A/230 V AC
	AC1[2] operation (cos j = 0.8) to EN 60 947-4-1	16/20 A/230 V AC
	C-Load switching capacity	20 A
	Fluorescent lighting load to EN 60 669-1	16/20 AX/250 V AC (200 µF)[2]
	Minimum switching power	100 mA/12 V AC 100 mA/24 V AC
	DC current switching capacity (resistive load)	20 A/24 V DC
Relay service life	Mechanical service life	> 10^6 switching operations
	Electrical endurance to IEC 60 947-4-1	
	AC1[1] (240 V/cos j = 0.8)	> 10^5 switching operations
	AC3[1] (240 V/cos j = 0.45)	> 3 x 10^4 switching operations
	AC5a[1] (240 V/cos j = 0.45)	> 3 x 10^4 switching operations
Measuring range	Active consumption/active power	5.7 W…4,600 W (U_n = 230 V) 2.8 W…2,300 W (U_n = 115 V)
	Current (AC)	0.025…20 A
	Voltage (AC)	95…265 V
	Frequency	45…65 Hz

Accuracy[4]	Active consumption/active power (250…500 mA)	± 6 % measuring value
	Active consumption/active power (500 mA… 5 A)	± 3 % measuring value
	Active consumption/active power (5…20 A)	± 2 % measuring value
	Current (0.025…20 A)	± 1 % of actual value and ± 10 mA
	Voltage (95…265 V)	± 1 % of actual value
	Frequency (45…65 Hz)	± 1 % of actual value
Starting current	25 mA	
Relay switching times[3]	Maximum relay position changes per output per minute if all relays are switched simultaneously. The position changes should be distributed evenly over the minute.	15
	Maximum relay position changes per output per minute if only one relay is switched.	60
Connections	KNX	Via bus connection terminals
		0.8 mm Ø, single core
	Load current circuits (1 terminal per contact)	Universal head screw terminal (PZ 1) 0.2… 4 mm^2 stranded, 2 x 0.2…2.5 mm^2 0.2… 6 mm^2 solid, 2 x 0.2…4 mm^2
	Ferrules without/with plastic sleeves	0.25…2.5/4 mm^2
	TWIN ferrules	0.5…2.5 mm^2
		Contact pin length min. 10 mm
	Tightening torque	Maximum 0.8 Nm
Operating and display elements	Button/LED	For assignment of the physical address
	Switch position display	Relay operating element
Enclosure	IP 20	To EN 60 529
Safety class	II, in the installed state	To EN 61 140
Insulation category	Overvoltage category	III to EN 60 664-1
	Pollution degree	2 to EN 60 664-1
KNX safety extra low voltage	SELV 24 V DC	
Temperature range	Operation	-5 °C…+45 °C
	Storage	-25 °C…+55 °C
	Transport	-25 °C…+70 °C
Ambient conditions	Maximum air humidity	93 %, no condensation allowed
Design	Modular installation device (MDRC)	Pro *M* modular installation device
	Dimensions	90 x 72 x 64.5 mm (H x W x D)
	Mounting width in space units (modules at 18 mm)	4
	Mounting depth in mm	64.5
Weight	in kg	0.26
Installation	On 35 mm mounting rail	To EN 60 715
Mounting position	As required	
Housing/colour	Plastic housing, grey	
Approvals	KNX to EN 50 090-1, -2	Certificate
CE mark	In accordance with the EMC and Low Voltage Directive	

1) Further information concerning electronic endurance to IEC 60 947-4-1 can be found at: **AC1, AC3, AX, C-Load specifications**, page 15

2) The maximum peak inrush current may not be exceeded, see **Lamp load output**, page 9.

3) The specifications apply only after the bus voltage has been applied to the device for at least 30 seconds. Typical delay of the relay is approx. 20 ms.

4) The stated values apply only if no DC components are present. A DC component causes additional distortion of the measurement result.

2.1.2 Lamp load output

Lamps	Incandescent lamp load	3680 W
Fluorescent lamps T5 / T8	Uncorrected	3680 W
	Parallel compensated	2500 W
	DUO circuit	3680 W
Low-voltage halogen lamps	Inductive transformer	2000 W
	Electronic transformer	2500 W
Halogen lamps 230 V		3680 W
Dulux lamps	Uncorrected	3680 W
	Parallel compensated	3000 W
Marcury-vapour lamps	Uncorrected	3680 W
	Parallel compensated	3680 W
Switching performance (switching contact)	Maximum peak inrush-current I_p (150 ms)	600 A
	Maximum peak inrush-current I_p (250 ms)	480 A
	Maximum peak inrush-current I_p (600 ms)	300 A
Number of electronic ballasts (T5/T8, single element)[1)]	18 W (ABB EVG 1 x 18 SF)	26[2)]
	24 W (ABB EVG-T5 1 x 24 CY)	26[2)]
	36 W (ABB EVG 1 x 36 CF)	22
	58 W (ABB EVG 1 x 58 CF)	12[2)]
	80 W (Helvar EL 1 x 80 SC)	10[2)]

1) For multiple element lamps or other types, the number of electronic ballasts must be determined using the peak inrush current of the electronic ballasts, see **Ballast calculation**, page 14.

2) The number of ballasts is limited by the protection with B16 circuit-breakers

Device designation	Application program	Maximum number of communication objects	Maximum number of group addresses	Maximum number of associations
SE/S 3.16.1	Switch Measure 3f/…*	183	254	254

* … = current version number of the application program.

Note

The ETS and the current version of the device application program are required for programming.

The current application program can be found with the respective software information for download on the internet at *www.abb.com/knx.* After import in the ETS it is available in the ETS under *ABB/Output/Energy actuator*.

The device does not support the locking function of a KNX device in the ETS. If you inhibit access to all devices of the project with a *BCU code*, this has no effect on this device. It can still be read and programmed.

Note

Current values less than 25 mA are indicated as a 0 mA value on the KNX (starting current). For small load currents that are just above the minimum detection threshold of 25 mA, it is possible that a value of 0 mA is displayed due to the inaccuracies, even though a current is flowing.

The Energy Actuator is only suitable for recording measured values of *Loads*, i.e., the meters only record positive energy. Negative power values are discarded with load control, and negative instrument and power values (feedback) cannot be monitored with thresholds.

Important

Threshold value monitoring should not be used for safety-relevant applications. The Energy Actuator cannot assume the function of a circuit-breaker or RCD (earth-leakage circuit breaker).

With communication objects that can be written via the bus (e.g. threshold value limits), the range of values is not limited, i.e. even if the values that can be entered in the ETS for a threshold value or load limit can only be entered within defined limits, any value can be written to the communication object over the bus. It is therefore necessary to ensure that only permitted and useful values can be written to the communication object.

If the threshold value monitoring is to be used for equipment fault detection that only causes a slight change of less than 30 mA (7 W), mains voltage and current fluctuations due to ambient influences (e.g. temperature) and natural ageing of the load play a significant role. Even when the current changes are detected by the Energy Actuator, the detected current changes do not necessarily mean that a device has failed.

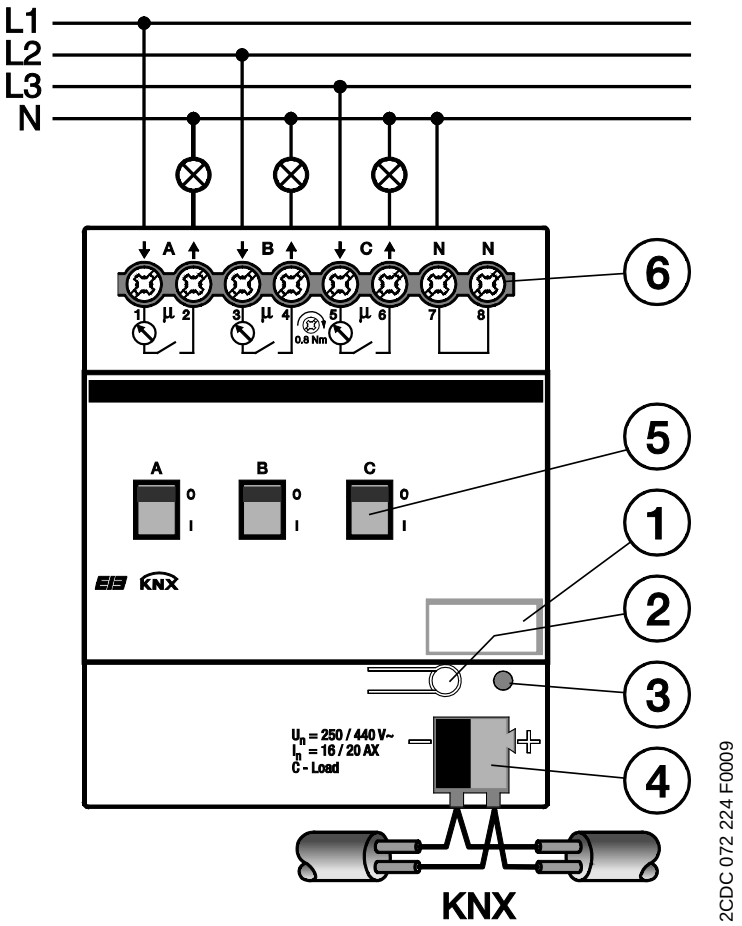
The outputs are electrically isolated from each other, i.e. they can be connected to different phase conductors within the voltage ranges permitted in the technical data. There may not be potential differences between the neutral conductor connection of the load and the neutral conductor connection on the Energy Actuator to ensure that useful measured values are delivered.

(Also refer to the note under Circuit diagram, page 11.)

Danger

In order to avoid dangerous touch voltages, which originate through feedback from different phase conductors, all-pole disconnection must be observed when extending or modifying the electrical connections.

2.1.3 Circuit diagram



1 Label carrier

2 Button *Programming*

3 LED *Programming* (red)

4 Bus terminal connection

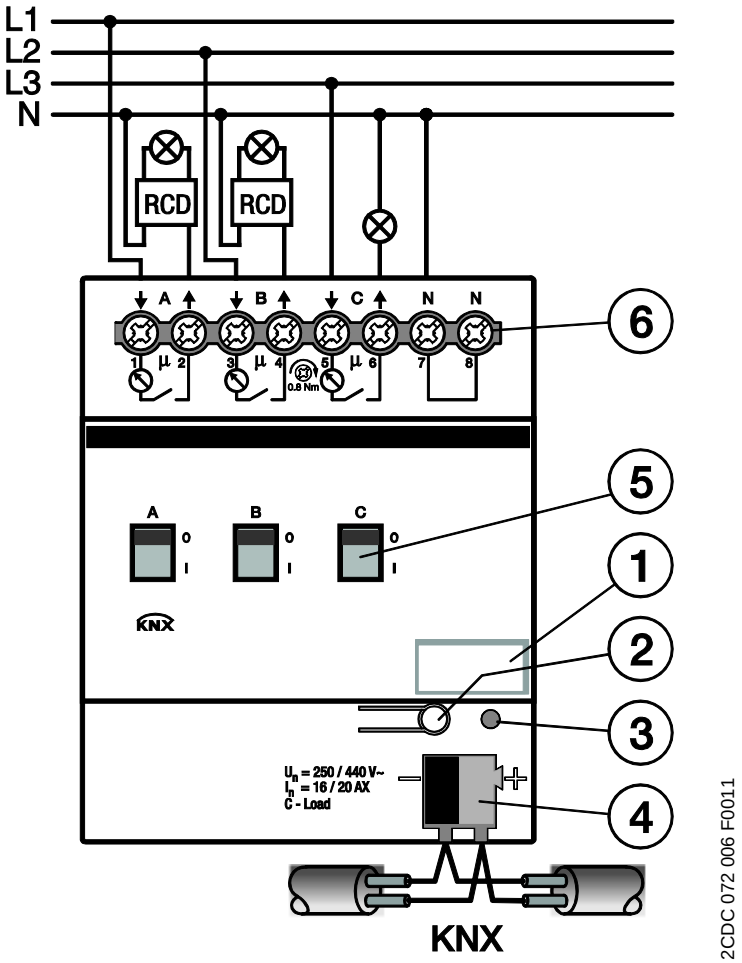
5 Switch position display and ON/OFF actuation

6 Load circuits (A…C) each with 2 screw terminals, neutral conductor (N)

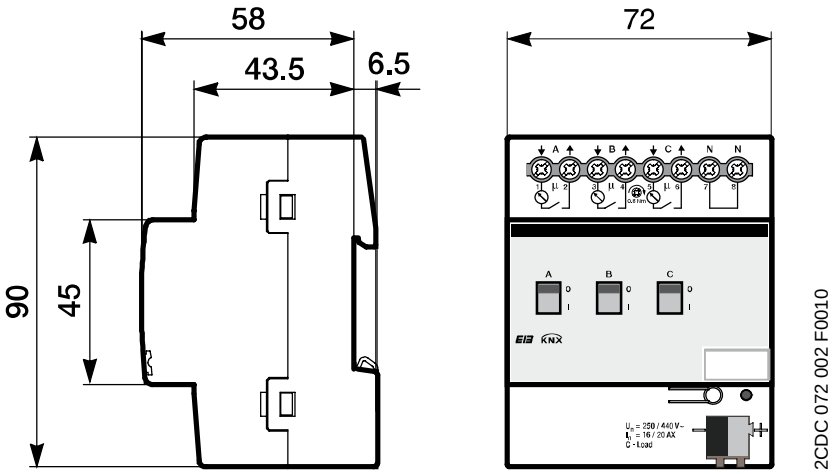
Important
Mains voltage must be present on at least one output, and the neutral conductor must be connected for supplying power to the measurement section.
No load currents may be conducted via the N terminal on the device. The switched load must be connected directly to the N rail.
Terminals 7 or 8 should be connected directly to the N busbar.
The second N terminal can be used to loop to further Energy Actuators.

2.1.3.1 Connection example

If the outputs of the Energy Actuator are to be individually protected against residual currents, the RCD (earth-leakage circuit breaker) must be connected as follows.



2.1.4 Dimension drawing



2.2 Ballast calculation

The electronic ballast is a device for operating gas discharge lamps, e.g. fluorescent lamps. During normal operation, it converts the mains voltage to an optimum operating voltage for the gas discharge lamps. Furthermore, the electronic ballast enables the gas discharge lamps to ignite (start) via capacitor circuitry.

Using the original choke/starter circuitry, the lamps switch-on consecutively, with the electronic ballast all fluorescent lamps switch on practically simultaneously. If switch-on occurs at the mains voltage peak, the buffer capacitors of the electronic ballast cause a high but very short current pulse. When using several ballasts on the same circuit, the simultaneous charging of the capacitors may result in very large system inrush currents.

This peak inrush current I_p is to be considered when designing the switch contacts as well as by the selection of the respective circuit protection. In the following, the effects of the electronic ballast peak inrush current and the associated limitation of the number of electronic ballasts on the Energy Actuator are examined.

The inrush current of the electronic ballast depends not only on the wattage but also on the type, the number of elements (lamps) and on the manufacturer. For this reason, the given maximum number of connectible electronic ballasts per output can only relate to a defined type of electronic ballast. For a different ballast type, this value can only represent an estimation.

In order to properly estimate the number of electronic ballasts, the peak inrush current I_p and the respective pulse width of the electronic ballast must be known. In the meantime, these values are stated by the manufacturer in the technical data or are available on request.

Typical values for single element electronic ballasts with T5/T8 lamps are: Peak inrush current 15…50 A with a pulse time of 120…200 ms.

The relays of the Energy Actuators have the following maximum starting values:

	SE/S 3.16.1
Max. peak inrush-current I_p (150ms)	600 A
Max. peak inrush-current I_p (250ms)	480 A
Max. peak inrush-current I_p (600ms)	300 A

Caution

Do not exceed the threshold values.

Exceeding the value leads to destruction of the relay, e.g. due to welding.

Example

Electronic ballast 1 x 58 CF

Peak inrush-current I_p = 33.9 A (147.1 ms)

Maximum number of electronic ballasts/output = 600 A/34 A = 17 ballasts

This number has been limited to 12 electronic ballasts in conjunction with a B16 miniature circuit breaker. If more electronic ballasts are connected, the miniature circuit breaker may trip during switch on.

2.3 AC1, AC3, AX, C-Load specifications

In intelligent installation systems, different switching capacity and performance specifications, that are dependent on the special applications, have become established in industrial and building installations. These performance specifications are rooted in the respective national and international standards. The tests are defined so that typical applications, e.g. motor loads (industrial) or fluorescent lamps (residential), are simulated.

The specifications AC1 and AC3 are switching performance specifications, which have become established in the industrial field.

Typical application:

AC1	Non-inductive or slightly inductive loads, resistive furnaces (relates to switching of resistive loads, cos φ = 0.8)
AC3	Squirrel-cage motors: Stating, switching off motors during running (relates to (inductive) motor load, cos φ = 0.45)
AC5a	Switching of electric discharge lamps

These switching performances are defined in the standard EN 60947-4-1 *Contactors and motor-starters - Electromechanical contactors and motor-starters*. This standard described motor starters and/or contactors which were previously used primarily in industrial applications.

The designation AX has established itself in the field of building engineering.

AX relates to a (capacitive) fluorescent lighting load. Switchable capacitive loads (200 µF, 140 µF, 70 µF or 35 µF) are referred to in conjunction with fluorescent lamp loads.

This switching capacity refers to the standard EN 60669 *Switches for household and similar fixed electrical installations – General requirements*, which deals primarily with applications in building engineering. For 6 A devices, a test with 70 µF is demanded, and for devices exceeding 6 A, a test with 140 µF is demanded.

The switching capacity specifications AC and AX are not directly comparable. However, the following switching capacity quality can still be determined:

The lowest switching capacity corresponds with the specification AC1 - mainly for resistive loads.

The following switching capacity should be rated higher AX - fluorescent lighting load to the standard: 70 µF (6 A), 140 µF (10 A, 16 A).

The highest switching capacity is designated by AC3 - motor loads,C-Load - fluorescent lighting loads (200 uF).

Both specifications are almost equivalent. This means that a device, which has fulfilled the test for AC3 to EN 60947, will most probably fulfil the tests to EN 60669 with 200 µF.

In conclusion, the following can be said:

- Users or customers, who are primarily involved with industrial applications, will refer to AC3 switching capacities.
- Users, who are involved with building or lighting technology, will more often than not refer to an AX switching capacity or C-load (200 µF loads).

The switching capacity differences must be considered with the selection of an Energy Actuator.

2.4 Measurement methods

The Energy Actuator has its own evaluation electronics for detection and measurement of the various measured variables for each output, which can be programmed separately.

Current and voltage are measured directly; all other variables (meter values, active power, apparent power, power factor, crest factor, frequency) are derived from these values.

The measurement method, other than with the Switch Actuators SA/S, is a real RMS value measurement. The signal is scanned 100 times per period (at 50 Hz), and the RMS value is determined from these scanned values. The measuring accuracy is also assured with non-sinusoidal signals.

The measured values are evaluated every 200 ms. Provided that the parameter *Delay for switching* has been set to the value 0, exceeding the threshold, for example, will be detected after 200 ms at the latest.

Current values less than 25 mA are displayed as value 0 (starting current). For this reason, even values derived from the current are indicated as a value of 0 even when a current less than 25 mA is flowing. Voltages less than 5 V as shown as 0 for technical reasons.

Note
The progression of the current and voltage curves is not analyzed, i.e., analysis of the signal waveform (e.g. FFT) is not undertaken. All values are determined by sampling the signal. Therefore, the power factor always results as the sum of the distortion power (e.g. dimmer currents) and displacement power (e.g. inductive or capacitive loads). This power factor does **not** (or only in special cases) comply with the cos φ (Cosine Phi) with a phase displaced current! It can also **not** be used for reactive power compensation!

2.5 Requesting status values and setting the cycle times

The 1 bit communication objects for requesting status values are enabled for the Energy Actuator at a central point. There is a 1 bit communication object each for requesting all status values, all meter values, all power values and all instrument values.

Furthermore, the cycle times for cyclic sending of telegrams are set at a central point with the Energy Actuator. There is a common cycle time for cyclic sending of all power values, all instrument values and all meter values.

On the individual communication objects, you can then set whether the value of the respective communication object should or should not be sent *cyclically* or *on request*.

2.6 Assembly and installation

The ABB i-bus® Energy Actuator SE/S 3.16.1 is a modular installation device for installation in the distribution board on 35 mm mounting rails to EN 60 715.

The mounting position can be selected as required.

The electrical connection is implemented using screw terminals. The connection to the bus is implemented using the supplied bus connection terminal. The terminal assignment is located on the housing.

The device is ready for operation after connection to the bus voltage. Mains voltage must be present on at least one output, and the corresponding neutral conductor must be connected for supplying power to the measurement section.

Accessibility to the device for the purpose of operation, testing, visual inspection, maintenance and repair must be provided compliant to VDE 0100-520.

Commissioning requirements

In order to commission the device, a PC with ETS and an interface, e.g. USB or IP, are required. The device is ready for operation after connection to the bus voltage.

The installation and commissioning may only be carried out by qualified electrical specialists. The appropriate norms, guidelines, regulations and specifications should be observed when planning and setting up electrical installations.

Protect the device from damp, dirt and damage during transport, storage and operation.

Only operate the device within the specified technical data limits!

The device should only be operated in an enclosed housing (distribution board)!

Manual operation

The Energy Actuator has a manual operating feature. The switch contacts can be switched on or off with an operating element on the relay. The operating element simultaneously indicates the switch status.

Important
The Energy Actuator does not feature electrical monitoring of the manual actuation and cannot therefore react to manual operation. From a power engineering point of view, the relay is only actuated with a switching pulse if the known relay position has changed. This has the consequence that after a one-off manual operation, a repeated switching telegram is received via the bus, and no contact changeover occurs. The Energy Actuator assumes that no contact changeover has occurred and that the correct contact position is still set. If the switch impulse is to be undertaken in every case, the parameter Triggering of relay, see page 52, must be set accordingly. Furthermore, each output can be monitored for manual switching, if required, using threshold value 1 of the current monitoring.

Supplied state

The device is supplied with the physical address 15.15.255. The application program is pre-installed. It is therefore only necessary to load group addresses and parameters during commissioning.

However, the complete application program can be reloaded if required. The entire application program is loaded after a change of the application program, after a discontinued download or after discharge of the device. The process takes significantly longer than loading parameters and group addresses.

Assignment of the physical address

The assignment and programming of the physical address is carried out in the ETS.

The device features a *Programming* button for assignment of the physical device address. The red LED *Programming* lights up after the button has been pushed. It switches off as soon as the ETS has assigned the physical address or the *Programming* button is pressed again.

Cleaning

If devices become dirty, they can be cleaned using a dry cloth or a slightly damp cloth and soap solution. Corrosive agents or solutions should never be used.

Maintenance

The device is maintenance-free. No repairs should be carried out if damage occurs, e.g. during transport and/or storage.

3 Commissioning

The ABB i-bus® KNX Energy Actuator SE/S 3.16.1 is a switch actuator, which records the energy consumers of the connected electrical loads. Its three outputs feature the same functions. It is thus possible, depending on the application, to freely define every output and to parameterize it accordingly.

A short overview of all functions of the Energy Actuator can be found in the next chapter.

3.1 Overview

The following table provides an overview of the functions used by the Energy Actuator SE/S 3.16.1 and those possible with the application program *Switch Measure 3f*.

Energy Actuator properties	**SE/S 3.16.1**
Type of installation	MDRC
Number of outputs	3
Module width	4
In rated current (A)	16/20 A
Manual operation	
Switch on and off of the outputs (device front)	n
Switch position display (device front)	n

Parameterization options *General*	**SE/S 3.16.1**
Cyclic monitoring telegram (In operation)	n
Limit number of telegrams	n
Request status values via 1 bit communication object	n
Request instrument values via 1 bit communication object	n
Request power values via 1 bit communication object	n
Instrument values send cycle time	n
Power values send cycle time	n

Parameterization options *Metering (Wh)*	**SE/S 3.16.1**
Request meter readings via 1 bit communication object	n
Meter readings send delay	n
Meter readings send cycle time	n
Reset all meters via communication object	n
Enable meter reading total	n

Parameterization options *Meter reading total (Wh)*	**SE/S 3.16.1**
Meter total	n
Intermediate meter total	n
Trigger 1	n
– via communication object	n
– via time	n
Trigger 2	n
– via communication object	n
– via time	n
– via limit	n
– via duration	n
Reset intermediate meter via communication object	n
Reaction after download and ETS reset	n

Parameterization options *Functions*	**SE/S 3.16.1**
Monitor Active power total	
Send Active power	n
Threshold value 1	n
– upper limit	n
– lower limit	n
– warning	n
Threshold value 2	n
– upper limit	n
– lower limit	n
– warning	n
Reaction after download and ETS reset	n
Monitor frequency	
Send frequency	n
Threshold value 1	n
– upper limit	n
– lower limit	n
– warning	n
Threshold value 2	n
– upper limit	n
– lower limit	n
– warning	n
Reaction after download and ETS reset	n

Parameterization options *Functions*	**SE/S 3.16.1**
Device is load control master	
Number of shedding stages	n
Load limit can be changed	n
Reaction after download and ETS reset	n
Source for power values 1…4	n
Enable of additional power values [0…6]	n
Monitor power values cyclically	n
Reaction time when a load limit is exceeded	n
Reaction time when a value falls below a load limit	n
Hysteresis with a switch on attempt of the load limit	n
Deactivate load control (master) after recovery of bus voltage	n
Master enable shedding stage	**n**
Enable safety objects	**n**
Function safety priority 1	n
Function safety priority 2	n
Function safety priority 3	n

Parameterization options per output	**SE/S 3.16.1**
General	
Status response of switching state	n
Triggering of relay	n
Delay for interpretation	n
Send status "Contact monitoring"	n
Reaction on bus voltage failure	n
Reaction at bus voltage recovery, download and ETS reset	n
Power values send cycle time	n
Function *Time*	
Staircase lighting	n
– Staircase lighting duration	n
– Staircase lighting warning	n
Switching ON and OFF delay	n
Flashing	n
Disable function time	n
Function *Scene*	
18 scenes	n
Recall and save via KNX with 8 bit telegram	n
Function *Logic*	
Logical AND function	n
Logical OR function	n
Logical XOR function	n
Logical GATE function	n

Parameterization options per output	SE/S 3.16.1
Function *Safety*	
Safety priority 1	n
Forced operation	n
Safety priority 2	n
Safety priority 3	n
Function *Metering (Wh)*	
Send meter reading	n
Send intermediate meter reading	n
Trigger 1 (Start)	n
– via communication object	n
– via time	n
Reset Intermediate meter reading total on trigger 1 (Start)	n
Send intermediate meter reading total on trigger 1 (Start)	n
Trigger 2	n
– via communication object	n
– via time	n
– via limit	n
– via duration	n
Stop intermediate meter reading on trigger 2	n
– Reaction to stop	n
Reset intermediate meter via communication object	n
Reaction after download and ETS reset	n
Function *Instruments and power values*	
Monitor active power	n
Monitor current	n
Monitor voltage	n
Enable apparent power	n
Enable power factor	n
Enable crest factor	n
Function *Load control slave*	
Shedding stages [1...8]	n
Load shedding stage can be changed via object	n
Slave is controlled via	n
– external communication object	n
– receives load shedding stage internally	n
Deactivate load control (slave) after recovery of bus voltage	n

3.1.1 Conversion

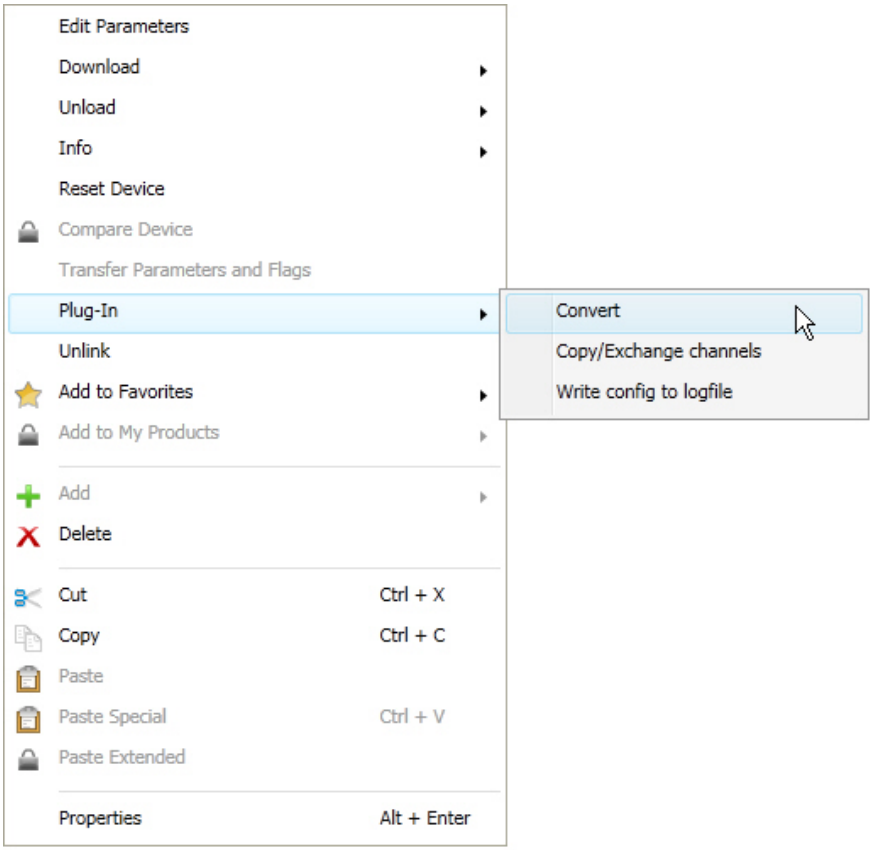
For ABB i-bus® KNX devices from ETS3 or higher, it is possible to assume the parameter settings and group addresses from earlier application program versions.

Furthermore, conversion can be applied to transfer the existing parameterization of a device to another device.

Note
When the term “channels” is used in the ETS, inputs and/or outputs are meant. In order to ensure that the ETS language generally applies for as many ABB i-bus® devices as possible, the word „channels“ is used here.

3.1.1.1 Procedure

- Insert the required device into the project.
- Import the current application program into the ETS.
- Perform parameterization and program the device.
- After you have programmed a device, you can transfer the settings to a second device.
- Right click on the product and select *Plug-in* > *Convert* in the context menu for this purpose.



- Thereafter undertake the required settings in the *Convert* dialog.
- Finally, exchange the physical address and delete the old device.

Should you wish to only copy individual channels within a device, use the function Copy and exchange, page 25.

3.1.2 Copying and exchanging parameter settings

Parameterization of devices can take a lot of time depending on the complexity of the application and the number of device outputs. To keep the commissioning work to the minimum possible, using the function *Copy/exchange channels*, parameter settings of an output can be copied or exchanged with freely selectable outputs. Optionally, the group addresses can be retained, copied or deleted in the target output.

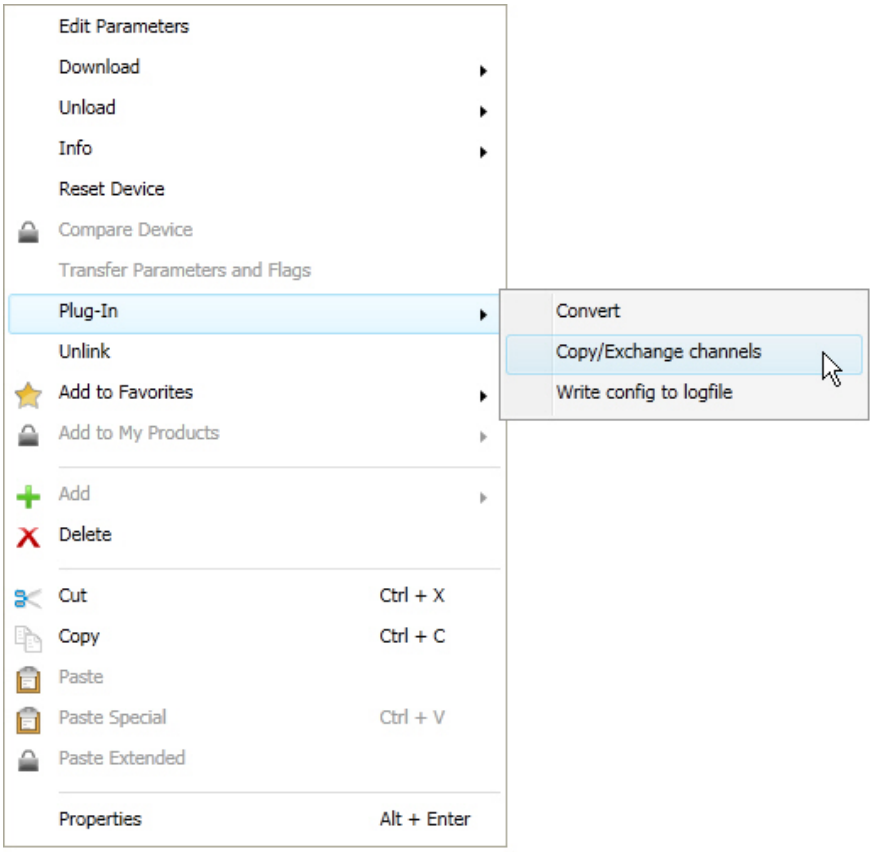
Note
When the term “channels” is used in the ETS, inputs and/or outputs are meant. In order to ensure that the ETS language generally applies for as many ABB i-bus® devices as possible, the word channels is used here.

The copy function for inputs/outputs is particularly useful with devices having the same parameter settings for several outputs, inputs or groups. For example, lighting in a room is frequently controlled in an identical manner. In this case, the parameter settings from input/output X can be copied to all other inputs/outputs or to a special input/output of the device. Thus the parameters for this input/output must not be set separately, which significantly shortens the commissioning time.

The exchange of parameter settings is useful, e.g. should the outputs be swapped when wiring the terminals. The parameter settings of the incorrectly wired outputs can be simply exchanged saving the requirement for time-consuming rewiring.

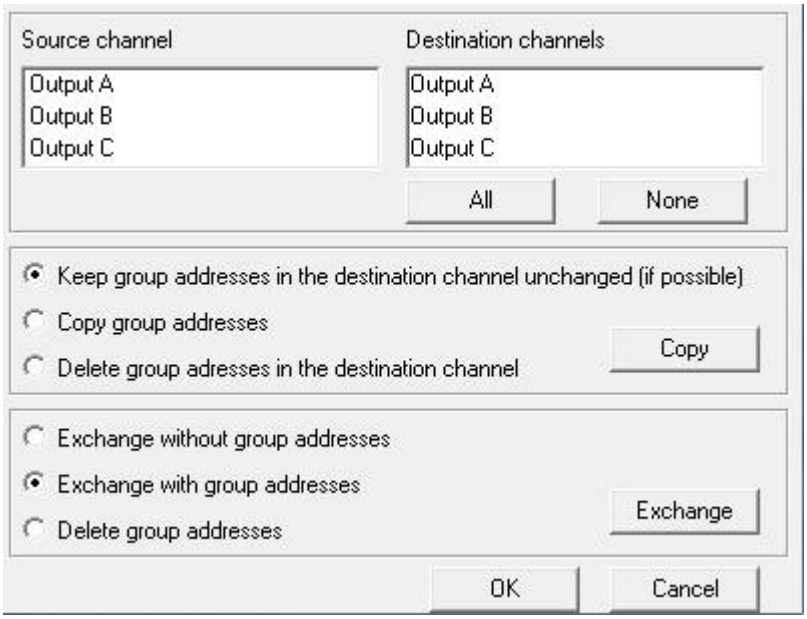
3.1.2.1 Procedure

- Insert the required device into the project.
- Import the current application program into the ETS.
- Click with the right mouse button on the product, whose outputs you wish to copy or exchange, and select the context menu *Plug-in > Copy/exchange channels.*



Thereafter, undertake the required settings in the Copy/exchange channels dialog.

3.1.2.2 Dialog *Copy/exchange channels*



At the top left, you will see the source channel selection window for marking the source channel. Beside it is located the selection window for the target channel or channels for marking the target channel or channels.

Source channel

With the selection of the source channel, you define which parameter settings should be copied or exchanged. Only one source channel can be selected at a time.

Target channels

With the selection of the target channels, you define which channel/channels are to assume the parameter settings of the source channel.

- For the function *Exchange*, only one target output can be selected at a time.
- For the function *Copy*, different target channels can be selected simultaneously. For this purpose, press the Ctrl key and mark the required channels with the mouse cursor, e.g. channels B and C.

All	With this button, you select **all** available target channels, e.g. A…C.
None	Reset the selection of the target channel with this button.

Copy

The following options can be selected before copying the parameter settings:

- Leave the group addresses unchanged (if possible) in the target channel
- Copy group addresses
- Delete group addresses in the target channel

Copy — With this button, copy the settings of the source channel into the target channel or channels.

Exchange

The following options can be selected before exchanging the parameter settings:

- Retain group addresses
- Exchange group addresses
- Delete group addresses

Exchange — With this button, exchange the settings of the source channel with the target channel.

OK — Confirm your selection with this button, and the window closes.

Cancel — Using this button, the window closes without accepting the changes.

3.2 Parameters

The parameterization of the Energy Actuator is implemented using the Engineering Tool Software ETS from version ETS3.0f or higher.

The application program is available in the ETS3 at *ABB/Output/Energy Actuator*.

The following chapter describes the parameters of the device using the parameter window. The parameter window features a dynamic structure so that further parameters may be enabled depending on the parameterization and the function.

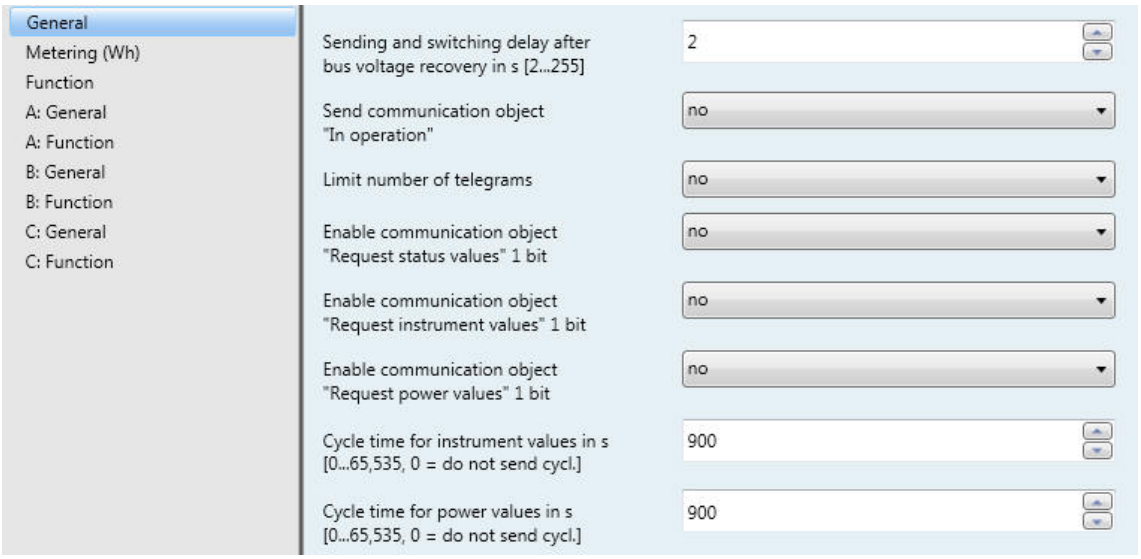
The default values of the parameters are underlined, e.g.:

Options: yes
no

Note
However, as the functions for all outputs are identical, only the functions of output A will be described.

3.2.1 Parameter window *General*

Higher level parameters can be set in the parameter window *General*.



Sending and switching delay after bus voltage recovery in s [2…255]

Options: 2…255

Telegrams are only received during the send and switching delay. The telegrams are not processed however, and the outputs remain unchanged. No telegrams are sent on the bus.

After the sending and switching delay, telegrams are sent, and the state of the outputs is set to correspond to the parameterization or the communication object values.

If communication objects are read during the sending and switching delay, e.g. by a visualisation system, these read requests are stored, and a response is sent, after the send and switching delay has been completed.

An initialisation time of about two seconds is included in the delay time. The initialisation time is the time that the processor requires to be ready to function.

How does the device behave with bus voltage recovery?

After bus voltage recovery, the device always waits for the send delay time to elapse before sending telegrams on the bus.

Send communication object "In operation"

Options: no
send value 0 cyclically
send value 1 cyclically

The *in operation* communication object indicates the presence of the device on the bus. This cyclic telegram can be monitored by an external device. If a telegram is not received, the device may be defective or the bus cable to the transmitting device may be interrupted.

- *no:* The communication object *on operation* is not enabled.
- *send value 0/1 cyclically:* The communication object *in operation* is sent cyclically on the KNX. The following parameter appears:

  Sending cycle time in s [1…65,535]

  Options: 1…60…65,535

  Here the time interval, at which the communication object *In operation* cyclically sends a telegram, is set.

Limit number of telegrams

Options: no
yes

The load on the bus generated by the device can be limited with the limitation on the number of telegrams sent. This limit relates to all telegrams sent by the device.

- *yes:* The following parameters appear:

  Max. number of sent telegrams [1…255]

  Options: 1…20…255

  in period

  Options: 50 ms/100 ms…1 s…30 s/1 min

  This parameter sets the number of telegrams, which can be sent by the device within a period. The telegrams are sent as quickly as possible at the start of a period.

Enable communication object "Request status values" 1 bit

Options: no
yes

- *yes:* The 1 bit communication object *Request status values* is enabled.

Using this communication object, the following status messages are requested in every case:

- Measurement circuit active
- Frequency error
- Status byte output A…C

The following status messages are sent depending on the parameterization:

- *Status switch* output A…C (provided that the communication object is enabled and parameterized *as on request)*
- *Status contact monitoring* (if parameterized *as on request)*)
- *Status intermediate meter total* (if Intermediate meter total is enabled)
- *Status intermediate meter* output A…C (if the intermediate meter total output A…C is enabled)
- *Load limit exceeded* (if function *Load control master* enabled)
- *Status load control* (if function *Load control master* enabled and *Monitor load values cyclically* is parameterized).

With the option *yes*, the following parameters appear:

Request with object value

Options: 0
<u>1</u>
0 or 1

- *0:* Sending status messages is requested with the value 0.
- *1:* Sending status messages is requested with the value 1.
- *0 or 1:* Sending status messages is requested with the value 0 or 1.

Enable communication object "Request instrument values" 1 bit

Options: <u>no</u>
yes

- *yes:* A 1 bit communication object *Request instrument values* is enabled.

Via this communication object, all instrument values can be requested, provided that they have been parameterized with the option *on request*. These instrument values include:

- Current
- Voltage
- Frequency
- Power factor
- Crest factor.

With the option *yes*, the following parameters appear:

Request with object value

Options: 0
<u>1</u>
0 or 1

- *0:* Sending status messages is requested with the value 0.
- *1:* Sending status messages is requested with the value 1.
- *0 or 1:* Sending status messages is requested with the value 0 or 1.

Enable communication object "Request power values" 1 bit

Options: no
yes

- *yes:* A 1 bit communication object *Request power values* is enabled.

Via this communication object, all power values can be requested, provided that they have been parameterized with the option on request. These power values include:

- Active power (Output A…C)
- Active power total
- Apparent power (Output A…C)
- Send sum power values

With the option *yes*, the following parameters appear:

Request with object value

Options: 0
1
0 or 1

- *0:* Sending status messages is requested with the value 0.
- *1:* Sending status messages is requested with the value 1.
- *0 or 1:* Sending status messages is requested with the value 0 or 1.

Cycle time for instrument values in s [0…65,535, 0 = do not send cycl.]

Options: 0…900…65,535

A common cycle time for all instrument values is set with this parameter, provided that this has been parameterized with the option *Send cyclically*.

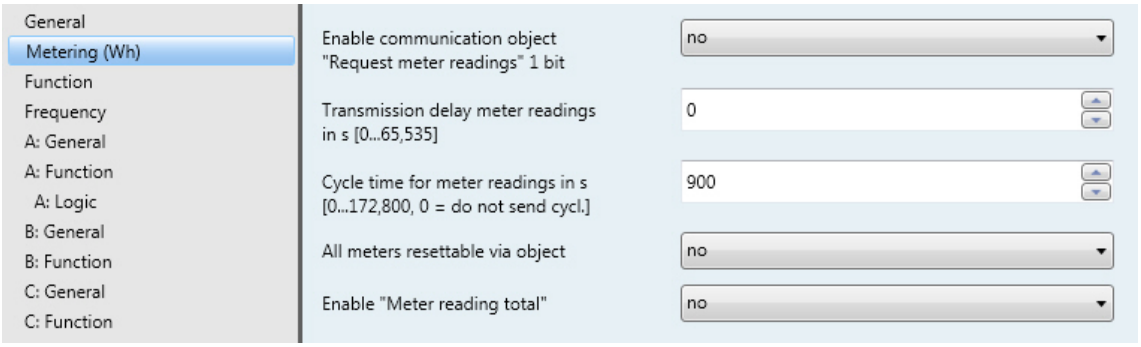
Cycle time for power values in s [0…65,535, 0 = do not send cycl.]

Options: 0…900…65,535

A common cycle time for all power values is set with this parameter, provided that this has been parameterized with the option *Send cyclically*.

3.2.2 Parameter window *Metering (Wh)*

In parameter window *Metering (Wh),* the higher-level settings that apply for all meters are undertaken, and the *Meter reading total* can be enabled here with the respective parameter window.



Enable communication object "Request meter readings" 1 bit

Options: no
yes

- *yes:* A 1 bit communication object *Request meter readings* is enabled. Using this communication object, all meter readings can be requested, provided that the meters have been enabled and they have been parameterized with the option *on request*.
- Meter total Meter reading
- Intermediate meter total Meter reading
- Meter *Meter reading* Output A…C
- Intermediate meter *Meter reading* Output A…C

With the option *yes*, the following parameters appear:

Request with object value

Options: 0
1
0 or 1

- *0:* Sending status messages is requested with the value 0.
- *1:* Sending status messages is requested with the value 1.
- *0 or 1:* Sending status messages is requested with the value 0 or 1.

Transmission delay meter readings in s [0…65,535]

Options: 0…65,535

The send delay time is used to minimize the bus load should the meter readings of several Energy Actuators be requested simultaneously. When meter readings are requested, they will only be sent after the delay time has timed out.

Note
Should a send delay be set and a meter reading is sent *cyclically and on request*, the send delay is taken into consideration with the first cyclic sending and with every request.

Important
During the time where the sending delay of the meter readings is active, cyclic sending is interrupted for all meter readings, including those where do not send *on request* is parameterized. The cycle time continues to run in the background, and cyclic sending continues only after the send delay time has timed out.

Cycle time for meter readings in s [0…172,800, 0 = do not send cycl.]

Options: 0…900…172,800 (2 days)

This parameter determines the cycle time for cyclic sending of all meter values, provided that they are parameterized with the option *cyclically*.

All meters resettable via object

Options: no
yes

- *yes:* The 1 bit communication object *Enable reset meters* and *Reset meter readings* are enabled.

Using these communication objects, all meter readings (main and intermediate meters) are set to zero, and all intermediate meters are stopped.

For further information see: Communication objects, page 92

Important
The meters can only be reset when the measurement process is active, i.e. rated voltage is present on at least one output.

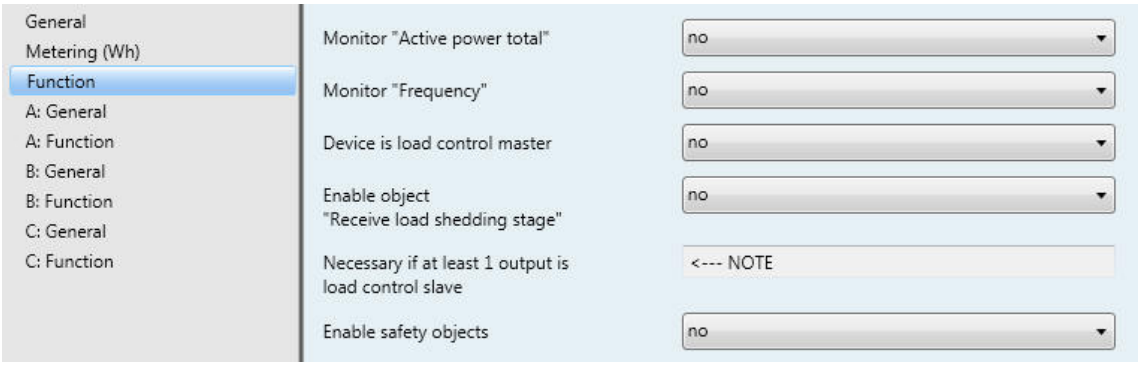
Enable "Meter reading total"

Options: no
yes

- *yes:* The parameter window *Meter reading total* as well as the communication objects for the *Meter total* and the *Intermediate meter total* are enabled.

3.2.3 Parameter window *Function*

In the parameter window *Function*, the functions and the corresponding communication objects for the entire device are enabled.



Monitor "Active power total"

Options: no
yes

- *yes:* The parameter window *Active power total* and the communication object *Active power* (Active power total) are enabled.

Monitor "Frequency"

Options: no
yes

- *yes:* The parameter window *Frequency* and the communication object *Frequency* are enabled.

Device is load control master

Options: no
yes

- *yes:* The parameter window *Load control master* as well as the respective communication objects are enabled.

Enable communication object
“Receive load shedding stage”

Options: no
yes

- *yes:* The communication object *Receive load shedding stage* is enabled. This communication object is required, provided that at least one of the outputs is parameterized with *Load control slave* and the load shedding stage is received externally from a master or a visualization system. The load shedding stage is received once per device and applies internally for all the outputs parameterized as a slave.

Necessary if at least 1 output is
load control slave

<−−− NOTE

Enable safety objects

Options: no
yes

· *yes:* The communication objects device safety are enabled. Three further parameters appear:

Function safety priority 1

Options: inactive
enabled by object value 0
enabled by object value 1

With the *Function safety priority 1…3*, a customized trigger condition (safety disconnection) can be defined for each priority. With safety disconnection, one communication object *Safety priority 1…3* becomes visible each time. These communication objects relate to the entire device. However, every output can react differently to the receipt of a telegram. The reaction of the output is parameterized in the parameter window A: Safety, page 70, of the respective output.

· *inactive:* The *Function safety priority 1* is not used.

· *enabled by object value 0* Activation of the safety is triggered if at communication object *Safety Priority 1*, a telegram with the value 0 is received. The following parameter appears.

· *enabled by object value 1* Activation of the safety is triggered if at communication object *Safety Priority 1*, a telegram with the value 1 is received. The following parameter appears:

Control period in seconds
[0…65,535, 0 = inactive]

Options: 0…65,535

This parameter defines the control period of the function *Safety priority 1*. If a telegram is received in this time with the defined triggering condition as defined in parameter *Function safety priority 1* on communication object *Safety priority 1*, or if a telegram is not received within this monitoring period, it will be triggered. Should the communication object *Safety priority 1* receive a telegram that does not fulfil the trigger conditions, the control period is reset and restarted.

· *0:* This is no monitoring. However, the *Safety priority 1* is triggered when a telegram with the defined triggering condition, as defined in parameter *Function safety priority 1,* on communication object *Receive Safety priority 1* is received.

Note
The control period should be at least twice as long as the cyclical transmission time of the sensor, so that the immediate absence of a signal, e.g. due to a high bus load, does not immediately result in an alarm.

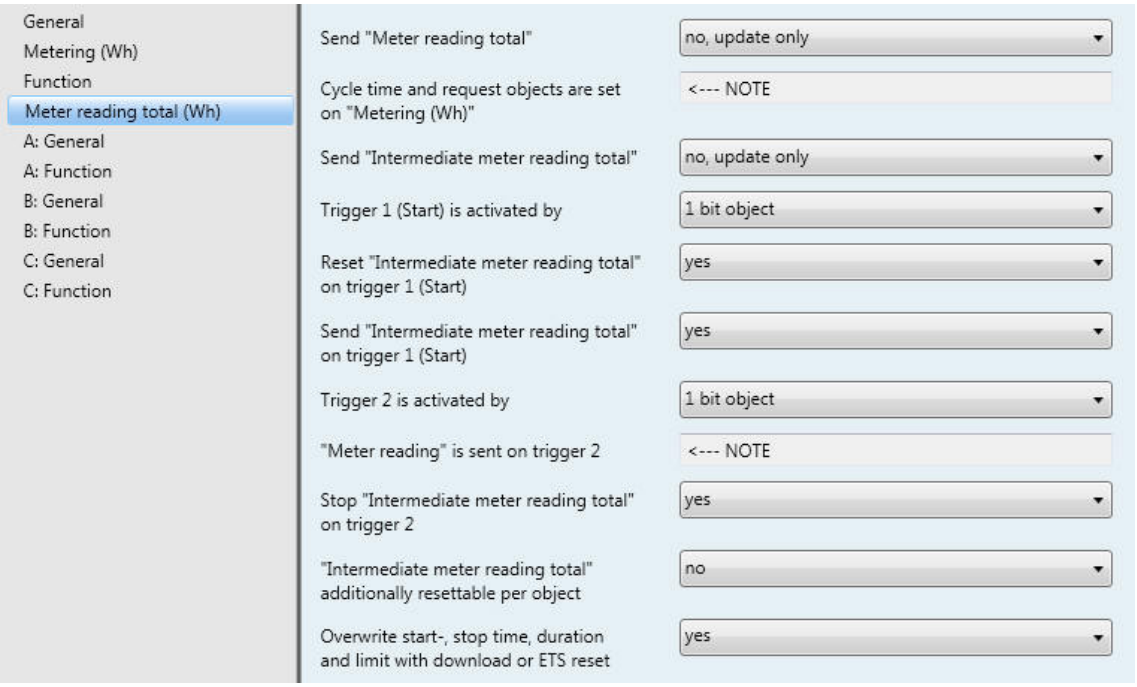
Function safety priority 2

Function safety priority 3

Note
The functions and setting options of the parameter *Function safety priority 2* and *Function safety priority 3* do not differentiate from those of parameter *Function safety priority 1*. Please refer to the description of Function safety priority 1 for the description.

3.2.3.1 Parameter window *Meter reading total (Wh)*

In parameter window *Meter reading total*, the settings for the *Meter total* and the *Intermediate meter total* are undertaken.



Send "Meter reading total"

Send "Intermediate meter reading total"

Options: no, update only
cyclically
on request
cyclically and on request

The meter readings *Meter total* and *Intermediate meter total* are sent to suit parameterization. Setting of the cycle time and enabling of the request object occurs in the parameter window Metering (Wh), page 33.

Furthermore, the readings of the Intermediate meter total are sent on the bus at starting and/or stopping.

Trigger 1 (Start) is activated by

Options: 1 bit object
Time

- *1 bit object:* The 1 bit communication object *Receive trigger 1 (*Intermediate meter total) is enabled. The intermediate meter starts if a telegram with the value 1 is received on this communication object.
- *Time:* The 3 byte communication object *Trigger 1 change time* (Intermediate meter total) is enabled. The start time can be modified using this communication object. The following parameters appear:

Hour [0…23]

Options: 0…23

Minute [0…59]

Options: 0…59

Weekday

Options: Monday…Sunday
every day

The *intermediate meter* (meter reading) starts if the parameterized time is received on the communication object *Receive time* (General).

Note
The time is only required once per device for all meters.

Reset "Intermediate meter reading total" on trigger 1 (Start)

Options: yes
no

This parameter determines whether the *Intermediate meter total* (Meter reading) is reset when a telegram is received on the communication object *Trigger 1…*. Alternatively, an additional 1 bit communication object can be enabled, see parameter "Intermediate meter reading total" additionally resettable via object, page 41.

Send "Intermediate meter reading total" on trigger 1 (Start)

Options: yes
no

This parameter determines whether the *Intermediate meter total* (Meter reading) is sent when a telegram is received on the communication object *Trigger 1…*.

Trigger 2 is activated by

Options: 1 bit object
Time
Limit
Duration

- *1 bit object:* The 1 bit communication object *Receive trigger 2* (Intermediate meter total) is enabled. The meter reading is sent if a telegram with the value 1 is received on this communication object. It is possible to parameterize whether the intermediate meter stops or does not stop.
- *Time:* The 3 byte communication object *Trigger 2 change time* (Intermediate meter total) is enabled. Using this communication object, the time for trigger 2 can be modified. The following parameters appear:

Hour [0…23]

Options: 0…23

Minute [0…59]

Options: 0…59

Weekday

Options: Monday…Sunday
every day

The intermediate meter is sent if the parameterized time is received on the communication object *Receive time* (General). It is possible to parameterize whether the intermediate meter stops or does not stop.

Note
The time is only required once per device for all meters.

- *Limit:* The 4 byte communication object *Trigger 2 change limit (Intermediate meter total)* is enabled. Using this communication object, the limit for trigger 2 can be modified.

Note
When *Limit* is selected, the intermediate meter total must be reset before a renewed start. This is adjustable via the parameter *Reset "Intermediate meter reading total" on trigger 1 (Start)"* or via the separate 1 bit communication object *Reset*. If the parameterized limit is achieved, the meter reading is sent on the bus, and the intermediate meter stops.

The following parameter also appears with the selection Limit:

Limit in Wh [1…120,888,000]

Options: 1…5000…120,888,000

If the parameterized limit is achieved, the meter reading is sent on the bus, and the intermediate meter stops.

- *Duration:* The 2 byte communication object *Trigger 2 change duration* (Intermediate meter total) is enabled. Using this communication object, the duration until trigger 2 achieved is set. The following parameter appears:

Duration in min [1…65,535]

Options: 1…5…65,535

The meter reading is sent if the parameterized duration has elapsed. It is possible to parameterize whether the intermediate meter stops or does not stop.

"Meter reading" is sent on trigger 2

<−−− NOTE

Stop "Intermediate meter reading total" on trigger 2

Options: yes
no

Note
This parameter is not available should *Limit* be selected beforehand.

- *no:* The intermediate meter sends its meter reading at trigger 2 and continues to count further (without reset).
- *yes:* The intermediate meter uses its meter reading at trigger 2 and stops. The intermediate meter total can be restarted via the 1 bit communication object *Receive trigger 1* or via the parameterzied time *Trigger 1 change time*.

"Intermediate meter reading total" additionally resettable per object

Options: no
yes

- *yes:* The communication object *Reset* (Intermediate meter total) is enabled. When a telegram is received with the value 1 on the communication object, the meter reading is sent and subsequently reset to zero. The status of the meter is not changed, i.e. if the meter is metering, it will continue to take readings; if it is stopped, it will remain stopped.

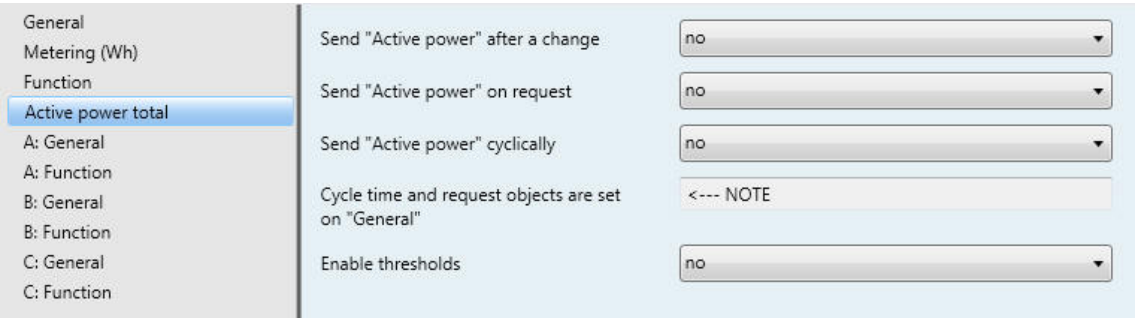
Overwrite start-, stop time, duration and limit with download or ETS reset

Options: no
yes

- *yes:* After a download or ETS reset, the values changed on the bus are overwritten again with the parameter values.
- *no:* After a download or ETS reset, the values changed on the bus are retained.

3.2.3.2 Parameter window *Active power total*

In parameter window *Active power total,* the parameters and communication objects for recording and monitoring of the *Active power total* (sum of outputs A, B and C) are enabled. The parameter window is enabled when in parameter window Function, page 35, the parameter *Monitor "Active power total"* has been selected with the option *yes*.



Send "Active power" after a change

Options: no
yes

· *yes:* The value of the communication object Active power (Active power total) is sent on a change. The following parameter appears:

Send "Active power" when +/- W [1…13,800]

Options: 1…20…13,800

This parameter determines which changes of the value of the communication object *Active power* are sent.

Send "Active power" on request

Options: no
yes

· *yes:* The value of the communication object *Active power* (Active power total) is sent when a telegram is received on the communication object *Request power values*. This communication object is enabled in the parameter window General, page 29.

Send "Active power" cyclically

Options: no
yes

· *yes:* The communication object *Active power* (Active power total) is sent cyclically. The setting of the cycle time is undertaken in parameter window General, page 29 (parameter *Cycle time for power values*).

Cycle time and request objects are set on "General"

<−−− NOTE

Enable thresholds

Options: no
yes

- *yes:* The parameters and communication objects for threshold 1 for monitoring the *Active power total* are enabled. The following parameters appear:

Overwrite thresholds with download or ETS reset

Options: no
yes

- *yes:* The threshold values can be modified via the bus. With this setting, after a download or ETS reset, the values changed on the bus are again overwritten with the parameterized values. This setting applies for threshold value 1 and threshold value 2.

Threshold 1 lower limit in W [0…13,800]

Options: 0…90…13,800

This is the lower hysteresis limit of threshold value 1. If the lower threshold is undershot, there is a reaction.

For further information see: Instruments and power values, page 125

Threshold 1 upper limit in W [0…13,800]

Options: 0…100…13,800

This is the upper hysteresis limit of threshold value 1. If the upper threshold is exceeded, there is a reaction.

For further information see: Instruments and power values, page 125

Threshold 1 warning

Options: do not send
send 0 when exceeding
send 1 when exceeding
send 0 when falling below
send 1 when falling below
exceeding 0, falling below 1
exceeding 1, falling below 0

If threshold value 1 is exceeded or undershot, the parameterized value of the communication object *Threshold 1 warning* (Active power total) is sent.

Note
Exceeding the threshold means that the upper limit is exceeded, falling below the threshold means that the lower limit is undershot.

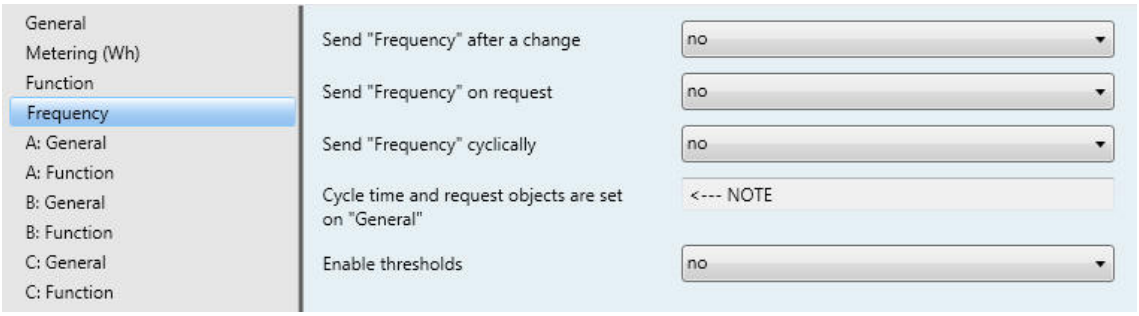
Enable threshold 2

Options: no
yes

Parameterization of threshold value 2 is identical to threshold value 1.

3.2.3.3 Parameter window *Frequency*

In parameter window *Frequency*, parameter and communication objects for the detection and monitoring of the frequency are enabled. The parameter window is enabled when in parameter window *Function*, page 35, the parameter *Monitor "Frequency"* has been selected with the option *yes*.



Send "Frequency" after a change

Options: no
yes

· *yes:* The value of the communication object *Frequency* is sent after a change. The following parameter appears:

Send "Frequency" when +/- 0.1 Hz x value [1…650]

Options: 1…5…650

This parameter determines which changes of the value of the communication object *Frequency* are sent.

Send "Frequency" on request

Options: no
yes

· *yes:* The value of the communication object *Frequency* is sent when a telegram is received on the communication object *Request instrument values*. This communication object is enabled in the parameter window General, page 29 (parameter *Cycle time for instrument values*).

Send "Frequency" cyclically

Options: no
yes

· *yes:* The communication object *Frequency* is sent cyclically. The setting of the cycle time is undertaken in parameter window General, page 29 (parameter *Cycle time for instrument values*).

Cycle time and request objects are set on "General"

<−−− NOTE

Enable thresholds

Options: no
yes

- *yes:* The parameters and communication objects for *Threshold value 1* for monitoring the Frequency are enabled. The following parameters appear:

Overwrite thresholds with download or ETS reset

Options: no
yes

- *yes:* The threshold values can be modified via the bus. With this setting, after a download or ETS reset, the values changed on the bus are again overwritten with the parameterized values. This setting applies for threshold value 1 and threshold value 2.

Threshold 1 lower limit in 0.1 Hz x value [1…650]

Options: 0…450…650

This is the lower hysteresis limit of threshold value 1. If the lower threshold is undershot, there is a reaction.

For further information see: Instruments and power values, page 125

Threshold 1 upper limit in 0.1 Hz x value [1…650]

Options: 0…500…650

This is the upper hysteresis limit of threshold value 1. If the upper threshold is exceeded, there is a reaction.

For further information see: Instruments and power values, page 125

Threshold 1 warning

Options: do not send
send 0 when exceeding
send 1 when exceeding
send 0 when falling below
send 1 when falling below
exceeding 0, falling below 1
exceeding 1, falling below 0

If threshold value 1 is exceeded or undershot, the parameterized value of the communication object *Threshold 1 warning* (Frequency) is sent.

Note
Exceeding the threshold means that the upper limit is exceeded, falling below the threshold means that the lower limit is undershot.

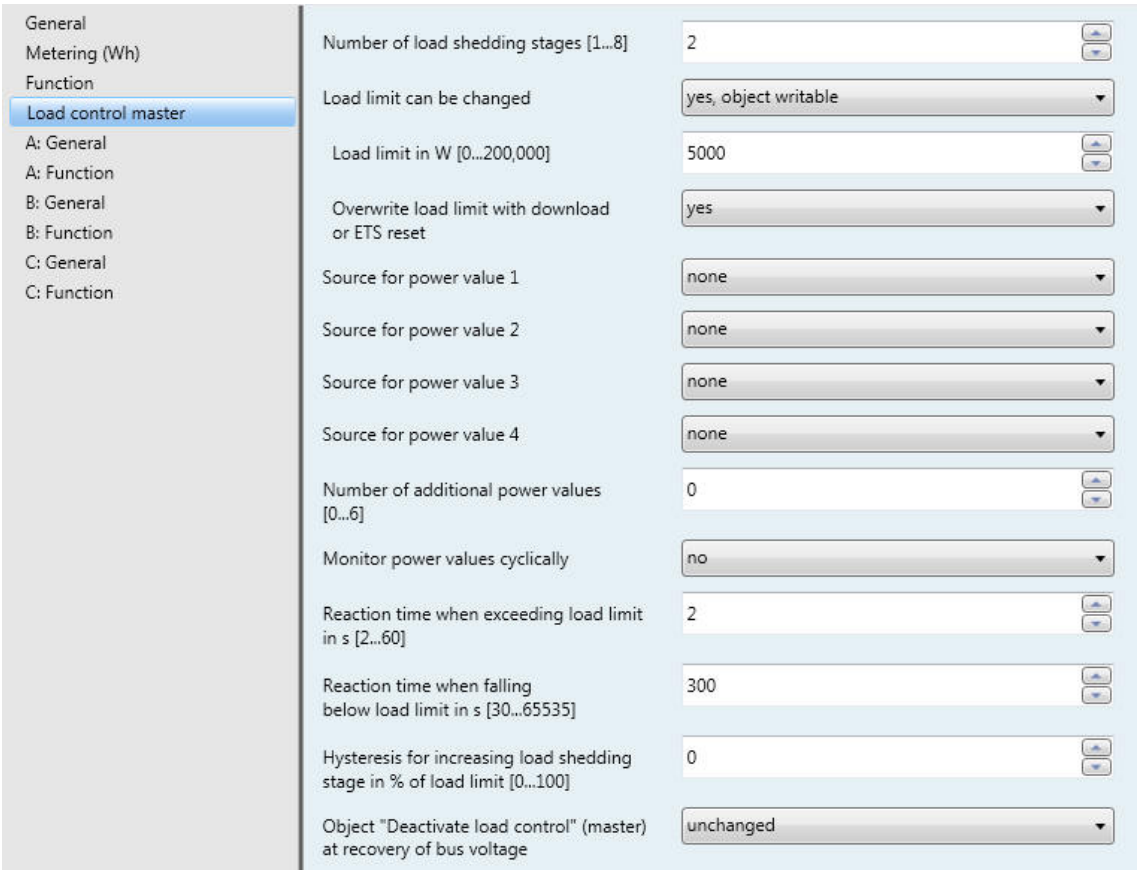
Enable threshold 2

Options: no
yes

Parameterization of threshold value 2 is identical to threshold value 1.

3.2.3.4 Parameter window *Load control master*

In the parameter window *Load control master*, the settings for the load control are undertaken, provided that the Energy Actuator is used as a master for load control. The parameter window is enabled when in parameter window Function, page 35, the parameter *Device is load control master* has been selected with the option *yes*.



Number of load shedding stages [1…8]

Options: 1…2…8

The slaves assigned to the master are assigned depending on the priority of the load shedding stage. If the parameterized load limit is exceeded, the master sends load shedding stages on the bus. The load shedding stage is increased, commencing at load shedding stage 1, until the load limit is no longer exceeded. If the load limit is exceeded, the load shedding limit is reduced again.

Load limit can be changed

Options: yes, 4 values selectable
yes, object writable

- *yes, 4 values selectable:* The communication objects *Choose load limit* and *Send load limit* are enabled. Using communication object *Choose load limit,* you can choose between four parameterized load limits. The following parameters appear:

Load limit 1 in W [0…200,000]

Load limit 2 in W [0…200,000]

Load limit 3 in W [0…200,000]

Load limit 4 in W [0…200,000]

Options 0…5000…200,000

Active load limit after download or ETS reset

Options: Load limit 1…4

The load limit parameterized here is active after a download or ETS reset.

- *yes, object writable:* The communication object *Receive load limit* is enabled. The parameterized load limit can be modified via the bus. The following parameters appear:

Load limit in W [0…200,000]

Options: 0…5000…200,000

Overwrite load limit with download or ETS reset

Options: no
yes

- *yes:* The load limit can be modified via the bus. With this selection, the parameterized value is accepted again after a download or ETS reset.

Note
The following parameters determine, which of the up to 10 values are included for the calculation of the *Send sum power values*. The power values of the master can be used (outputs A, B, C and/or the total power) or the power values are received externally from a communication object, generally the active power total from other Energy Actuators. The power values 1…4 may receive their value internally or externally; power values 5…10 may only receive their value externally. The sum of these power values is compared to the parameterized load limit for load control purposes. If negative power values are received (power feed), they are not considered for load control.

Source for power value 1

Options: none
active power Output A
external via object

- *none:* Power value 1 is not used, the communication object *Receive power value 1* is not enabled.
- *active power Output A:* The active power of output A is used as power value 1. The communication object *Receive power value 1* is not enabled; it is linked internally.
- *external via object:* The communication object *Receive power value 1* is enabled and can receive an external power value via the bus.

Source for power value 2

Options: none
active power Output B
external via object

The settings and functions are identical to those of the parameter *Source for power value 1*.

Source for power value 3

Options: none
active power Output C
external via object

The settings and functions are identical to those of the parameter *Source for power value 1*.

Source for power value 4

Options: none
active power total
external via object

The settings and functions are identical to those of the parameter *Source for power value 1*.

Number of additional power values
[0…6]

Options: 0…6

Depending on the selection, the communication objects *Receive power value 5* to *Receive power value 10* are enabled.

Monitor power values cyclically

Options: no
yes

- *yes:* The 4 byte communication object *Status load control* is enabled. Using this communication object, you monitor whether all enabled power values are received via the bus. The following parameter appears:

  Control period in s [20…65,535]

  Options: 20…65,535

  If the master does not receive all the external power values from the slaves within the parameterized monitoring time, the missing values are requested via *Value Read* and an internal timer starts (10 s). After the timer has timed out, the corresponding error bit in the communication object *Status load management* is set and the value of the communication object is sent.

Reaction time when exceeding load limit in s [2…60]

Options: 2…60

If the sum of the power values exceeds the parameterized load limit, the master commences to send shedding stages on the bus after the parameterized time. The shedding stage is increased until the load falls below the load limit. The reaction time restarts before every further increase of the shedding stage.

Reaction time when falling below load limit in s [30…65,565]

Options: 30…300…65,565

If the load is again below the load limit (sufficient slaves have been shed), the master waits for the parameterized time and then commences in inverse sequence to reduce the shedding stages until shedding stage 0 is reached (i.e. all slaves are enabled) or the load limit is exceeded again.

Note
It is necessary to consider the reaction speed of the system. Depending on the number of shedding stages and parameterized reaction times, it may take a long time before all slaves are re-enabled. If the reaction times are too short and the system is frequently in an overload state (load limit exceeded), the maximum number of relay switching operations (service life) can be reached prematurely.

Hysteresis for increasing load shedding stage in % of load limit [0…100]

Options: 0…100

If the system is frequently at overload during operation, the hysteresis can prevent that a shedding stage is continuously switched on and off. The hysteresis is subtracted from the load limit. Only when the limit value is less than the load limit minus the hysteresis will the shedding stage be reduced.

Object "Deactivate load control" (master) at recovery of bus voltage

Options: unchanged
0 = load control activated
1 = load control deactivated

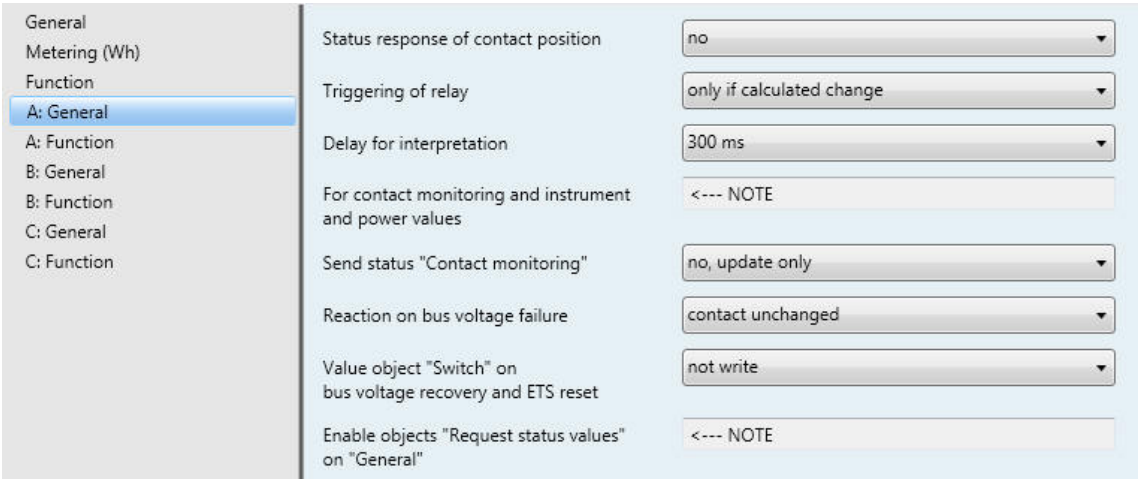
This parameter defines how the function *Load control master* should behave after bus voltage recovery.

- *unchanged:* The status of the function *Load control master* is saved at bus voltage failure and restored after bus voltage recovery.
- *0 = load control activated:* The function *Load control master* is active after bus voltage recovery.
- *1 = load control deactivated:* The function *Load control master* is not active after bus voltage recovery.

3.2.4 Parameter window *A: General*

In parameter window *A: General*, all the general settings are undertaken for output A.

Note
The Energy Actuator has 3 outputs. However, as the functions for all outputs are identical, only the functions of output A will be described.



Status response of contact position

Options: no
yes, object "Status Switch"

- *no:* The switch state is not actively sent on the bus.
- *yes: object "Status Switch"* An additional *Status switch* communication object is enabled. Using it, a 1 bit telegram with the actual switch status is sent on the bus. The following parameters appear:

  Send

  Options: no, update only
  after a change
  on request
  after a change or on request

  - *no, update only:* If the status of the switching state changes, this is updated but not sent on the bus.
  - *after a change:* Should the status of the switching state change, this is sent by a telegram via the communication object.
  - *after request:* The status of the switching state can only be sent via the KNX if a telegram with the parameterized value is received on the communication object *Request status values*.
  - *after a change or on request:* The status of the switching state is only sent via the KNX if the status changes or a telegram with the parameterized value is received on the communication object *Request status values*.

Inverted

Options: no: 0 = open, 1 = closed
yes: 0 = closed, 1 = open

With this parameter, the status response of contact position can be inverted.

- *0 = open, 1 = closed:* The value 1 is written with a closed contact, and the value 0 is written with an open contact in the communication object *Status switch*.
- *0 = closed, 1 = open:* The value 0 is written with a closed contact, and the value 1 is written with an open contact in the communication object *Status switch*.

Triggering of relay

Options: only if calculated change
always

- *only if calculated change:* This is the recommended standard setting.

Just as with the existing range of ABB i-bus® KNX Switching Actuators, a switching impulse is only triggered to switch the Energy Actuator when the calculated relay position diverges from the received switching telegram.

Example
The contact is already opened, one of the functions of the Energy Actuator, e.g. function *Staircase lighting* or *Threshold value,* triggers a further OFF telegram. In this case, the relay is not controlled again, as the required relay contact position already exists.

- *always:* This selection should be chosen if it is not possible to exclude that the relay is manually switched and the required relay contact position must be guaranteed. The switching telegram is then always undertaken regardless of the calculated position. The disadvantage is if, for example, the same switching telegram is always received cyclically, the switching impulse is internally enabled and the following switching telegram is undertaken with a delay (in the most unfavourable case up to 1 s).

Delay for interpretation

Options: 100 ms/300 ms/500 ms/1 s/2 s/5 s

The interpretation delay applies for contact monitoring, all instrument and all power values from output A. It starts with each switching impulse even when the relay position does not change. No communication objects are updated or sent during the interpretation delay; monitoring by the threshold values only commences after the parameterized time has timed out. This prevents an undesired reaction of the Energy Actuator should a threshold value be briefly exceeded due to settling actions or the start-up behaviour of load.

The minimum duration of 100 ms results because the Energy Actuator requires a certain amount of time before all measured values are available.

For contact monitoring and instrument and power values

<−−− NOTE

Send status "Contact monitoring"

Options: no, update only
after a change
on request
after a change or on request

The sending behaviour of the communication object *Contact monitoring* can be parameterized by this parameter. A contact fault is indicated via the communication object *Contact monitoring*. An error (value 1) is displayed as soon as a current of about 30 mA (observe the tolerances) is detected with an open contact.

The contact position can only be correctly evaluated should the switching actions occur via KNX. The SE/S cannot differentiate between manual switching and a cable break or device fault. Evaluation of the contact monitoring occurs about two seconds after opening the contact.

- *no, update only:* The status of the contact monitoring is always updated but not sent.
- *after a change:* The status of the contact monitoring is then sent on the bus when the value of the communication object *Contact monitoring* changes. Here the bus load, particularly for Energy Actuators with multiple outputs, can be influenced significantly.
- *after request:* The status of the contact monitoring can only be sent via the bus if a telegram with the parameterized value is received on the communication object *Request status values*.
- *after a change or on request:* The status of the contact monitoring is only sent via the bus if the status changes or a telegram with the parameterized value is received on the communication object *Request status values*.

Reaction on bus voltage failure

Options: contact open
contact closed
contact unchanged

The output can adopt a defined state on bus voltage failure with this parameter.

For further information see: Reaction on bus voltage failure, page 134, and Reaction on bus voltage recovery, download, ETS reset and application update, page 134

Value object "Switch" on bus voltage recovery and ETS reset

Options: not write
write with 0
write with 1

With this parameter, the output can be influenced after bus value recovery.

- *not write:* After bus voltage recovery, the valid value active before the bus voltage failure is restored.

Note
· Before the very first download (device fresh from the factory), the value before bus voltage failure is not defined. For this reason, the communication object is written with 0 and the contact is opened. · If opening of the contact at bus voltage recovery before the first download (building phase) is not desired, this can be prevented by temporary removal of the KNX voltage. · If the output has been switched manually (on the operating element) or by the receipt of a telegram on the communication object *Scene*, this setting will not be taken into consideration after bus voltage recovery. Consequently, the switching process after bus voltage recovery is possible irrespective of the setting *not write*.

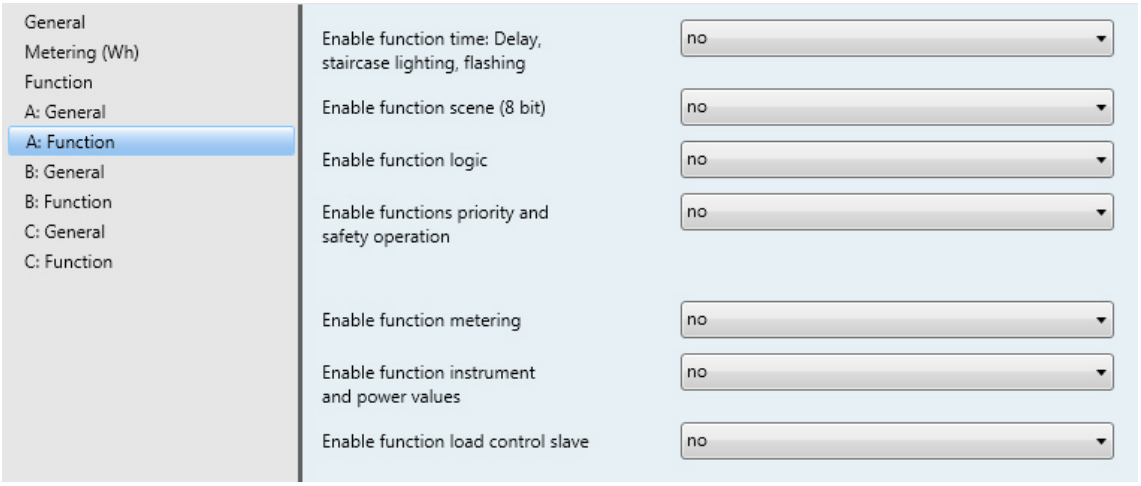
- *write with 0:* The communication object *Switch* is written with a 0 at bus voltage recovery. The contact position is redefined and reset in dependence on the set device parameterization.
- *write with 1:* The communication object *Switch* is written with a 1 at bus voltage recovery. The contact position is redefined and reset in dependence on the set device parameterization.

Enable objects "Request status values" on "General"

<−−− NOTE

3.2.5 Parameter window *A: Function*

In this parameter window, the behaviour of the output is determined and different functions can be enabled, where further parameter windows become available.



Enable function time: Delay, staircase lighting, flashing

Options: no
yes

- *no:* The parameter window *A: Time* for output A is not enabled.
- *yes:* The parameter window *A: Time* for output A as well as the communication object *Disable function time* is enabled. Using this communication object, the function *Time* can be enabled (telegram with value 0) or disabled (telegram with value 1) via the bus.

As long as the function *Time* is disabled, the output can only be switched on and off without delay via the communication object *Switch*. The priorities as listed in the Function chart, page 120, still remain valid.

Note
The function *Time* is only disabled when the ongoing function *Time* has ended.
During disabling of the output, the higher switching priorities, e.g. the functions *Safety*, are undertaken.
After the function *Time* has been enabled, the communication object *Permanent ON* is enabled. The output is switched ON via this communication object. It remains switched ON until a telegram with the value 0 is received by the communication object *Permanent ON*.
The functions continue to operate in the background during the Permanent ON phase. The contact position at the end of the Permanent ON phase results from the functions operating in the background.

With the selection *yes* a new parameter appears:

Value "Disable function time" after bus voltage recovery and ETS reset

Options: 1 = disable function time
0 = enable function time

- *1 = disable function time:* The function *Time* is disabled by a telegram with the value 1.

Note
They can only be enabled via the communication object *Disable function time*.

- *0 = enable function time:* The function *Time* is enabled by a telegram with the value 0.

Note
The timing is performed until complete. Only then is the function *Time* no longer active.

How does the staircase lighting behave with bus voltage failure?

The behaviour at bus voltage failure is determined by the parameter *Reaction on bus voltage failure* in the parameter window *A: General*.

How does the staircase light behave with bus voltage recovery?

The reaction at bus voltage recovery is defined by two conditions:

1. By the communication object *Disable function time*: If the staircase light is blocked after bus voltage recovery, the staircase lighting can only be switched on or off via the communication object *Switch*.
2. Using the parameterization of the communication object *Switch:* Whether the light is switched on or off with bus voltage recovery depends on the programming of the communication object *Switch*.

Enable function scene (8 bit)

Options: no
yes

- *no:* The parameter window *A: Scene* for output A is not enabled.
- *yes:* The parameter window *A: Scene* for output A and the communication object *8 bit scene* are enabled. The following parameter appears:

Overwrite scene assignment with download or ETS reset

Options: no
yes

- *yes:* The scene values changed via the bus are overwritten again with the parameterized scene assignments.

Enable function "logic"

Options: no
yes

- *no:* The parameter window *A: Logic* for output A is not enabled.
- *yes:* The parameter window *A: Logic* for output A is enabled.

Enable function priority and safety operation

Options: no
yes

- *no:* The parameter window *A: Safety* for output A is not enabled.
- *yes:* The parameter window *A: Safety* for output A is enabled. In this parameter window, the safety priorities 1, 2, 3 and forced operation are parameterized.

Enable function metering

Options: no
yes

- *no:* The parameter window *A: Metering (Wh)* for output A is not enabled.
- *yes:* The parameter window *A: Metering (Wh)* for output A and the corresponding communication objects are enabled.

Enable function instrument and power values

Options: no
yes

- *no:* The parameter window *A: Instrument and power values* for output A is not enabled.
- *yes:* The parameter window *A: Instrument and power values* for output A and the corresponding communication objects are enabled.

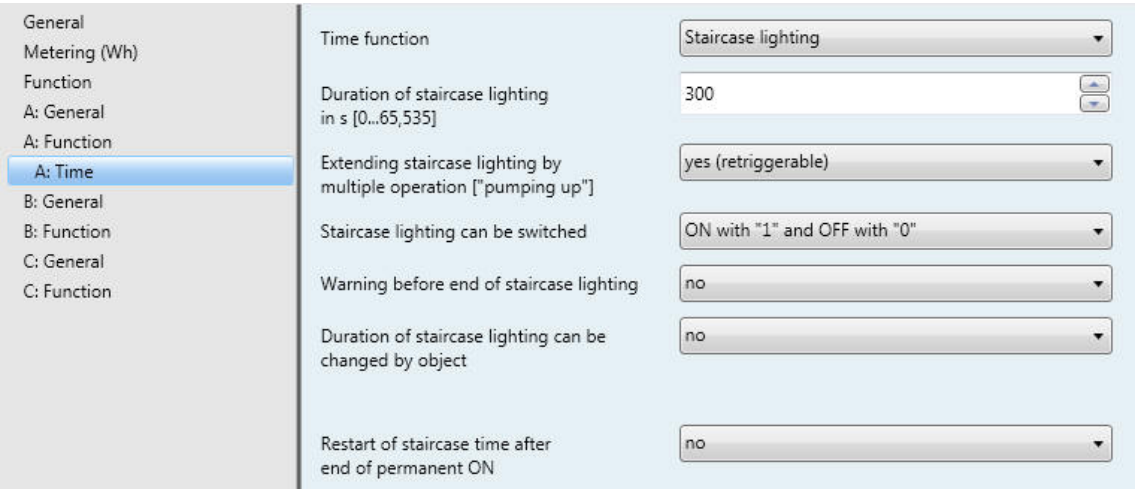
Enable function load control slave

Options: no
yes

- *no:* The parameter window *A: Load control slave* for output A is not enabled.
- *yes:* The parameter window *A: Load control slave* for output A and the corresponding communication objects are enabled.

3.2.5.1 Parameter window *A: Time*

In this parameter window, all settings for the function *Time* are undertaken: *Switching ON and OFF delay, Staircase lighting* and *Flashing*.



Time function

Options: Staircase lighting
Switching ON and OFF delay
Flashing

This parameter defines the type of function *Time* for each output.

- *Staircase lighting:* The value, with which the staircase lighting is switched on and off, can be parameterized. The staircase lighting time is started when the function is activated. It is switched off immediately after the staircase lighting time has been completed.

Note
With a telegram to the communication object *Disable function time*, the function *Staircase lighting* can be disabled. The parameterization for this purpose is implemented in the parameter window *A: Function*, with the parameter *Value object "Disable function time" after bus voltage recovery and ETS reset*.

- *Switching ON and OFF delay:* The output can be switched on or off with a delay via this function.
- *Flashing:* The output starts to flash as soon as the parameterized value is received in the communication object *Switch*. The flashing period can be adjusted via the parameterized time duration for ON or OFF. The output is switched on at the start of the flashing period. When a new value is received on the communication object *Switch,* the flashing period will recommence. The relay state after flashing can be programmed. The communication object *Status switch* indicates the current relay state during flashing.

Note
With a telegram to the communication object *Disable function time*, the function *Flashing* can be disabled. The parameterization for this purpose is implemented in the parameter window *A: Function*, with the parameter *Value object "Disable time function" after bus voltage recovery and ETS reset*.

The following parameter appears with the selection *Staircase lighting*:

Staircase lighting duration in s [0…65,535]

Options: 0…<u>300</u>…65,535

The staircase lighting time defines how long the contact is closed and how long the light remains on after an ON telegram. The input is made in seconds. The staircase lighting time may extend depending on the value set in the parameter *Warning before end of staircase lighting*.

Extending staircase lighting by multiple operation (“pumping up”)

Options: no (not retriggerable)
<u>yes (retriggerable)</u>
up to max. 2x staircase lighting time
up to max. 3x staircase lighting time
up to max. 4x staircase lighting time
up to max. 5x staircase lighting time

If a further ON telegram is received during the staircase lighting time sequence, the remaining staircase lighting time can be extended by a further period. This is possible by repeated operation of the push button (“pumping up”) until the maximum programmed number of retriggering operations is reached. The maximum time can be set to 1, 2, 3, 4 or 5-fold time of the staircase lighting time.

The staircase lighting time is extended by “pumping up” to the maximum time. If some of the time has already timed out, the staircase lighting time can again be extended to the maximum time by “pumping up”. The parameterized maximum time may not however be exceeded.

- *no:* The receipt of a further ON telegram is ignored. The staircase lighting time continues without modification to completion.
- *yes (retriggerable):* The staircase light time is reset each time by a renewed ON telegram and starts to count again each time. This process can be repeated as often as desired using this selection.
- *up to max. 2/3/4/5 x staircase lighting time:* The staircase lighting time is extended by the 2/3/4/5-fold staircase lighting time with a renewed ON telegram.

Staircase lighting can be switched

Options: <u>ON with 1 and OFF with 0</u>
ON with 1 no action with 0
ON with 0 or 1, switch OFF not possible

This parameter defines the telegram value used for switching the staircase lighting on and off prematurely.

- *ON with 0 or 1, switch OFF not possible:* The function *Staircase lighting* is switched on independently of the value of the incoming telegram. Premature switch off is not possible.

Note
After enabling the function *Time* via the communication object *Disable function time*, the contact position of the enabled output remains unchanged. Function *Time* is only triggered after the next switching telegram. This means however, should the option *ON with 1 no action 0* be parameterized, the output is switched on simultaneously with enable. Switch off via the bus is thus not possible. Only after, e.g. the function *Staircase lighting* is started, does the output switch off, after the staircase lighting time has elapsed.

Warning before end of staircase lighting

Options: no
via object
via quick switching OFF-ON
via object and switching OFF-ON

Before the staircase lighting time times-out, the user can be informed of the imminent switch off of the lighting by a warning. If the warning time is not equal to 0, the staircase lighting time is extended by the warning time. The warning time is not modified by the “pumping up” action.

- *no:* No warning is given, the staircase light switches off immediately after the staircase lighting time elapses.

There are two types of warning:

1. The communication object *Staircase lighting warning* is set to the value 1 at the commencement of warning time and remains set until the warning time has elapsed. The communication object can be used, for example, to switch a warning light.
2. Switching the output (briefly OFF and ON again).

Both possibilities can be set together or separately from one another. The time duration between the OFF and ON process is about 1 second. If the warning time is not equal to 0, the staircase lighting time is extended by the warning time. If the staircase lighting is ended prematurely, e.g. by a switching telegram, no warning is given.

Note
When dealing with the warning time, it is important to remember that the Energy Actuator draws its switching energy exclusively from the bus. Furthermore, the Energy Actuator collects enough energy before the first switching action to ensure that all outputs can safely go to the required position should the bus voltage fail. Under these conditions, only a certain number of switching actions are possible per minute, see Technical data, page 7.

Warning time in sec. [0…65,535] add to Staircase lighting duration

Options: 0…45…65,535

This parameter is visible if a warning is parameterized before the staircase lighting time ends. The warning time must be entered in seconds. The staircase lighting time is extended by the warning time. The warning is triggered at the start of the warning time.

The warning time is not modified by “pumping up”.

Staircase lighting duration can be changed via object

Options: no
yes

- *yes:* A 2 byte *Staircase lighting duration* communication object is enabled. The staircase lighting time can be changed via the bus here. The value defines the staircase lighting time in seconds. The function *Staircase lightning*, which has already commenced, is completed. A change of the staircase lighting time is used the next time it is accessed.
- *no:* No modification of the staircase lighting time is possible via the bus.

How does the staircase lighting behave with bus voltage failure?

The behaviour at bus voltage failure is determined by the parameter *Reaction on bus voltage failure* in the parameter window A: General, page 51.

How does the staircase light behave with bus voltage recovery?

The reaction at bus voltage recovery is defined by two conditions:

1. By the communication object *Disable function time*: If the staircase light is blocked after bus voltage recovery, the staircase lighting can only be switched on or off via the communication object *Switch*.
2. Using the parameterization of the communication object *Switch*: Whether the staircase lighting is switched on or off with bus voltage recovery depends on the programming of the communication object *Switch*.

Restart of staircase time after end of permanent ON

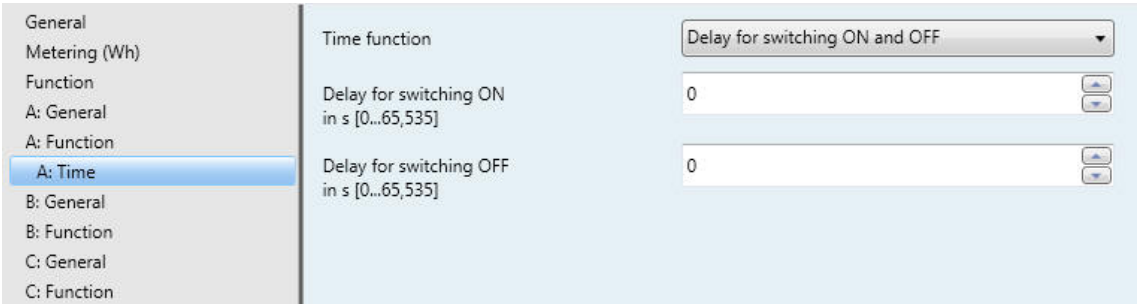
Options: no
yes

- *no:* The lighting switches off if *Permanent ON* is ended.
- *yes:* The lighting remains on, and the staircase lighting time restarts.

The function of continuously ON is controlled via the *Permanent ON* communication object value. If the communication object receives a telegram with the value 1, the output is switched ON irrespective of the value of the communication object *Switch* and remains switched on until the communication object *Permanent ON* has the value 0.

Note
Permanent ON only switches ON and “masks” the other functions. This means that the other functions, e.g. staircase time or “pumping up”, continue to run in the background but do not initiate a reaction. After the end of permanent ON, the switching state, which would result without the permanent ON function, becomes active.

The following parameters appear at *Switching ON and OFF delay*:



The output can be switched on or off with a delay via this function. Explanations for the on and off delay can be found at Switching ON and OFF delay, page 131. Also, a timing diagram and the effects of different ON and OFF telegrams in combination with ON and OFF delays can be found there.

Delay for switching ON
in s [0…65,535]

Options: 0…65,535

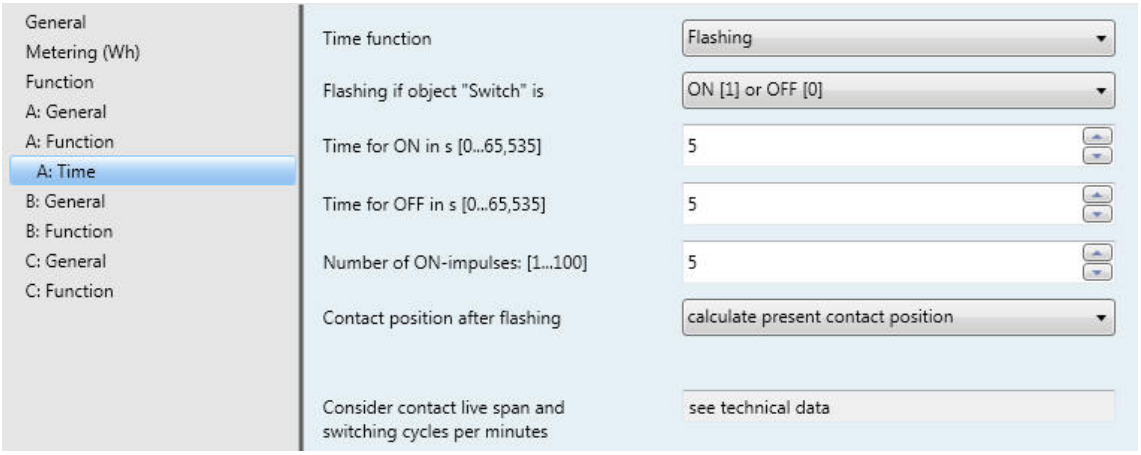
Here you set the time, by which an ON telegram is delayed after switch on.

Delay for switching OFF
in s [0…65,535]

Options: 0…65,535

Here you set the time, by which switch OFF is delayed after a switch OFF telegram.

The following parameters appear with the selection *Flashing*:



The output starts to flash as soon as the parameterized value is received in the communication object *Switch*. The flashing period can be adjusted via the parameterized time duration for ON or OFF. The output is switched on at the start of the flashing period. When a new value is received on the communication object *Switch*, the flashing period will recommence. The relay state after flashing can be programmed. The communication object *Status switch* indicates the current relay state during flashing.

Note
Only a certain number of switching actions are possible per minute and Energy Actuator. With frequent switching, a switching delay can occur, as only a certain number of switching actions are possible per minute, see Technical data, page 7. The same applies directly after bus voltage recovery. When the function *Flashing* is selected, the service life of the switching contacts must be considered, see Technical data, page 7. With a telegram to the communication object *Disable function time*, the function *Flashing* can be disabled. The parameterization for this purpose is implemented in the parameter window A: Function, page 55, with the parameter *Value object "Disable function time" after bus voltage recovery and ETS reset.*

Flash if object "Switch" is

Options: 1
0
1 or 0

Here you set the value of the communication object *Switch*, at which the output flashes. Flashing is not retriggerable.

- *1:* Flashing starts when a telegram with the value 1 is received on the communication object *Switch*. A telegram with the value 0 ends flashing.
- *0:* Flashing starts when a telegram with the value 0 is received on the communication object *Switch*. A telegram with the value 1 ends flashing.
- *1 or 0:* A telegram with the value 1 or 0 triggers flashing. Suspension of flashing is not possible in this case.

Time for ON in sec [0…65,535]

Options: 0….5…65,535

This time for ON defines how long the output is switched ON during a flashing period. The smallest value is 1 second.

Note
Only a certain number of switching actions are possible per minute and Energy Actuator. With frequent switching, a switching delay can occur, as only a certain number of switching actions are possible per minute, see Technical data, page 7. The same applies directly after bus voltage recovery.

Time for OFF in sec [0…65,535]

Options: 0….5…65,535

This time for OFF defines how long the output is switched ON during a flashing period. The smallest value is 1 second.

Note
Only a certain number of switching actions are possible per minute and Energy Actuator. With frequent switching, a switching delay can occur, as only a certain number of switching actions are possible per minute, see Technical data, page 7. The same applies directly after bus voltage recovery.

Number of flashes: [1…100]

Options: 1…5…100

This parameter defines the maximum number of pulses. This is useful to avoid unnecessary wear of the contacts caused by flashing.

Contact position after flashing

Options: ON
OFF
calculate present contact position

This parameter defines the state that the parameter should assume after flashing.

- *ON:* The output is switched on after flashing.
- *OFF:* The output is switched off after flashing.
- *calculate present contact position:* The output assumes the switching state, which it had before flashing commenced.

For further information see: Function chart, page 120

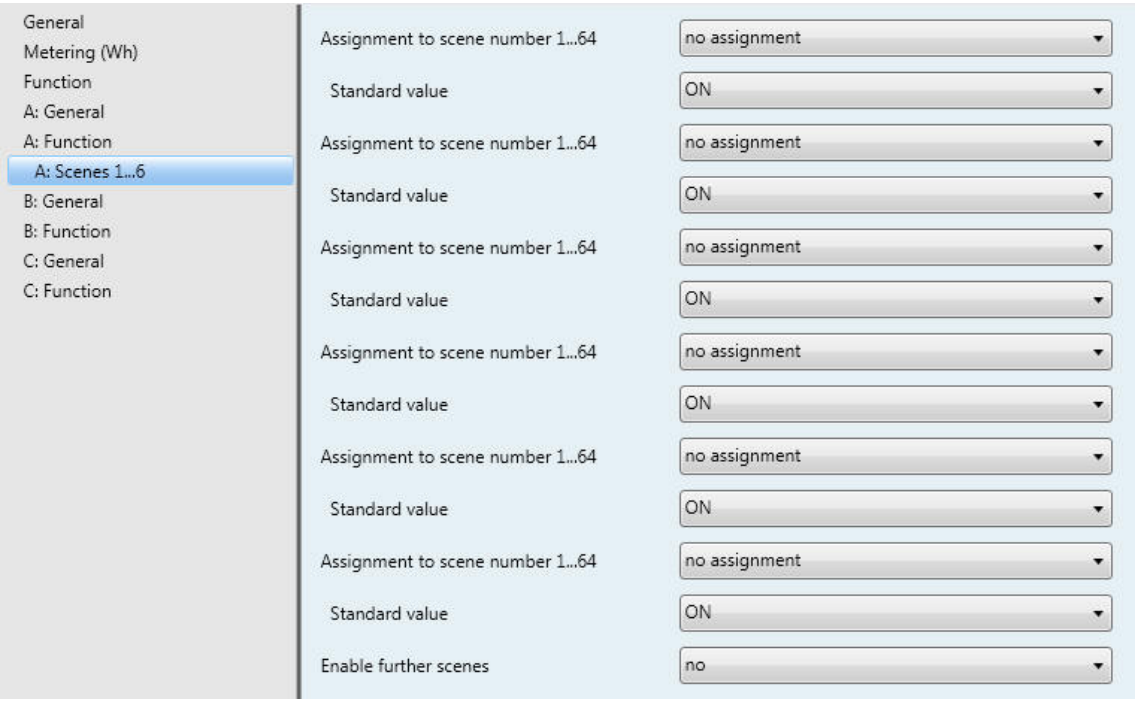
Note: Consider contact life span and switching cycles per minute

For further information see: Technical data, page 7

Note
Only a certain number of switching actions are possible per minute and Energy Actuator. With frequent switching, a switching delay can occur, as only a certain number of switching actions are possible per minute, see Technical data, from page 7. The same applies directly after bus voltage recovery.

3.2.5.2 Parameter window *A: Scenes 1…6*

In this parameter window, all settings for *Scenes 1…6* are undertaken.



With the parameter *Overwrite scene assignment with download or ETS reset* in parameter window A: Function, page 55, it is possible to not overwrite the scene values set via the bus during a download and to protect them.

Assignment to scene number 1…64

Options: no assignment
Scene 1
…
Scene 64

With the function *Scene*, up to 64 different scenes are managed via a single group address. With this group address, all slaves, who are integrated into a scene, are linked via a 1 byte communication object. The following information is contained in a telegram:

- Number of the scene (1…64) as well as
- Telegram: recall scene or save scene.

The output can be integrated in up to 18 scenes. So for example, the scene can be switched on in the morning and switched off in the evening, or the output can be integrated into light scenes.

Standard value

Options: ON
OFF

By storing a scene, the user has the opportunity to change the programmed value stored in the ETS. After a bus voltage failure, the value saved via the KNX is retained.

Note
When a scene is recalled: · the function *Time* is restarted. · the *logical connections* are re-evaluated.

For further information see: Communication objects Output A, page 107, Function Scene, page 132, and Scene code table (8 bit), page 144

Enable further scenes

Options: no
yes

· *yes:* The parameter window *A: Scenes 7…12* is enabled.

3.2.5.3 Parameter window *A: Scenes 7…12*

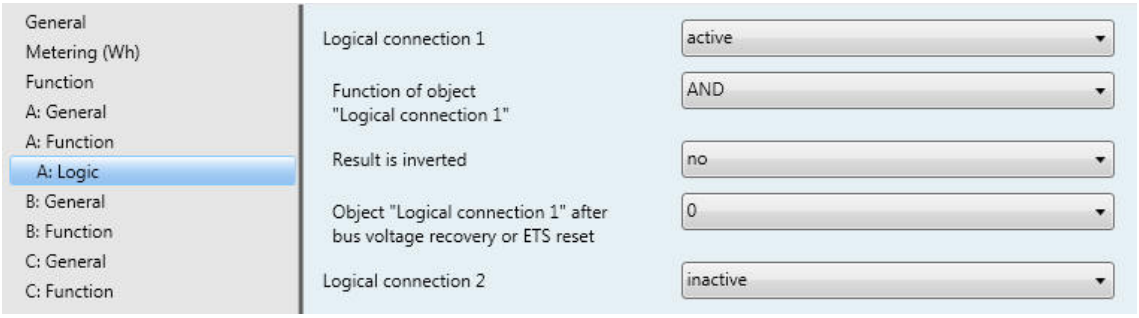
3.2.5.4 Parameter window *A: Scenes 13…18*

The functions and setting options of parameter window *A: Scenes 7…12* and *A: Scenes 13…18* do not differentiate from those of parameter window *A: Scenes 1…6*. Further scenes are simply enabled.

The descriptions of the parameter setting options can be found in the parameter window A: Scenes 1…6, page 66.

3.2.5.5 Parameter window *A: Logic*

In this parameter window, all settings for the function *Logic* are undertaken.



The function *Logic* provides up to two logic objects for each output, which can be logically linked with the *Switch* communication object.

The logic is always re-calculated when a communication object value is received. Hereby, the communication object *Logical connection 1* is first of all evaluated with the communication object *Switch*. The result is then logically linked with the communication object *Logical connection 2*.

Explanations of the function *Logic* can be found under Function Logic, page 132. Please also observe the Function chart, page 120, where the priorities become evident.

Logical connection 1

Options: inactive
active

With these parameters, the communication object *Logical connection 1* is enabled.

- *active:* The following parameters appear:

  Function of object "Logical connection 1"

  Options: AND
  OR
  XOR
  GATE

  The logical function of the communication object *Logical connection 1* is defined with the switch telegram. All three standard operations (AND, OR, XOR) are possible. Furthermore, the GATE operation can be used to inhibit switch telegrams.

  For further information see: Function Logic, page 132

  Result is inverted

  Options: no
  yes

  - *no:* There is no inversion.
  - *yes:* The result of the logical connection is inverted.

Object "Logical connection 1" after bus voltage recovery or ETS reset

Options: 1
0

This parameter defines the value allocated to the communication object *Logical connection 1* with bus voltage recovery and ETS reset.

A further parameter appears if GATE is selected with the parameter *Function of object "Logical connection 1"*:

Gate disabled, if object value "Logical connection 1" is

Options: 1
0

This parameter defines the value, at which the communication object *Logical connection 1* disables the GATE.

Disabling of the gate means that the telegrams received on the *Switch* communication object are ignored. As long as the GATE is activated, the value that was sent last to the input of the GATE remains on the output. After a gate is blocked, the value that was on the output before the block remains on the output of the gate.

After the GATE is enabled, this value will be retained until a new value is received.

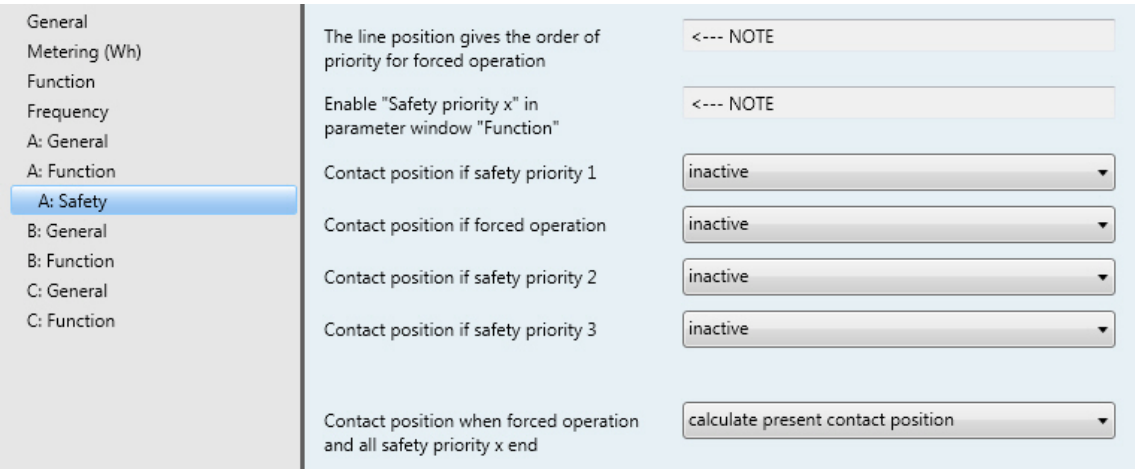
For further information see: Function chart, page 120

Logical connection 2 active

The same programming options exist as those for parameter *Logical connection 1 active*.

3.2.5.6 Parameter window *A: Safety*

In this parameter window, all settings for the function *Safety* are undertaken.



The forced operation (a 1 bit or 2 bit communication object per output) or safety priority (three independent 1 bit communication objects per Energy Actuator) sets the output in a defined state, which can no longer be changed, as long as forced operation or safety priority is active. The parameterized reaction on bus voltage failure and recovery has a higher priority.

The isolation of the three communication objects *Safety Priority x* (x = 1, 2, 3) is undertaken in parameter window Function, page 35. In this window, the monitoring time and the telegram value to be monitored are set. If a telegram is not received within this monitoring time, the output will assume the safety position. The determination is implemented in the parameter window *A: Safety*, which will be described in the following.

As a direct contrast to the three safety priorities, an independent communication object *Forced Positioning* is available for each output.

The forced positioning can be activated or deactivated via a 1 bit or 2 bit communication object. Using the 2 bit communication object, the output state is defined directly via the value.

The switch state after the end of function *Safety* can be set using the parameter *Contact position when forced operation and all safety priority x end*.

If multiple demands occur, the priority is defined as follows in accordance with the sequence in parameter window *A: Safety*:

- Safety priority 1 (highest priority)
- Forced operation
- Safety priority 2
- Safety priority 3 (lowest priority)

With the option inactive, the *Safety priority x* or the *Forced positioning* and the respective communication object are not considered and omitted in the priority sequence.

The line position gives the order of priority for forced operation

<−−− NOTE

Enable “Safety priority x” on “Function”

<−−− NOTE

Contact position if safety priority 1

Options: unchanged
inactive
ON
OFF

This parameter determines the switch position of the output if the safety condition *Safety priority 1* (setting undertaken in parameter window Function, page 35) has been fulfilled.

The 1 bit communication object *Safety priority 1* is used as a master for the safety position. The switch positions ON, OFF and unchanged are available.

- *inactive:* The state of the communication objects *Safety priority 1* has no effect on the output.

Contact position if forced operation

Options: inactive
unchanged via 1 bit object
ON, via 1 bit object
OFF, via 1 bit object
switch position via 2 bit object

The forced operation relates to the 1 bit or 2 bit *Forced positioning* communication object of the output that is available to every output.

- *inactive:* The state of the communication object *Forced Positioning* has no effect on the output.
- *unchanged via 1 bit object, ON, via 1 bit object* and *OFF, via 1 bit object:* The 1 bit communication object *Forced positioning* determines the switching state of the output during forced operation.
- *switch position via 2 bit object:* The 2 bit communication object *Forced positioning* is enabled. The value of the telegram sent via the 2 bit communication object determines the switch position, see the following table:

Value	Bit 1	Bit 0	State	Description
0	0	0	Free	If the communication object *Forced positioning* receives a telegram with the value 0 (binary 00) or 1 (binary 01), the output is enabled and can be actuated via different communication objects.
1	0	1	Free	
2	1	0	Forced OFF	If the communication object *Forced operation* receives a telegram with the value 2 (binary 10), the output is switched off and remains disabled until forced operation is again switched off. Actuation via another communication object is not possible as long as the forced operation is activated. The state of the output at the end of forced operation can be programmed.
3	1	1	Forced ON	If the communication object *Forced operation* receives a telegram with the value 3 (binary 11), the output is switched on and remains disabled until forced operation is again switched off. Actuation via another communication object is not possible as long as the forced operation is activated. The state of the output at the end of forced operation can be programmed.

**Object "Forced operation" on
bus voltage recovery and ETS reset**

This parameter is only visible if forced operation is activated.

Depending on whether the *Forced operation* communication object is a 1 bit or 2 bit communication object, there are two different parameterization possibilities available:

With selection *1 bit object*:

Options: inactive
active

- *inactive:* Forced operation is switched off, and the output behaves in the same way as with parameter *Behaviour at end of safety*.
- *active:* Forced operation is active again after bus voltage recovery or ETS reset. The switch position of the output is determined by the parameterization of *Contact position if forced operation*.

With selection *2 bit object*:

Options: 0 = inactive
2 = OFF
3 = ON

- *0 = inactive:* Forced operation is switched off, and the output behaves in the same way as with parameter *Behaviour at end of safety*.
- *2 = OFF:* The communication object *Forced Positioning* is written with the value 2, and the output is switched off.
- *3 = ON:* The communication object *Forced Positioning* is written with the value 3, and the output is switched on.

Contact position if safety priority 2

Contact position if safety priority 3

The same programming options exist as those for parameter *Contact position if safety priority 1*.

**Contact position when forced operation
and all safety priority x end**

Options: calculate present contact position
ON
OFF
unchanged

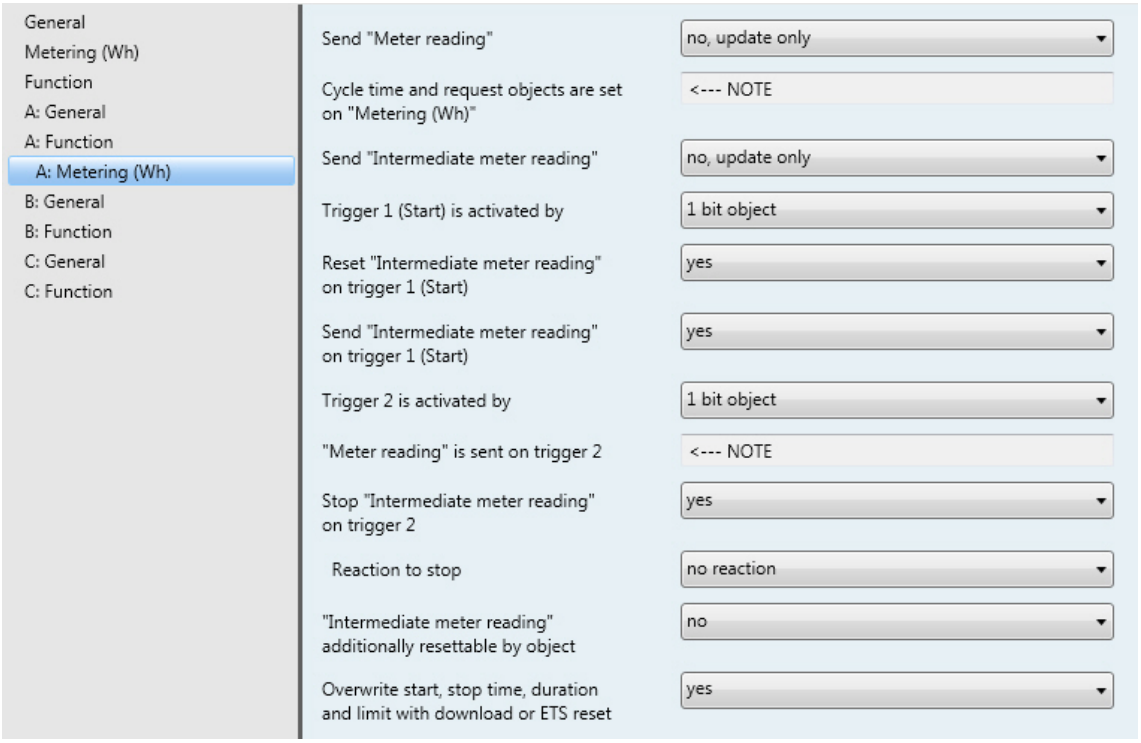
This parameter is only visible if the forced operation or a function *Safety priority x* (x = 1, 2 or 3) is activated.

The contact position of the relay at the end of the forced operation is defined here.

- *calculate present contact position:* After forced operation has ended, the switch value is recalculated and immediately initiated, i.e., the Energy Actuator output continues to operate normally in the background during forced operation, the output is not changed and only set after the end of safety priorities.
- *unchanged:* The contact position is retained during forced operation or safety priority. The contact position only changes when a new switch value is calculated.

3.2.5.7 Parameter window *A: Metering (Wh)*

In parameter window *A: Metering (Wh)*, the settings for the main meter and the intermediate meter or output A are undertaken.



Send "Meter reading"

Send "Intermediate meter reading"

Options: no, update only
cyclically
on request
cyclically and on request

The meter readings *Meter* and *Intermediate meter* are sent according to the parameterization options selected. Setting of the cycle time and enabling of the request object occurs in the parameter window Metering (Wh), page 33.

Furthermore, the readings of the *Intermediate meter* are sent on the bus at start and/or stop.

Trigger 1 (Start) is activated by

Options: 1 bit object
Time

- *1 bit object:* The 1 bit communication object *Receive trigger 1 (A: Intermediate meter*) is enabled. The intermediate meter starts if a telegram with the value 1 is received on this communication object.
- *Time:* The 3 byte communication object *Trigger 1 change time (A: Intermediate meter*) is enabled. The start time can be modified using this communication object. The following parameters appear:

Hour [0…23]

Options: 0…23

Minute [0…59]

Options: 0…59

Weekday

Options: Monday…Sunday
every day

The intermediate meter reading is sent if the parameterized time is received on the communication object *Receive time* (General).

Note
The time is only required once per device for all meters.

Reset "Intermediate meter reading" on trigger 1 (Start)

Options: yes
no

This parameter determines whether the *Intermediate meter* (meter reading) is reset when a telegram is received on the communication object *Trigger 1…*. Alternatively, an additional 1 bit communication object can be enabled, see parameter "Intermediate meter reading total" additionally resettable via object, page 76.

Send "Intermediate meter reading" on trigger 1 (Start)

Options: yes
no

This parameter determines whether the *Intermediate meter* (meter reading) is sent when a telegram is received on the communication object *Trigger 1…*.

Trigger 2 is activated by

Options: 1 bit object
Time
Limit
Duration

- *1 bit object:* The 1 bit communication object *Receive trigger 2 (A: Intermediate meter*) is enabled. The meter reading is sent if a telegram with the value 1 is received on this communication object. It is possible to parameterize whether the intermediate meter stops or does not stop.
- *Time:* The 3 byte communication object *Trigger 2 change time (A: Intermediate meter*) is enabled. Using this communication object, the time for trigger 2 can be modified. The following parameters appear:

Hour [0…23]

Options: 0…23

Minute [0…59]

Options: 0…59

Weekday

Options: Monday…Sunday
every day

The meter reading is sent if the parameterized time is received on the communication object *Receive time* (general). It is possible to parameterize whether the intermediate meter stops or does not stop.

Note
The time is only required once per device for all meters.

- *Limit:* The 4 byte communication object *Trigger 2 change time (A: Intermediate meter*) is enabled. Using this communication object, the limit for trigger 2 can be modified.

Note
When *Limit* is selected, the intermediate meter must be reset before a renewed start. This is adjustable via the parameter *Reset "Intermediate meter reading total" on trigger 1 (Start)"* or via the separate 1 bit communication object *Reset*. If the parameterized limit is achieved, the meter reading is sent on the bus, and the intermediate meter stops.

The following parameter also appears with the selection *Limit*:

Limit in Wh [1…120,888,000]

Options: 1…5000…120,888,000

If the parameterized limit is reached, the meter reading is sent, and the intermediate meter stops.

- *Duration:* The 2 byte communication object *Trigger 2 change time (A: Intermediate meter*) is enabled. Using this communication object, the duration until trigger 2 achieved is set. The following parameter appears:

Duration in min [1…65,535]

Options: 1…5…65,535

The meter reading is sent if the parameterized duration has elapsed. It is possible to parameterize whether the intermediate meter stops or does not stop.

"Meter reading" is sent on trigger 2

<−−− NOTE

**Stop "Intermediate meter reading"
on trigger 2**

Options: yes
no

Note
This parameter is not available should *Limit* be selected beforehand. Instead of the parameter *Reaction to stop*, the parameter *Contact position when limit is reached* appears with the same options as in parameter *Reaction to stop*.

- *no:* The intermediate meter sends its meter reading at trigger 2 and continues to count further (without reset).
- *yes:* The intermediate counter sends its meter reading at trigger 2 and must be restarted by trigger 1. The following parameter appears:

  Reaction to stop

  Options: no reaction
  switch ON until next switch operation
  switch OFF until next switch operation

  If the intermediate meter is stopped at trigger 2, the output can switch on, switch off or retain its switch position. The switching is evaluated as a “normal” switch telegram, i.e., the output is not inhibited and every new switch telegram can switch the output again.

**"Intermediate meter reading"
additionally resettable via object**

Options: no
yes

- *yes:* The communication object Reset (*A: Intermediate meter*) is enabled. When a telegram is received with the value 1 on the communication object, the meter reading is sent and subsequently reset to zero. The status of the meter is not changed, i.e. if the meter is metering, it will continue to take readings; if it is stopped, it will remain stopped.

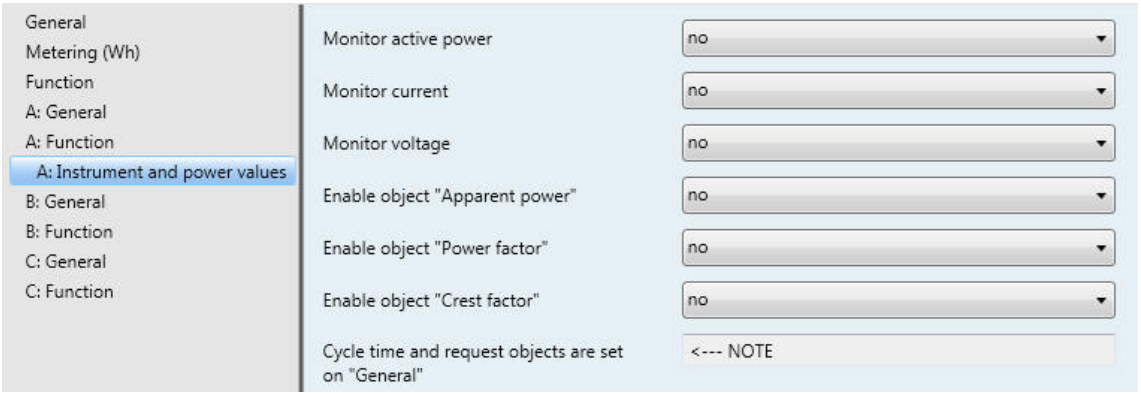
**Overwrite start-, stop time, duration
and limit with download or ETS reset**

Options: no
yes

- *yes:* After a download or ETS reset, the values changed on the bus are overwritten again with the parameter values.
- *no:* After a download or ETS reset, the values changed on the bus are retained.

3.2.5.8 Parameter window *A: Instrument and power values*

In this parameter window, further parameter values for monitoring of the instrument and power values and the respective communication objects are enabled.



Monitor active power

Options: no
yes

· *yes:* The parameter window *A: Monitor active power* is enabled.

Monitor current

Options: no
yes

· *yes:* The parameter window *A: Monitor current* is enabled.

Monitor voltage

Options: no
yes

· *yes:* The parameter window *A: Monitor voltage* is enabled.

Enable object "Apparent power"

Options: no
yes

· *yes:* The communication object *Apparent power* (A: Apparent power) is enabled. The following parameters appear:

Send "Apparent power" after a change

Options: no
yes

· *yes:* The value of the communication object *Apparent power* (A: Apparent power) is sent in the event of a change. The following parameter appears:

Send "Apparent power" when +/- VA [1…4,600]

Options: 1…5…4,600

This parameter determines which changes of the value of the communication object *Apparent power* are sent.

Send "Apparent power" on request

Options: no
yes

- *yes:* The value of the communication object *Apparent power* is sent when a telegram is received on the communication object *Request power values*. This communication object is enabled in the parameter window General, page 29.

Send "Apparent power" cyclically

Options: no
yes

- *yes:* The value of the communication object *Apparent power* is sent cyclically. The setting of the cycle time is undertaken in parameter window General, page 29 (parameter *Cycle time for power values*).

Enable object "Power factor"

Options: no
yes

- *yes:* The value of the communication object *Power factor* (A: Power factor) is enabled. The following parameters appear:

Send "Power factor" after a change

Options: no
yes

- *yes:* The value of the communication object *Power factor* (A: Power factor) is sent in the event of a change. The following parameter appears:

Send "Power factor" when +/- 0.01 x value [1…100]

Options: 1…5…100

This parameter determines which changes of the value of the communication object *Power factor* are sent.

Send "Power factor" on request

Options: no
yes

- *yes:* The value of the communication object *Power factor* is sent when a telegram is received on the communication object *Request instrument values*. This communication object is enabled in the parameter window General, page 29.

Send "Power factor" cyclically

Options: no
yes

· *yes:* The value of the communication object *Power factor* is sent cyclically. The setting of the cycle time is undertaken in parameter window General, page 29 (parameter *Cycle time for instrument values*).

Enable object "Crest factor"

Options: no
yes

· *yes:* The communication object *Crest factor* (A: Crest factor current) is enabled. The following parameters appear:

Send "Crest factor" after a change

Options: no
yes

· *yes:* The value of the communication object *Power factor* (A: Crest factor) is sent in the event of a change. The following parameter appears:

Send "Crest factor" when +/- 0.1 x value [1…100]

Options: 1…5…100

This parameter determines which changes of the value of the communication object *Crest factor current* are sent.

Send "Crest factor" on request

Options: no
yes

· *yes:* The value of the communication object *Crest factor current* is sent when a telegram is received on the communication object *Request instrument values*. This communication object is enabled in the parameter window General, page 29.

Send "Crest factor" cyclically

Options: no
yes

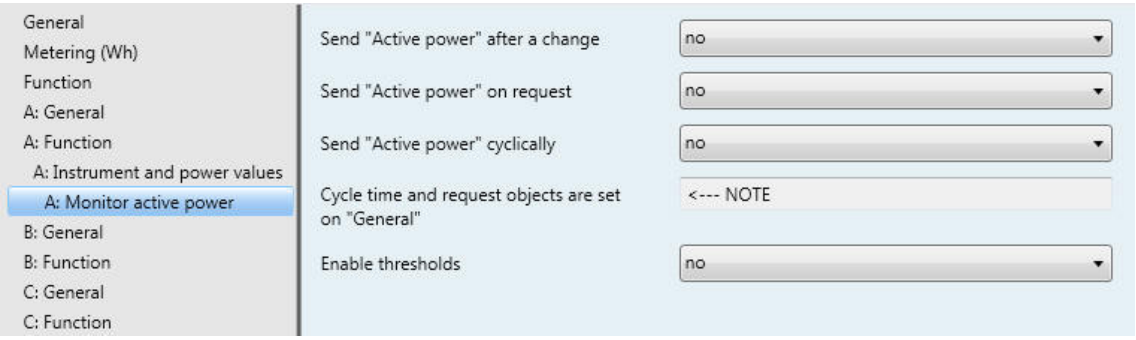
· *yes:* The value of the communication object *Crest factor current* is sent cyclically. The setting of the cycle time is undertaken in parameter window General, page 29 (parameter *Cycle time for instrument values*).

Cycle time and request objects are set on "General"

<−−− NOTE

3.2.5.8.1 Parameter window *A: Monitor active power*

In parameter window *A: Monitor active power*, the parameters and the communication objects for the detection and monitoring of the active power of output A are enabled.



Send "Active power" after a change

Options: no
yes

- *yes:* The value of the communication object *Active power* is sent after a change. The following parameter appears:

  Send "Active power" when +/- W [1…4,600]

  Options: 1…5…4,600

  This parameter determines which changes of the value of the communication object *Active power* are sent.

Send "Active power" on request

Options: no
yes

- *yes:* The value of the communication object *Active power* is sent when a telegram is received on the communication object *Request power values*. This communication object is enabled in the parameter window General, page 29.

Send "Active power" cyclically

Options: no
yes

- *yes:* The value of the communication object *Active power* is sent cyclically. The setting of the cycle time is undertaken in parameter window General, page 29 (parameter *Cycle time for power values*).

Cycle time and request objects are set on "General"

<−−− NOTE

Enable thresholds

Options: no
yes

- *yes:* The parameters and communication objects for threshold 1 for monitoring the *Active power* of output A are enabled. The following parameters appear:

Overwrite thresholds with download or ETS reset

Options: no
yes

- *yes:* The threshold values can be modified via the bus. With this setting, after a download or ETS reset, the values changed on the bus are again overwritten with the parameterized values. This setting applies for threshold value 1 and threshold value 2.

Delay for switching in s [0…65,535]

Options: 0…1…65,535

Then output can switch in dependence on the threshold values for active power. The switching reaction occurs if the threshold exceeds or falls below the time parameterized here. This setting applies for threshold value 1 and threshold value 2.

Evaluation of threshold 1

Options: only if contact is closed
only if contact is open
always

- *only if contact is closed:* Threshold 1 is only evaluated when the contact is closed.
- *only if contact is open:* Threshold 1 is only evaluated when the contact is opened.
- *always:* Threshold 1 is evaluated independently of the contact position.

Note
The evaluation of threshold 1 occurs based on the “calculated” relay position, i.e. if manual switching has occurred or if a contact has welded, this will not be considered.

Threshold 1 lower limit in W [0…4,600]

Options: 0…5…4,600

This is the lower hysteresis limit of threshold value 1. If the lower threshold is undershot, there is a reaction.

For further information see: Instruments and power values, page 125

Threshold 1 upper limit in W [0…4,600]

Options: 0…100…4,600

This is the upper hysteresis limit of threshold value 1. If the upper threshold is exceeded, there is a reaction.

For further information see: Instruments and power values, page 125

Threshold 1 warning

Options: do not send
send 0 when exceeding
send 1 when exceeding
send 0 when falling below
send 1 when falling below
exceeding 0, falling below 1
exceeding 1, falling below 0

If threshold value 1 is exceeded or undershot, the parameterized value of the communication object *Threshold 1 warning* (Active power) is sent.

Note
Exceeding the threshold means that the upper limit is exceeded, falling below the threshold means that the lower limit is undershot.

Contact position when falling below lower limit

Options: no reaction
switch OFF until next switch operation

Contact position when exceeding upper limit

Options: no reaction
switch OFF until next switch operation

The output switches after threshold value 1 has been exceeded or has fallen below the limit, and the parameterized *Delay for switching* has timed out.

Switching off is evaluated as a “normal” switch telegram, i.e., the output is not inhibited, and every new switch telegram can switch the output again.

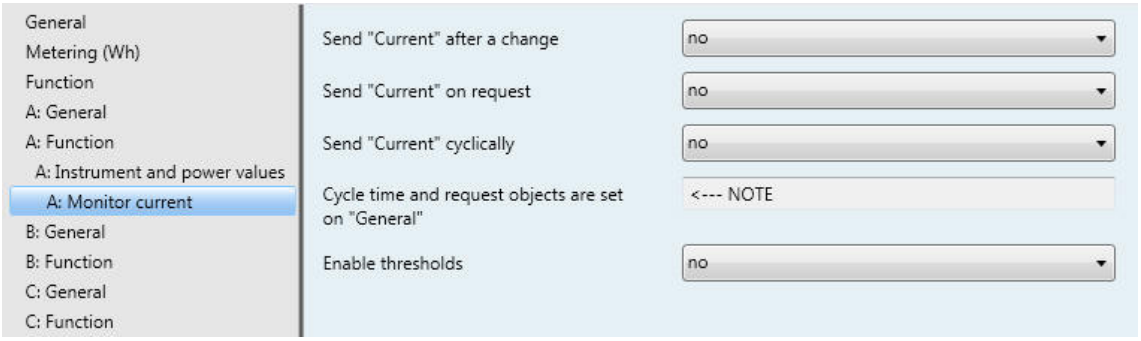
Enable threshold 2

Options: no
yes

Parameterization of threshold value 2 is identical to threshold value 1.

3.2.5.8.2 Parameter window *A: Monitor current*

In parameter window *A: Monitor current*, the parameters and the communication objects for the detection and monitoring of the current value of output A are enabled.



Send "Current" after a change

Options: no
yes

- *yes:* The value of the communication object *Current value* is sent after a change. The following parameter appears:

  Send "Current" when +/- mA [1…20,000]

  Options: 1…50…20.000

  This parameter determines which changes of the value of the communication object *Current value* are sent.

Send "Current" on request

Options: no
yes

- *yes:* The value of the communication object *Current value* is sent when a telegram is received on the communication object *Request power values*. This communication object is enabled in the parameter window General, page 29.

Send "Current" cyclically

Options: no
yes

- *yes:* The value of the communication object *Current value* is sent cyclically. The setting of the cycle time is undertaken in parameter window General, page 29 (parameter *Cycle time for power values*).

Cycle time and request objects are set on "General"

<−−− NOTE

Enable thresholds

Options: no
yes

- *yes:* The parameters and communication objects for threshold 1 for monitoring the *Current value* of output A are enabled. The following parameters appear:

Overwrite thresholds with download or ETS reset

Options: no
yes

- *yes:* The threshold values can be modified via the bus. With this setting, after a download or ETS reset, the values changed on the bus are again overwritten with the parameterized values. This setting applies for threshold value 1 and threshold value 2.

Delay for switching in s [0…65,535]

Options: 0…1…65,535

Then output can switch in dependence on the threshold values of the current value. The switching reaction occurs if the threshold exceeds or falls below the time parameterized here. This setting applies for threshold value 1 and threshold value 2.

Evaluation of threshold 1

Options: only if contact is closed
only if contact is open
always

- *only if contact is closed:* Threshold 1 is only evaluated when the contact is closed.
- *only if contact is open:* Threshold 1 is only evaluated when the contact is opened.
- *always:* Threshold 1 is evaluated independently of the contact position.

Note
The evaluation of threshold 1 occurs based on the “calculated” relay position, i.e. if manual switching has occurred or if a contact has welded, this will not be considered.

Threshold 1 lower limit in 100 mA x value [0…200]

Options: 0…1…200

This is the lower hysteresis limit of threshold value 1. If the lower threshold is undershot, there is a reaction.

For further information see: Instruments and power values, page 125

**Threshold 1 upper limit
in 100 mA x value [0…200]**

Options: 0…3…200

This is the upper hysteresis limit of threshold value 1. If the upper threshold is exceeded, there is a reaction.

For further information see: Instruments and power values, page 125

Threshold 1 warning

Options: do not send
send 0 when exceeding
send 1 when exceeding
send 0 when falling below
send 1 when falling below
exceeding 0, falling below 1
exceeding 1, falling below 0

If threshold value 1 is exceeded or undershot, the parameterized value of the communication object *Threshold 1 warning* (current value) is sent.

Note
Exceeding the threshold means that the upper limit is exceeded, falling below the threshold means that the lower limit is undershot.

**Contact position when
falling below lower limit**

Options: no reaction
switch OFF until next switch operation

**Contact position when
exceeding upper limit**

Options: no reaction
switch OFF until next switch operation

The output switches after threshold value 1 has been exceeded or has fallen below the limit, and the parameterized *Delay for switching* has timed out.

Switching off is evaluated as a “normal” switch telegram, i.e., the output is not inhibited and every new switch telegram can switch the output again.

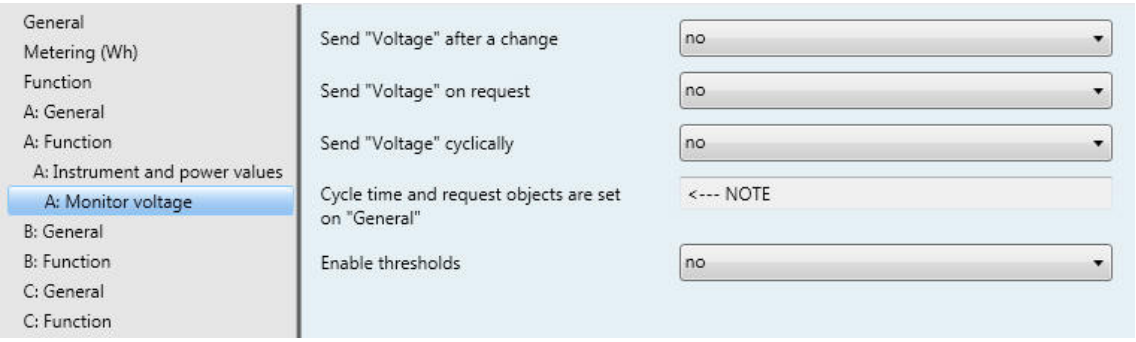
Enable threshold 2

Options: no
yes

Parameterization of threshold value 2 is identical to threshold value 1.

3.2.5.8.3 Parameter window *A: Monitor voltage*

In parameter window *A: Monitor voltage*, the parameters and the communication objects for the detection and monitoring of the voltage of output A are enabled.



Send "Voltage" after a change

Options: no
yes

- *yes:* The value of the communication object *Voltage* is sent after a change. The following parameter appears:

  Send "Voltage" when +/- V [1…265]

  Options: 1…5…265

  This parameter determines which changes of the value of the communication object *Voltage* are sent.

Send "Voltage" on request

Options: no
yes

- *yes:* The value of the communication object *Voltage* is sent when a telegram is received on the communication object *Request power values*. This communication object is enabled in the parameter window General, page 29.

Send "Voltage" cyclically

Options: no
yes

- *yes:* The value of the communication object Voltage is sent cyclically. The setting of the cycle time is undertaken in parameter window General, page 29 (parameter *Cycle time for power values*).

Cycle time and request objects are set on "General"

<−−− NOTE

Enable thresholds

Options: no
yes

- *yes:* The parameters and communication objects for threshold 1 for monitoring the *Voltage* of output A are enabled. The following parameters appear:

Overwrite thresholds with download or ETS reset

Options: no
yes

- *yes:* The threshold values can be modified via the bus. With this setting, after a download or ETS reset, the values changed on the bus are again overwritten with the parameterized values. This setting applies for threshold value 1 and threshold value 2.

Delay for switching in s [0…65,535]

Options: 0…1…65,535

The output can switch in dependence on the threshold values for the voltage. The switching reaction occurs if the threshold exceeds or falls below the time parameterized here. This setting applies for threshold value 1 and threshold value 2.

Evaluation of threshold 1

Options: only if contact is closed
only if contact is open
always

- *only if contact is closed:* Threshold 1 is only evaluated when the contact is closed.
- *only if contact is open:* Threshold 1 is only evaluated when the contact is opened.
- *always:* Threshold 1 is evaluated independently of the contact position.

Note
The evaluation of threshold 1 occurs based on the “calculated” relay position, i.e. if manual switching has occurred or if a contact has welded, this will not be considered.

Threshold 1 lower limit in V [95…265]

Options: 95…95…265

This is the lower hysteresis limit of threshold value 1. If the lower threshold is undershot, there is a reaction.

For further information see: Instruments and power values, page 125

Threshold 1 upper limit in V [95…265]

Options: 95…100…265

This is the upper hysteresis limit of threshold value 1. If the upper threshold is exceeded, there is a reaction.

For further information see: Instruments and power values, page 125

Threshold 1 warning

Options: do not send
send 0 when exceeding
send 1 when exceeding
send 0 when falling below
send 1 when falling below
exceeding 0, falling below 1
exceeding 1, falling below 0

If threshold value 1 is exceeded or undershot, the parameterized value of the communication object *Threshold 1 warning* (Voltage) is sent.

Note
Exceeding the threshold means that the upper limit is exceeded, falling below the threshold means that the lower limit is undershot.

Contact position when falling below lower limit

Options: no reaction
switch OFF until next switch operation
switch ON until next switch operation
switch OFF until limit is exceeded again
switch ON until limit is exceeded again

- *switch ON/OFF until next switch operation:* The output switches after threshold value 1 has fallen below the limit, and the parameterized *Delay for switching* has timed out. The switching is evaluated as a “normal” switch telegram, i.e., the output is not inhibited and every new switch telegram can switch the output again.
- *switch OFF/ON until limit is exceeded again:* The output switches after threshold value 1 has fallen below the limit, and the parameterized *Delay for switching* has timed out. Normal switching can occur again only after the threshold is exceeded. Exception: A telegram with a higher priority, see Function chart, page 120.

Contact position when exceeding upper limit

Options: no reaction
switch OFF until next switch operation
switch ON until next switch operation
switch OFF until value is falling below threshold again
switch ON until value is falling below limit again

- *switch ON/OFF until next switch operation:* The output switches after threshold value 1 is exceeded, and the parameterized *Delay for switching* has timed out. The switching is evaluated as a “normal” switch telegram, i.e., the output is not inhibited and every new switch telegram can switch the output again.
- *switch OFF/ON until value is falling below threshold again:* The output switches after threshold value 1 is exceeded, and the parameterized *Delay for switching* has timed out. Normal switching can occur again only after the value has fallen below the threshold again. Exception: A telegram with a higher priority, see Function chart, page 120.

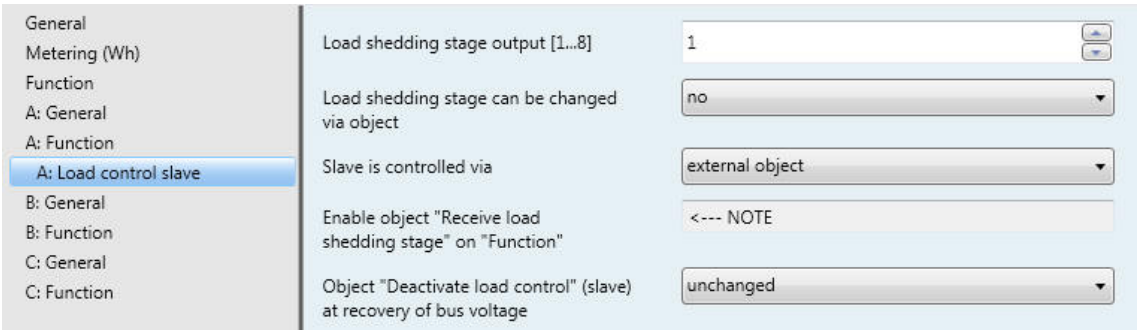
Enable threshold 2

Options: no
yes

Parameterization of threshold value 2 is identical to threshold value 1.

3.2.5.9 Parameter window *A: Load control slave*

In parameter window *Load control slave*, the behaviour of the output is parameterized, provided that the output is used as a slave for load control. The master can be another Energy Actuator, the device itself or e.g. another visualization.



Load shedding stage output [1...8]

Options: 1…8

Can be separately parameterized for each output at which shedding stage the output is switched off.

Should the Energy Actuator receive a shedding stage on the communication object *Receive load shedding stage* that is greater than or equal to the *Load shedding stage output*, the output will then switch off. If the received shedding stage is less than the parameterized *Load shedding stage output*, the output is re-enabled.

Load shedding stage can be changed via object

Options: no
yes

- *yes:* The shedding stage of the output (communication object *Shedding stage*) can be modified via the bus. The following parameter appears:

  Overwrite load shedding stage with download or ETS reset

  Options: yes
  no

  - *yes:* The shedding stage modified via the bus is overwritten after a download or ETS reset.

Slave is controlled via

Options: external object:
receives load shedding stage internally

- *external object:* The shedding stage is received via the bus, the Energy Actuator is not the master.
- *Receives load shedding stage internally:* The Energy Actuator generates the shedding stage itself; it is also the master. The communication object *Receive load shedding stage* is not required and can be made invisible (in parameter window Function, page 35). The shedding stage is transferred internally to the output.

Enable object "Receive load shedding stage" on "Function"

<--- NOTE

Object "Deactivate load control" (slave) at recovery of bus voltage

Options: unchanged
0 = load control activated
1 = load control deactivated

This parameter defines how the function *Load control slave* should behave after bus voltage recovery.

- *unchanged:* The status of the function *Load control slave* is saved at bus voltage failure and restored after bus voltage recovery.
- *0 = load control activated:* The function *Load control slave* is active after bus voltage recovery.
- *1 = load control deactivated:* The function *Load control slave* is not active after bus voltage recovery.

3.3 Communication objects

In this chapter, the communication objects of the Energy Actuator SE/S 3.16.1 are described. The description is divided into blocks, which relate to the name of the communication object.

General - Communication objects, valid for the entire Energy Actuator

Output A…C - Communication objects that relate to the corresponding output.

In order to obtain a quick overview of the function possibilities of the gateway, all communication objects are listed in an overview table. The detailed function can be examined in more detail in the subsequent description of the individual communication objects.

Note
Some communication objects are dynamic and are only visible if the corresponding parameters are activated in the application software.

3.3.1 Short overview of the communication objects

CO* No.	Function	Name	Data Point Type (DPT)	Length	Flags				
					C	R	W	T	A
0	In operation	System	DPT 1.002	1 bit	x			x	
1	Safety priority 1	General	DPT 1.005	1 bit	x		x		x
2	Safety priority 2	General	DPT 1.005	1 bit	x		x		x
3	Safety priority 3	General	DPT 1.005	1 bit	x		x		x
4	Request status values	General	DPT 1.017	1 bit	x		x		
5	Request meter readings	General	DPT 1.017	1 bit	x		x		
6	Request instrument values	General	DPT 1.017	1 bit	x		x		
7	Request power values	General	DPT 1.017	1 bit	x		x		
8	Receive time	General	DPT 10.001	3 byte	x		x		
9	Measurement circuit active	Diagnostics	DPT 1.011	1 bit	x	x		x	
10	Receive load shedding stage	Load control	DPT 236.001	1 byte	x		x		
11	Enable reset meters	Meter reading	DPT 1.003	1 bit	x	x	x		
12	Reset meter readings	Meter reading	DPT 1.015	1 bit	x		x		
13	Deactivate load control	Load control master	DPT 1.003	1 bit	x	x	x		
15	Status load control	Load control master	DPT 27.001	4 byte	x	x		x	
16	Load limit exceeded	Load control master	DPT 1.005	1 bit	x	x		x	
17	Receive power value 1	Load control master	DPT 14.056	4 byte	x		x	x	x
18	Receive power value 2	Load control master	DPT 14.056	4 byte	x		x	x	x
19	Receive power value 3	Load control master	DPT 14.056	4 byte	x		x	x	x
20	Receive power value 4	Load control master	DPT 14.056	4 byte	x		x	x	x
21	Receive power value 5	Load control master	DPT 14.056	4 byte	x		x	x	x
22	Receive power value 6	Load control master	DPT 14.056	4 byte	x		x	x	x
23	Receive power value 7	Load control master	DPT 14.056	4 byte	x		x	x	x
24	Receive power value 8	Load control master	DPT 14.056	4 byte	x		x	x	x
25	Receive power value 9	Load control master	DPT 14.056	4 byte	x		x	x	x
26	Receive power value 10	Load control master	DPT 14.056	4 byte	x		x	x	x
27	Send sum power values	Load control master	DPT 14.056	4 byte	x	x		x	
28	Send load shedding stage	Load control master	DPT 236.001	1 byte	x	x		x	
29	Choose load limit	Load control master	DPT 5.010	1 byte	x		x		
30	Send load limit	Load control master	DPT 14.056	4 byte	x	x		x	
	Receive/send load limit	Load control master	DPT 14.056	4 byte	x	x	x	x	
31	Meter reading	Meter total	DPT 13.010	4 byte	x	x		x	

* CO = communication object

CO* No.	Function	Name	Data Point Type (DPT)	Length	Flags				
					C	R	W	T	A
32	Meter reading	Intermediate meter total	DPT 13.010	4 byte	x	x		x	
33	Status	Intermediate meter total	non DPT	1 byte	x	x		x	
34	Receive trigger 1	Intermediate meter total	DPT 1.017	1 bit	x		x		
	Trigger 1 change time	Intermediate meter total	DPT 10.001	3 byte	x	x	x	x	
35	Receive trigger 2	Intermediate meter total	DPT 1.017	1 bit	x		x		
	Trigger 2 change time	Intermediate meter total	DPT 10.001	3 byte	x	x	x	x	
	Trigger 2 change limit	Intermediate meter total	DPT 13.010	4 byte	x	x	x	x	
	Trigger 2 change duration	Intermediate meter total	DPT 7.006	2 byte	x	x	x	x	
36	Reset	Intermediate meter total	DPT 1.015	1 bit	x		x		
37	Active power	Active power total	DPT 14.056	4 byte	x	x		x	
38	Threshold 1 lower limit	Active power total	DPT 14.056	4 byte	x	x	x	x	
39	Threshold 1 upper limit	Active power total	DPT 14.056	4 byte	x	x	x	x	
40	Threshold 1 warning	Active power total	DPT 1.005	1 bit	x	x		x	
41	Threshold 2 lower limit	Active power total	DPT 14.056	4 byte	x	x	x	x	
42	Threshold 2 upper limit	Active power total	DPT 14.056	4 byte	x	x	x	x	
43	Threshold 2 warning	Active power total	DPT 1.005	1 bit	x	x		x	
44	Frequency	Frequency	DPT 14.033	4 byte	x	x		x	
45	Threshold 1 lower limit	Frequency	DPT 14.033	4 byte	x	x	x	x	
46	Threshold 1 upper limit	Frequency	DPT 14.033	4 byte	x	x	x	x	
47	Threshold 1 warning	Frequency	DPT 1.005	1 bit	x	x		x	
48	Threshold 2 lower limit	Frequency	DPT 14.033	4 byte	x	x	x	x	
49	Threshold 2 upper limit	Frequency	DPT 14.033	4 byte	x	x	x	x	
50	Threshold 2 warning	Frequency	DPT 1.005	1 bit	x	x		x	
51	Frequency error	Diagnosticd	DPT 1.005	1 bit	x	x		x	
60	Switch	A: Switch	DPT 1.001	1 bit	x		x		
61	Status Switch	A: Switch	DPT 1.001	1 bit	x	x		x	
62	Status byte	A: Diagnostics	non DPT	1 byte	x	x		x	
63	Permanent ON	A: Time	DPT 1.001	1 bit	x		x		
64	Disable function time	A: Time	DPT 1.001	1 bit	x	x	x	x	
65	Staircase lighting duration	A: Staircase lighting	DPT 7.005	2 byte	x	x	x	x	
66	Staircase lighting warning	A: Staircase lighting	DPT 1.005	1 bit	x			x	
67	8 bit scene	A: Scene	DPT 18.001	1 byte	x		x		
68	Logical connection 1	A: Logic	DPT 1.002	1 bit	x		x		
69	Logical connection 2	A: Logic	DPT 1.002	1 bit	x		x		
70	Forced operation	A: Forced operation	DPT 1.003	1 bit	x		x		
	Forced operation	A: Forced operation	DPT 2.001	2 bit	x		x		
71	Contact monitoring	A: Contact	DPT 1.002	1 bit	x	x		x	
74	Meter reading	A: Meter	DPT 13.010	4 byte	x	x		x	

* CO = communication object

CO* No.	Function	Name	Data Point Type (DPT)	Length	Flags				
					C	R	W	T	A
75	Meter reading	A: Intermediate meter	DPT 13.010	4 byte	x	x		x	
76	Status	A: Intermediate meter	non DPT	1 byte	x	x		x	
77	Receive trigger 1	A: Intermediate meter	DPT 1.017	1 bit	x		x		
	Trigger 1 change time	A: Intermediate meter	DPT 10.001	3 byte	x	x	x	x	
78	Receive trigger 2	A: Intermediate meter	DPT 1.017	1 bit	x		x		
	Trigger 2 change time	A: Intermediate meter	DPT 10.001	3 byte	x	x	x	x	
	Trigger 2 change limit	A: Intermediate meter	DPT 13.010	4 byte	x	x	x	x	
	Trigger 2 change duration	A: Intermediate meter	DPT 7.006	2 byte	x	x	x	x	
79	Reset	A: Intermediate meter	DPT 1.015	1 bit	x		x		
80	Deactivate load control	A: Load control slave	DPT 1.003	1 bit	x	x	x		
81	Load shedding stage output	A: Load control slave	DPT 5.010	1 byte	x	x	x	x	
82	Active power	A: Active power	DPT 14.056	4 byte	x	x		x	
83	Threshold 1 lower limit	A: Active power	DPT 14.056	4 byte	x	x	x	x	
84	Threshold 1 upper limit	A: Active power	DPT 14.056	4 byte	x	x	x	x	
85	Threshold 1 warning	A: Active power	DPT 1.005	1 bit	x	x		x	
86	Threshold 2 lower limit	A: Active power	DPT 14.056	4 byte	x	x	x	x	
87	Threshold 2 upper limit	A: Active power	DPT 14.056	4 byte	x	x	x	x	
88	Threshold 2 warning	A: Active power	DPT 1.005	1 bit	x	x		x	
89	Current Value	A: Current	DPT 14.019	4 byte	x	x		x	
90	Threshold 1 lower limit	A: Current	DPT 14.019	4 byte	x	x	x	x	
91	Threshold 1 upper limit	A: Current	DPT 14.019	4 byte	x	x	x	x	
92	Threshold 1 warning	A: Current	DPT 1.005	1 bit	x	x		x	
93	Threshold 2 lower limit	A: Current	DPT 14.019	4 byte	x	x	x	x	
94	Threshold 2 upper limit	A: Current	DPT 14.019	4 byte	x	x	x	x	
95	Threshold 2 warning	A: Current	DPT 1.005	1 bit	x	x		x	
96	Voltage	A: Voltage	DPT 14.027	4 byte	x	x		x	
97	Threshold 1 lower limit	A: Voltage	DPT 14.027	4 byte	x	x	x	x	
98	Threshold 1 upper limit	A: Voltage	DPT 14.027	4 byte	x	x	x	x	
99	Threshold 1 warning	A: Voltage	DPT 1.005	1 bit	x	x		x	
100	Threshold 2 lower limit	A: Voltage	DPT 14.027	4 byte	x	x	x	x	
101	Threshold 2 upper limit	A: Voltage	DPT 14.027	4 byte	x	x	x	x	
102	Threshold 2 warning	A: Voltage	DPT 1.005	1 bit	x	x		x	
103	Apparent power	A: Apparent power	DPT 14.056	4 byte	x	x		x	
105	Power factor	A: Power factor	DPT 14.057	4 byte	x	x		x	
106	Crest factor current	A: Crest factor current	DPT 14.057	4 byte	x	x		x	
120… 166	Output B the same CO as output A	B: see output A							
180… 226	Output C the same CO as output A	C: see output A							

* CO = communication object

3.3.2 Communication objects *General*

No.	Function	Object name	Data type	Flags
0	**In operation**	**System**	**1 Bit DPT 1.002**	**C, T**
This communication object is enabled when in the parameter window General, page 29, the parameter *Send communication object "In operation"* is selected with the option *send value 0 cyclically* or *send value 1 cyclically*. In order to regularly monitor the presence of the Energy Actuator on the ABB i-bus® KNX, an in operation monitoring telegram can be sent cyclically on the bus. As long as the communication object is activated, it sends an in operation telegram. Telegram value: 1 = system in operation with option *send value 1 cyclically* 0 = system in operation with option *send value 0 cyclically*				
1	**Safety priority 1**	**General**	**1 bit** **DPT 1.005**	**C, W, U**
This communication object is enabled if in parameter window Function, page 35, the parameter *Function safety priority 1* is selected with the option *enabled by object value 0* or *enabled by object value 1*. The Energy Actuator can receive a 1 bit telegram via this communication object, which another KNX device, e.g. diagnostics module or wind sensor, sends cyclically. If the communication object for the monitoring time is activated, the communication capability of the bus or the sensor (signalling device) can be monitored on receipt of the telegram. If the Energy Actuator does not receive a telegram (value can be programmed) on the communication object *Safety priority 1* within a determined period, a fault is assumed and a response programmed in parameter window *A: Safety* is implemented. The output of the Energy Actuator goes into a safety state and does not process any telegrams. Only after the communication object *Safety priority 1* again receives a 1 or 0 (depending on the parameterization) incoming telegrams will be processed again and the contact setting changed. The monitoring period can be adjusted in the parameter *Function* via the parameter *Control period in seconds*. The *Safety priority 1* is also triggered if a telegram with the programmable trigger value is received.				
2	**Safety priority 2**	**General**	**1 bit** **DPT 1.005**	**C, W, U**
See communication object 1				
3	**Safety priority 3**	**General**	**1 bit** **DPT 1.005**	**C, W, U**
See communication object 1				
4	**Request status values**	**General**	**1 bit** **DPT 1.017**	**C, W**
This communication object is enabled if in parameter window General, page 29, the parameter *Enable communication object "Request status values" 1 bit* has been selected with option *yes*. If a telegram with the value x (x = 0; 1; 0 or 1) is received in the communication object, all status objects are sent on the bus, as long as these have been programmed with the option *on request* or *after a change or on request*. Some status objects are sent in every case; see the description of the parameter in chapter 3.2.1. The following function results for the value x = 1: Telegram value: 1 = all status messages are sent 0 = nothing happens				

No.	Function	Object name	Data type	Flags
5	**Request meter readings**	**General**	**1 bit** **DPT 1.017**	**C, W**
This communication object is enabled if in Parameter window Metering (Wh), page 33, the parameter *Enable communication object "Request status values" 1 bit* has been selected with option *yes*. If a telegram with the value x (x = 0; 1; 0 or 1) is received on the communication object, all meter readings are sent on the bus, as long as these have been programmed with the option *on request* or *cyclically and on request*, refer to the description of the parameter on chapter 3.2.2. The following function results for the value x = 1: Telegram value: 1 = all meter readings are sent 0 = nothing happens				
6	**Request instrument values**	**General**	**1 bit** **DPT 1.017**	**C, W**
This communication object is enabled if in parameter window General, page 29, the parameter *Enable communication object "Request instrument values" 1 bit* has been selected with option *yes*. If a telegram with the value x (x = 0; 1; 0 or 1) is received in the communication object, all instrument values are sent on the bus, as long as these have been programmed with the option *on request* or *after a change or on request*. Some status objects send in every case, see the description of the parameter in chapter 3.2.1. The following function results for the value x = 1: Telegram value: 1 = all meter readings are sent 0 = nothing happens				
7	**Request power values**	**General**	**1 bit** **DPT 1.017**	**C, W**
This communication object is enabled if in parameter window General, page 29, the parameter *Enable communication object "Request power values" 1 bit* has been selected with option *yes*. If a telegram with the value x (x = 0; 1; 0 or 1) is received in the communication object, all power values are sent on the bus, as long as these have been programmed with the option *on request* or *after a change or on request*. Some status objects send in every case, see the description of the parameter in chapter 3.2.1. The following function results for the value x = 1: Telegram value: 1 = all power values are sent 0 = nothing happens				
8	**Receive time**	**General**	**3 byte** **DPT 10.001**	**C, W**
This communication object is always enabled. The time (day/hour/minute/second) is received via the bus with this communication object. If the time has been selected with an intermediate counter as trigger 1 or trigger 2, trigger 1 or trigger 2 is activated when the parameterized time is received on the bus. The evaluation is on a minute basis, i.e. the seconds are not taken into account. If the same time is received several times, i.e., the time is sent more than once a minute, a renewed reception does not cause a reaction. In order to ensure that the parameterized time for trigger 1 or trigger 2 is received, the time must be sent once a minute on the bus (external timer).				

No.	Function	Object name	Data type	Flags
9	**Measurement circuit active**	**Diagnostics**	**1 bit** **DPT 1.011**	**C, R, T**

This communication object is always enabled. It indicates that the measurement electronics of the Energy Actuator are “working”. The value of the communication object is sent on a change and when a telegram is received on the communication object *Request status values.*

The measurement section is supplied with power from one of the output circuits A…C.

If the rated voltage (see Technical data, page 7) is present on at least one of the outputs, the measurement values are recorded and are available on the KNX side.

Telegram value:
1 = On at least one (any) output of the Energy Actuator rated voltage is present, measurement values are recorded.
0 = No rated voltage is present on any of the outputs, measurement values are not recorded.

No.	Function	Object name	Data type	Flags
10	**Receive load shedding stage**	**Load control**	**1 byte** **DPT 236.001**	**C, W**

This communication object is enabled if in parameter window Function, page 35, the parameter *Enable object "Receive load shedding stage"* has been selected with the option *yes*.

This communication object is required for load control, as soon as the function *Enable function load control slave* has been enabled on at least one of the outputs and the shedding stage is received via the bus (from an Energy Actuator that is parameterized as a load control master or, e.g. by a visualization system). If the Energy Actuator itself is the master, the shedding stage can also be internally linked (parameter window *X: Load control slave.* Parameter *Slave is controlled via* option *Receives load shedding stage internally.*

If a parameterized Load shedding stage output is received at Output A…C, the respective output switches off The shedding stage is received once per device and is valid for all outputs parameterized as a slave.

Format:

8 bit DPPPSSSS

D (bit 7):
1 = load control is not active, received shedding stages are not evaluated and the slaves are enabled.
0 = load control is active, received shedding stages are evaluated.

P (bit 6…4) [000b…111b]: If more than one master is available in the system, these bits can determine the priorities of the masters among themselves. The Energy Actuator always sends P = 0. The slave only evaluates telegrams with P = 0.

S (bit 3…0) [0000b-1111b]: This is the actual shedding stage.

Telegram value:
S = 0000b: Shedding stage 0, the slaves are enabled
S = 0001b: Shedding stage 1
…
S = 1000b: Shedding stage 8

Shedding stages 9 to 16 are not used with the Energy Actuator.

No.	Function	Object name	Data type	Flags
11	**Enable reset meters**	**Meter reading**	**1 bit** **DPT 1.003**	**C, R, W**
This communication object is enabled if in parameter window Metering (Wh), page 33, the parameter *All meters resettable via object* have been selected with the option *yes*. The internal timer starts when a telegram with the value 1 is received on this communication object. If a telegram with the value 1 is received within 10 s after the start of the timer on the communication object *Reset meter readings* (communication object no. 12), all main and intermediate meters are reset and stopped. **Note** All meter readings are lost and cannot be restored. **Important** The meters can only be reset when the measurement process is active, i.e. rated voltage is present on at least one output.				
12	**Reset meter readings**	**Meter reading**	**1 bit** **DPT 1.015**	**C, W**
See communication object 11				

3.3.3 Communication objects *Load control master*

No.	Function	Object name	Data type	Flags
13	**Deactivate load control**	**Load control master**	**1 bit** **DPT 1.003**	**C, R, W**
This communication object is enabled when in parameter window Function, page 35, the parameter *Device is load control master* has been selected with the option *yes*. Using this communication object, the function *Load control master* can be deactivated via the receipt of a corresponding telegram. Telegram value: 0 = The function *Load control master* is active. 1 = The function *Load control master* is deactivated. The communication object *Send load shedding stage* is sent with the value “Shedding stage 0”, all slaves are thus enabled. The communication object no. 28 *Send load shedding stage* is written with the value 128 and sent (shedding stage 0, load control not active). The value of the communication object after bus voltage recovery can be parameterized in the parameter window Load control master, page 46.				
14				
Not assigned.				

No.	Function	Object name	Data type	Flags
15	**Status load control**	**Load control master**	**4 byte** **DPT 27.001**	**C, R, T**

The communication object is enabled when in parameter window Load control master, page 46, the parameter *Monitor power values cyclically* has been selected with the option *yes*. The value of the communication object is sent on a change or when a telegram is received on the communication object *Request status values.*

The communication object consists of a mask that defines the valid bits and their data. The data indicates the monitoring faults of the power values.

If the master does not receive all the external power values from the slaves within the parameterized monitoring time, the missing values are requested via Value Read and an internal timer starts (10 s). After the timer has timed out, the corresponding error bit is set and the value of the communication object is sent.

m15	m14	m13	m12	m11	m10	m9	m8	m7	m6	m5	m4	m3	m2	m1	m0	s15	s14	s13	s12	s11	s10	s9	s8	s7	s6	s5	s4	s3	s2	s1	s0
0	0	0	0	0	0	Validity power value 10	Validity power value 9	Validity power value 8	Validity power value 7	Validity power value 6	Validity power value 5	Validity power value 4	Validity power value 3	Validity power value 2	Validity power value 1	0	0	0	0	0	0	Power value 10	Power value 9	Power value 8	Power value 7	Power value 6	Power value 5	Power value 4	Power value 3	Power value 2	Power value 1

Bit value mask:

1 = The respective status bit is valid and is evaluated
0 = The respective status bit is invalid and will not be evaluated

Bit value status:

1 = Monitoring error, the monitored value has not been received
0 = The monitored value has not been received within the monitoring period

Note

Monitoring of power values 1…4 is only active provided that the corresponding parameter *Source for power value 1…4* has been parameterized with the option *external via object* and a power value has been received.

No.	Function	Object name	Data type	Flags
16	**Load limit exceeded**	**Load control master**	**1 bit** **DPT 1.005**	**C, R, T**

This communication object is enabled when in parameter window Function, page 35, the parameter *Device is load control master* has been selected with the option *yes*. The value of the communication object is sent on a change and when a telegram is received on the communication object *Request status values.*

The master adds the received power values to *Send sum power values* (communication object no. 27). If the sum is greater than the parameterized permitted load limit, the value of the communication object is set to 1 and sent. If the sum is less than the allowed load limit (minus hysteresis), the value of the communication object is reset to 0.

No.	Function	Object name	Data type	Flags
17…26	**Receive power value 1…10**	**Load control master**	**4 byte** **DPT 14.056**	**C, R, T, U**
These communication objects are enabled, provided that in parameter window Function, page 35, the parameter *Device is load control master* has been selected with the option *yes* and in the parameter window Load control master, page 46, the parameter *Source for power value 1…4* (communication objects no. 17…20) has been selected with the option *external via object* as well as the parameter *Number of additional power values [1…6]* (communication objects no. 21…27) has been selected with a number > 0. The external power values are received via these communication objects (up to 10). Power values 1…4 can also be alternatively linked internally with power values output 1…3 or the total power of the device.				
27	**Send sum power values**	**Load control master**	**4 byte** **DPT 14.056**	**C, R, T**
This communication object is enabled, provided that in parameter window Function, page 35, the parameter *Device is load control master* has been selected with the option *yes*. The value of the communication object is internally calculated from the sum or the received power values and the internally linked power values.				
28	**Send load shedding stage**	**Load control master**	**1 byte** **DPT 236.001**	**C, R, T**

This communication object is enabled, provided that in parameter window Function, page 35, the parameter *Device is load control master* has been selected with the option *yes*.

The master sends the shedding stage on the bus as soon as the *Sum power values* (communication object no. 27) has exceeded the parameterized load limit.

Format:

8 bit	DPPPSSSS
D (bit 7):	1 = load control is not active, received shedding stages are not evaluated and slaves are enabled. 0 = load control is active, received shedding stages are evaluated.
P (bit 6…4) [000b…111b]:	If more than one master is available in the system, these bits can determine the priorities of the masters among themselves. The Energy Actuator always sends P = 0.
S (bit 3…0) [0000b-1111b]:	This is the actual shedding stage.
Telegram value:	S = 0000b: Shedding stage 0, the slaves are enabled S = 0001b: Shedding stage 1 … S = 1000b: Shedding stage 8

Shedding stages 9 to 16 are not used with the Energy Actuator.

If the load limit is exceeded, load shedding stage 1 is sent. All slaves with load shedding stage 1 then switch off. The *Sum power values* is then recalculated and compared with the load limit. If this is still exceeded, load shedding stage n + 1 is sent until the load limit is below the limit (before every increase in the shedding stage, the parameterized *Reaction time when exceeding load limit* is completed beforehand).

Should the value be below the load limit minus the hysteresis again, the shedding stage is reduced in steps (taking the *Reaction time when falling below load limit* into consideration).

No.	Function	Object name	Data type	Flags
29	**Choose load limit**	**Load control master**	**1 byte** **DPT 5.010**	**C, W**
This communication object is enabled when in parameter window Load control master, page 46, the parameter *Load limit can be changed* has been selected with the option *yes, 4 values selectable*. With this communication object, one of the 4 parameterized load limits can be selected as the active load limit. Value range [0…255] Telegram value: 0 = Load limit 1 active 1 = Load limit 2 active 3 = Load limit 3 active 4 = Load limit 4 active 5…255: not allowed. The active load limit after download or ETS reset is parameterized.				
30	**Send load limit**	**Load control master**	**4 byte** **DPT 14.056**	**C, R, T**
This communication object is enabled when in parameter window Load control master, page 46, the parameter *Load limit can be changed* has been selected with the option *yes, 4 values selectable*. Four parameterized load limits are available. The active load limit can be viewed using this communication object.				
30	**Receive / send load limit**	**Load control master**	**4 byte** **DPT 14.056**	**C, R, T**
This communication object is enabled when in parameter window Load control master, page 46, the parameter *Load limit can be changed* has been selected with the option *yes, object writable*. Only 1 load limit is available. It can be displayed and modified using this communication object.				

3.3.4 Communication objects *Meter total*

No.	Function	Object name	Data type	Flags
31	**Meter reading**	**Meter total**	**4 byte** **DPT 13.010**	**C, R, T**
This communication object is enabled if in parameter window Metering (Wh), page 33, the parameter *Enable "Meter reading total"* has been selected with the option *yes*. The value of the communication object is calculated from the sum of the meter outputs A…C. The *Meter total* can only be reset via communication objects no. 11 and 12.				

3.3.5 Communication objects *Intermediate meter total*

Note
The functions of communication objects No. 34 and 35 change in accordance with the parameterization.

No.	Function	Object name	Data type	Flags
32	**Meter reading**	**Intermediate meter total**	**4 byte** **DPT 13.010**	**C, R, T**
This communication object is enabled if in parameter window Metering (Wh), page 33, the parameter *Enable "Meter reading total"* has been selected with the option *yes*. The *Intermediate meter total* is derived from the *Meter total*. It is controlled via communication objects no. 33…36.				
33	**Status**	**Intermediate meter total**	**1 byte** **non DPT**	**C, R, T**
This communication object is enabled if in parameter window Metering (Wh), page 33, the parameter *Enable "Meter reading total"* has been selected with the option *yes*. The value of the communication object is sent when a telegram is received on the communication object *Request status values.* This communication object indicates whether the counter is currently started or stopped and whether the meter reading could be erroneous. This can be the case, for example, during a start or stop event if bus voltage is not available and this event is thus not recorded. Telegram value: Bit 0: 1 = meter reading is started 0 = meter reading is stopped Bit 1: 1 = since the last reset of the intermediate meter, a bus voltage failure or download has occurred. The meter reading may not be correct. 0 = since the last reset of the intermediate meter, no bus voltage failure or download has occurred. Bit 2…7: Not assigned, 0.				
34	**Receive trigger 1**	**Intermediate meter total**	**1 bit** **DPT 1.017**	**C, W**
This communication object is enabled if in Parameter window Meter reading total (Wh), page 38, the parameter *Trigger 1 (Start) is activated by* has been selected by the option *1 bit object*. The intermediate meter starts if a telegram with the value 1 is received via this communication object. You can parameterize whether the intermediate readings are reset and/or sent.				

No.	Function	Object name	Data type	Flags
34	**Trigger 1 change time**	**Intermediate meter total**	**3 byte DPT 10.001**	**C, R, W, T**
This communication object is enabled if in Parameter window Meter reading total (Wh), page 38, the parameter *Trigger 1 (Start) is activated by* has been selected by the option *Time*. The parameterized start time can be modified using this communication object. If the parameterized start time is received via the communication object *Time* (communication object no. 8), the intermediate meter starts. You can parameterize whether the intermediate readings are reset and/or sent.				
35	**Receive trigger 2**	**Intermediate meter total**	**1 bit** **DPT 1.017**	**C, W**
This communication object is enabled if in Parameter window Meter reading total (Wh), page 38, the parameter *Trigger 2 (Start) is activated by* has been selected by the option *1 bit object*. The intermediate meter is sent if a telegram with the value 1 is received via this communication object. You can parameterize whether the intermediate meter stops or continues to count when trigger 2 is received.				
35	**Trigger 2 change time**	**Intermediate meter total**	**3 byte** **DPT 10.001**	**C, R, W, T**
This communication object is enabled if in Parameter window Meter reading total (Wh), page 38, the parameter *Trigger 2 (Start) is activated by* has been selected by the option *Time*. The parameterized start time can be modified using this communication object. If the parameterized start time is received via the communication object *Receive time* (communication object no. 8), the intermediate meter reading is sent. You can parameterize whether the intermediate meter stops or continues to count when trigger 2 is received.				
35	**Trigger 2 change limit**	**Intermediate meter total**	**4 byte** **DPT 13.010**	**C, R, W, T**
This communication object is enabled if in Parameter window Meter reading total (Wh), page 38, the parameter *Trigger 2 (Start) is activated by* has been selected by the option *Limit*. The parameterized limit can be modified using this communication object. If the parameterized limit is reached, the intermediate meter reading is sent and the intermediate meter stops.				
35	**Trigger 2 change duration**	**Intermediate meter total**	**2 byte** **DPT 7.006**	**C, R, W, T**
This communication object is enabled if in Parameter window Meter reading total (Wh), page 38, the parameter *Trigger 2 (Start) is activated by* has been selected by the option *Duration*. The parameterized duration can be modified using this communication object. The intermediate meter reading is sent when the parameterized duration is reached. You can parameterize whether the intermediate meter stops or continues to count when trigger 2 is received.				
36	**Reset**	**Intermediate meter total**	**1 Bit** **DPT 1.015**	**C, W**
This communication object is enabled if in Parameter window Meter reading total (Wh), page 38, the parameter *Intermediate meter reading total additionally resettable via object* has been selected with the option *yes*. The intermediate meter is reset if a telegram with the value 1 is received via this communication object.				

3.3.6 Communication objects *Active power total*

No.	Function	Object name	Data type	Flags
37	**Active power**	**Active power total**	**4 byte** **DPT 14.056**	**C, R, T**
This communication object is enabled when in parameter window Function, page 35, the parameter *Monitor "Active power total"* has been selected with the option *yes*. The value of the communication object is calculated from the sum of the active powers of outputs A…C and sent on the bus in watts. If the active power of one or more outputs is negative (power feed), it may occur that the total active power may also be negative. The communication object can send negative power values, but the threshold values cannot monitor them (only positive threshold values).				
38	**Threshold 1 lower limit**	**Active power total**	**4 byte** **DPT 14.056**	**C, R, W, T**
This communication object is enabled if in Parameter window Active power total, page 42, the parameter *Enable thresholds* has been selected with the option *yes*. *Threshold 1 lower limit* and *Threshold 1 upper limit* are the hysteresis limits of threshold value 1. If the value falls below the lower limit or exceeds the upper limit, a parameterized reaction occurs (warning is sent).				
39	**Threshold 1 upper limit**	**Active power total**	**4 byte** **DPT 14.056**	**C, R, W, T**
See communication object 38.				
40	**Threshold 1 warning**	**Active power total**	**1 bit** **DPT 1.005**	**C, R, T**
This communication object is enabled if in Parameter window Active power total, page 42, the parameter *Enable thresholds* has been selected with the option *yes*. The warning is sent with the parameterized value if threshold value 1 is exceeded or fallen below.				
41	**Threshold 2 lower limit**	**Active power total**	**4 byte** **DPT 14.056**	**C, R, W, T**
See Threshold value 1.				
42	**Threshold 2 upper limit**	**Active power total**	**4 byte** **DPT 14.056**	**C, R, W, T**
See Threshold value 1.				
43	**Threshold 2 warning**	**Active power total**	**1 bit** **DPT 1.005**	**C, R, T**
See Threshold value 1.				

3.3.7 Communication objects *Frequency*

No.	Function	Object name	Data type	Flags
44	**Frequency**	**Frequency**	**4 byte** **DPT 14.033**	**C, R, T**
This communication object is enabled when in parameter window Function, page 35, the parameter *Monitor "Frequency"* has been selected with the option *yes*. The value of the communication object is sent in Hertz on the bus.				
45	**Threshold 1 lower limit**	**Frequency**	**4 byte** **DPT 14.033**	**C, R, W, T**
This communication object is enabled if in parameter window Frequency, page 44, the parameter *Enable thresholds* has been selected with the option *yes*. *Threshold 1 lower limit* and *Threshold 1 upper limit* are the hysteresis limits of threshold value 1. If the value falls below the lower limit or exceeds the upper limit, a parameterized reaction occurs (warning is sent).				
46	**Threshold 1 upper limit**	**Frequency**	**4 byte** **DPT 14.033**	**C, R, W, T**
See communication object 45.				
47	**Threshold 1 warning**	**Frequency**	**1 bit** **DPT 1.005**	**C, R, T**
This communication object is enabled if in parameter window Frequency, page 44, the parameter *Enable thresholds* has been selected with the option *yes*. The warning is sent with the parameterized value if threshold value 1 is exceeded or fallen below.				
48	**Threshold 2 lower limit**	**Frequency**	**4 byte** **DPT 14.033**	**C, R, W, T**
See Threshold value 1.				
49	**Threshold 2 upper limit**	**Frequency**	**4 byte** **DPT 14.033**	**C, R, W, T**
See Threshold value 1.				
50	**Threshold 2 warning**	**Frequency**	**1 bit** **DPT 1.005**	**C, R, T**
See Threshold value 1.				
51	**Frequency error**	**Diagnostics**	**1 bit** **DPT 1.005**	**C, R, T**
This communication object is always enabled. It signals when the frequency is out of the range 40 ≤ f ≤ 70 Hz. The value of the communication object is sent on a change and when a telegram is received on the communication object *Request status values.* Telegram value: 1 = the frequency is f < 40 Hz or f > 70 Hz 0 = the frequency is 40 ≥ f ≤ 70 Hz				

3.3.8 Communication objects *Output A: Switch*

Note
As the functions are identical for all outputs, they will only be explained for output A.

The descriptions of the parameterization options for *Outputs A…X* are described from Parameter window A: General, page 51.

No.	Function	Object name	Data type	Flags
60	**Switch**	**A: Switch**	**1 bit** **DPT 1.001**	**C, W**

This communication object is used for switching of the output ON/OFF. The device receives a switch telegram via the switch object.

Telegram value 1 = switch ON
0 = switch OFF

Note
With logical connections or forced operations, a modification of the *Switch* communication object does not necessarily lead to a change of the contact position. For further information see: Function chart, page 120

61	**Status switch**	**A: Switch**	**1 bit** **DPT 1.001**	**C, W**

This communication object is enabled if in parameter window A: General, page 51, the parameter *Status response of contact position* the option *yes, object "Status Switch"* has been selected.

The communication object value directly indicates the current contact position of the switching relay.

The status value can be inverted.

Telegram value 1 = contact closed or opened (depending on the parameterization)
0 = contact closed or opened (depending on the parameterization)

62	**Status byte**	**A: Diagnostics**	**1 byte** **non DPT**	**C, R, T**

This is a diagnostics byte for the output. The value of the communication object is sent when a telegram is received on the communication object *Request status values.*

Telegram value:

Bit 0: 1 = Safety priority 1 active
0 = Safety priority 1 not active

Bit 1: 1 = Safety priority 2 active
0 = Safety priority 2 not active

Bit 2: 1 = Safety priority 3 active
0 = Safety priority 3 not active

Bit 3: 1 = Forced operation active
0 = Forced operation not active

Bit 4: 1 = function Time active (staircase lighting, flashing, delay)
0 = function Time not active (staircase lighting, flashing, delay)

Bit 5: 1 = active power negative, (i.e., power is fed into the system. An Energy Actuator is not intended for this application.)
0 = active power positive

Bit 6…7: Not assigned, 0.

No.	Function	Object name	Data type	Flags
63	**Permanent ON**	**A: Time**	**1 bit** **DPT 1.001**	**C, W**
This communication object is enabled if in parameter window A: Function, page 55, the parameter *enable function time* has been selected with the option *yes*. With this communication object, the output can be forcibly switched on. If the communication object is assigned with the value 1, the output is switched on irrespective of the value of the object *Switch* and remains switched on until the communication object *Permanent ON* has the value 0. After ending the permanent ON state, the state of the communication object *Switch* is used. *Permanent ON* only switches ON and “masks” the other functions. This means that the other functions (e.g. staircase) continue to run in the background but do not initiate a switching action. After the end of *Permanent ON*, the switching state, which would result without the *Permanent ON* function, becomes active. The behaviour for the function staircase lighting after *permanent ON* is programmed in parameter window A: Time, page 58. This communication object can be used for example to allow the service or maintenance and cleaning personnel to initiate a permanent ON. The device receives a switch telegram via the switch object. After a download or bus voltage recovery. *Permanent ON* becomes inactive. Telegram value 1 = activates permanent ON mode 0 = deactivates permanent ON mode				
64	**Disable function time**	**A: Time**	**1 bit** **DPT 1.003**	**C, R, W, T**
This communication object is enabled if in parameter window A: Function, page 55, the parameter *enable function time* has been selected with the option *yes*. After bus voltage recovery, in the parameter window *A: Function* the communication object value with the parameter *Value object "Disable function time" on bus voltage recovery* can be determined. With the blocked function *Time*, the output can only be switched on or off, the functions *Staircase lighting, , ON/OFF delay* and *Flashing* are not triggered. Telegram value 1 = disable function time 0 = Function time enabled The contact position at the time of disabling and enabling is retained and will only be changed with the next switch telegram to the communication object *Switch*.				
65	**Staircase lighting duration**	**A: Staircase lighting**	**2 byte** **DPT 7.005**	**C, R, W**
This communication object is enabled if in parameter window A: Time, page 58, the parameter *Change Staircase lighting duration* has been selected with the option *yes*. The Staircase lighting duration is set here. The time is defined in seconds.				
66	**Staircase lighting warning**	**A: Staircase lighting**	**1 bit** **DPT 1.005**	**C, T**
This communication object is enabled if in parameter window A: Time, page 58, the function *Staircase lighting* has been selected, and in parameter *Warning before end of staircase lighting* the option *via object* or *via object and via quick switching OFF/ON* has been selected.				

No.	Function	Object name	Data type	Flags
67	**8 bit scene**	**A: Scene**	**1 byte** **DPT 18.001**	**C, W**

This communication object is enabled if in parameter window A: Function, page 55, the parameter *Enable function scene* has been selected with the option *yes*.

Using this 8 bit communication object, a scene telegram can be received using a coded telegram. The telegram contains the number of the respective scene as well as the information if the scene is to be called, or if the current switch state is to be assigned to the scene.

Telegram format (1 byte):

MXSSSSSS
(MSB) (LSB)
M: 0 – scene is called
1 – scene is stored (if allowed)
X: not used
S: Number of the scene (1…64: 00000000 … 00111111)

KNX 1 byte telegram value		Meaning
Decimal	Hexadecimal	
00	00h	Recall scene 1
01	01h	Recall scene 2
02	02h	Recall scene 3
…	…	…
63	3Fh	Recall scene 64
128	80h	Store scene 1
129	81h	Store scene 2
130	82h	Store scene 3
…	…	…
191	AFh	Store scene 64

For further information see: Code table scene (8 bit), page 144

No.	Function	Object name	Data type	Flags
68	**Logical connection 1**	**A: Logic**	**1 bit** **DPT 1.002**	**C, W**

This communication object is enabled if in parameter window A: Function, page 55, the parameter *Enable function logic* has been selected with the option *yes*.

Using this communication object, the output of the first of two logic objects can be assigned. The logical connection is defined in the parameter window *A: Logic*.

Initially the switch object is then logically linked with the communication object *Logical*. *connection 1*. The result is then linked with the communication object *Logical connection 2*.

For further information see: Function Logic, page 132

No.	Function	Object name	Data type	Flags
69	**Logical connection 2**	**A: Logic**	**1 bit** **DPT 1.002**	**C, W**

See communication object 68.

No.	Function	Object name	Data type	Flags
70	**Forced operation**	**A: Forced operation**	**1 bit** **DPT 1.003**	**C, W**
This communication object is enabled if in parameter window A: Function, page 55, the parameter *Enable function safety* has been selected with the option *yes* and the parameter *Contact position if forced operation* has been selected with *1 bit object*. If the communication object receives the value 1, the output is forcibly set to the parameterized switch position, which has been set in the parameter window A: Safety, page 70. The forced positioning of the contact should remain until forced operation is ended. This is then the case when a 0 is received via the communication object *Forced operation.*				
70	**Forced operation**	**A: Forced operation**	**2 bit** **DPT 2.001**	**C, W**
This communication object is enabled if in parameter window A: Function, page 55, the parameter *Enable function safety* has been selected with the option *yes* and the parameter *Contact position if forced operation* has been selected with *2 bit object*. Output X can be forcibly operated via this communication object (e.g. by a higher-level control). The value of the communication object directly defines the forced position of the contact: 0 or 1 = The output is not forcibly operated. 2 = The output is forcibly switched off 3 = The output is forcibly switched on At the end of the forced operation, a check is performed to see if one of the three functions *Safety Priority x* is active. If necessary, the contact position is set by the active safety priorities. If no function *Safety Priority x* is active, the contact is set as parameterized in parameter window *A: Safety* in parameter *Reaction when forced operation and all Safety Priority x end*.				
71	**Contact monitoring**	**A: Contact**	**1 bit** **DPT 1.002**	**C, R, T**
This communication object is always enabled. The communication object value shows the contact state when the contact is open. Should a current flow be detected with an opening of the contact initiated via the KNX, contact welding or manual switch on has occurred (contact fault). The evaluation of whether a current flows occurs about one second after a contact is opened. The current is safely detected should a measurable current (about 25 mA starting current) flow. A prerequisite for correct evaluation is switching via the KNX. Telegram value 1 = contact error 0 = no current flows. For send response see parameter Send status contact monitoring, page 53				
72…73				
Not assigned.				

3.3.8.1 Communication objects *A: Meter*

No.	Function	Object name	Data type	Flags
74	**Meter reading**	**A: Meter**	**4 byte** **DPT 13.010**	**C, R, T**
This communication object is enabled if in parameter window A: Function, page 55, the parameter *Enable function metering* has been selected with the option *yes*. The *Meter* can only be reset via communication objects 11 and 12.				

3.3.8.2 Communication objects *A: Intermediate meter*

No.	Function	Object name	Data type	Flags
75	**Meter reading**	**A: Intermediate meter**	**4 byte** **DPT 13.010**	**C, R, T**
This communication object is enabled if in parameter window A: Function, page 55, the parameter *Enable function metering* has been selected with the option *yes*. The Intermediate meter is derived from the Meter total. It is controlled via communication objects no. 76…79.				
76	**Status**	**A: Intermediate meter**	**1 byte** **NON DPT**	**C, R, T**
This communication object is enabled if in parameter window A: Function, page 55, the parameter *Enable function metering* has been selected with the option *yes*. The value of the communication object is sent when a telegram is received on the communication object *Request status values.* This communication object indicates whether the counter is currently started or stopped and whether the meter reading could be erroneous. This can be the case, for example, during a start or stop event if bus voltage is not available and this event is thus not recorded. Telegram value: Bit 0: 1 = meter reading is started 0 = meter reading is stopped Bit 1: 1 = since the last reset of the intermediate meter a bus voltage failure or download has occurred. The meter reading may not be correct. 0 = since the last reset of the intermediate meter no bus voltage failure or download has occurred. Bit 2…7: Not assigned, 0.				
77	**Receive trigger 1**	**A: Intermediate meter**	**1 bit** **DPT 1.017**	**C, W**
This communication object is enabled if in parameter window A: Metering (Wh), page 73, the parameter *Trigger 1 (Start) is activated by* has been selected with the option *1 bit object*. The intermediate meter starts if a telegram with the value 1 is received via this communication object. You can parameterize whether the intermediate readings are reset and/or sent.				
77	**Trigger 1 change time**	**A: Intermediate meter**	**3 byte** **DPT 10.001**	**C, R, W, T**
This communication object is enabled if in parameter window A: Metering (Wh), page 73, the parameter *Trigger 1 (Start) is activated by* has been selected with the option *Time*. The parameterized start time can be modified using this communication object. If the parameterized start time is received via the communication object *Receive time* (no. 8), the intermediate meter starts. You can parameterize whether the intermediate readings are reset and/or sent.				
78	**Receive trigger 2**	**A: Intermediate meter**	**1 bit** **DPT 1.017**	**C, W**
This communication object is enabled if in parameter window A: Metering (Wh), page 73, the parameter *Trigger 2 (Start) is activated by* has been selected with the option *1 bit object*. The intermediate meter is sent if a telegram with the value 1 is received via this communication object. You can parameterize whether the intermediate meter stops or continues to count, or whether the output switches at stop when trigger 2 is received.				

No.	Function	Object name	Data type	Flags
78	**Trigger 2 change time**	**A: Intermediate meter**	**3 byte** **DPT 10.001**	**C, R, W, T**
This communication object is enabled if in parameter window A: Metering (Wh), page 73, the parameter *Trigger 2 is activated by* has been selected with the option *Time*. The parameterized stop time can be modified using this communication object. If the parameterized stop time is received via the communication object *Receive time* (no. 8), the intermediate meter reading is sent. You can parameterize whether the intermediate meter stops or continues to count, or whether the output switches at stop when trigger 2 is received.				
78	**Trigger 2 change limit**	**A: Intermediate meter**	**4 byte** **DPT 13.010**	**C, R, W, T**
This communication object is enabled if in parameter window A: Metering (Wh), page 73, the parameter *Trigger 2 is activated by* has been selected with the option *Limit*. The parameterized limit can be modified using this communication object. If the parameterized limit is reached, the intermediate meter reading is sent and the intermediate meter stops. It is possible to parameterize whether the output stops when switched.				
78	**Trigger 2 change duration**	**A: Intermediate meter**	**2 byte** **DPT 7.006**	**C, R, W, T**
This communication object is enabled if in parameter window A: Metering (Wh), page 73, the parameter *Trigger 2 is activated by* has been selected with the option *Duration*. The parameterized duration can be modified using this communication object. The intermediate meter reading is sent when the parameterized duration is reached. You can parameterize whether the intermediate meter stops or continues to count, or whether the output switches at stop when trigger 2 is received.				
79	**Reset**	**A: Intermediate meter**	**1 bit** **DPT 1.015**	**C, W**
This communication object is enabled if in parameter window A: Metering (Wh), page 73, the parameter *"Intermediate meter reading total" additionally resettable via object by* has been selected with the option *yes*. The intermediate meter is reset if a telegram with the value 1 is received via this communication object.				

3.3.8.3 Communication objects *A: Load control slave*

No.	Function	Object name	Data type	Flags
80	**Deactivate load control**	**A: Load control slave**	**1 bit** **DPT 1.003**	**C, R, W**

This communication object is enabled if in parameter window A: Function, page 55, the parameter *Enable function load control* has been selected with the option *yes.*

The output (slave) can be enabled using this communication object. The received shedding stage is not considered and the internal switching state is established.

Telegram value: 0 = the output (slave) “listens in” on the received shedding stage (communication object 10)
1 = the output (slave) is enabled, the function *Load control slave* is deactivated

The value of the communication object after bus voltage recovery can be parameterized (parameter window *Load control master*).

No.	Function	Object name	Data type	Flags
81	**Load shedding stage output**	**A: Load control slave**	**1 byte** **DPT 5.010**	**C, R, W, T**

This communication object is enabled if in parameter window A: Function, page 55, the parameter *Enable function load control slave* has been selected with the option *yes.*

Using this communication object, the shedding stage of the output (slave) can be read.

If in parameter window *A: Load control slave* the parameter *Load shedding stage can be changed via object* has been selected with the option *yes*, the shedding stage can also be modified via the bus.

Value range [0…255]

Telegram value:
0 = slave is enabled
1…8 = shedding stages [1...8]
9…255 = not allowed.

Note

If the slave is assigned (or parameterized) with shedding stage 1…8 and the Energy Actuator receives a shedding stage via the communication object *Receive load shedding stage* (no. 10) that is greater than or equal to the assigned stage, the output switches off. If a shedding stage that is less than the assigned stage is received, the internal switching state is restored, i.e., if the master sends shedding stage 0, all slaves are enabled.

If the slave is assigned with shedding stage 0 via communication object no. 81, all shedding stages that are received via communication object 10 are ignored. The slave is always enabled. If the slave is switched off by the load control during assignment of shedding stage 0, the internal switching stage is restored.

3.3.8.4 Communications objects *A: Instrument and power values*

No.	Function	Object name	Data type	Flags
82	**Active power**	**A: Active power**	**4 Byte** **DPT 14.056**	**C, R, T**
This communication object is enabled if in parameter window A: Instrument and power values, page 77, the parameter *Monitor active power* has been selected with the option *yes*. The value of the communication object is sent in Watts on the bus. If the active power is negative (power feed), the value of the communication object can be issued, but not monitored by threshold values (only positive threshold values).				
83	**Threshold 1 lower limit**	**A: Active power**	**4 Byte** **DPT 14.056**	**C, R, W, T**
This communication object is enabled if in parameter window A: Monitor active power, page 80, the parameter *Enable thresholds* has been selected with the option *yes*. *Threshold 1 lower limit* and *Threshold 1 upper limit* are the hysteresis limits of threshold value 1. If the value falls below the lower limit or exceeds the upper limit, a parameterized reaction occurs (warning is sent).				
84	**Threshold 1 upper limit**	**A: Active power**	**4 Byte** **DPT 14.056**	**C, R, W, T**
See communication object 83.				
85	**Threshold 1 warning**	**A: Active power**	**1 bit** **DPT 1.005**	**C, R, T**
This communication object is enabled if in parameter window A: Monitor active power, page 80, the parameter *Enable thresholds* has been selected with the option *yes*. The warning is sent with the parameterized value if threshold value 1 is exceeded or fallen below.				
86	**Threshold 2 lower limit**	**A: Active power**	**4 Byte** **DPT 14.056**	**C, R, W, T**
See Threshold value 1.				
87	**Threshold 2 upper limit**	**A: Active power**	**4 Byte** **DPT 14.056**	**C, R, W, T**
See Threshold value 1.				
88	**Threshold 2 warning**	**A: Active power**	**1 bit** **DPT 1.005**	**C, R, T**
See Threshold value 1.				
89	**Current Value**	**A: Current**	**4 Byte** **DPT 14.019**	**C, R, T**
This communication object is enabled if in parameter window A: Instrument and power values, page 77, the parameter *Monitor current* has been selected with the option *yes*. The value of the communication object is sent in Ampere on the bus.				

No.	Function	Object name	Data type	Flags
90	**Threshold 1 lower limit**	**A: Current**	**4 Byte** **DPT 14.019**	**C, R, W, T**
This communication object is enabled if in parameter window A: Monitor current, page 83, the parameter *Enable thresholds* has been selected with the option *yes*. *Threshold 1 lower limit and Threshold 1 upper limit* are the hysteresis limits of threshold value 1. If the value falls below the lower limit or exceeds the upper limit, a parameterized reaction occurs (warning is sent).				
91	**Threshold 1 upper limit**	**A: Current**	**4 Byte** **DPT 14.019**	**C, R, W, T**
See communication object 90.				
92	**Threshold 1 warning**	**A: Current**	**1 bit** **DPT 1.005**	**C, R, T**
This communication object is enabled if in parameter window A: Monitor current, page 83, the parameter *Enable thresholds* has been selected with the option *yes*. The warning is sent with the parameterized value if threshold value 1 is exceeded or fallen below.				
93	**Threshold 2 lower limit**	**A: Current**	**4 Byte** **DPT 14.019**	**C, R, W, T**
See Threshold value 1.				
94	**Threshold 2 upper limit**	**A: Current**	**4 Byte** **DPT 14.019**	**C, R, W, T**
See Threshold value 1.				
95	**Threshold 2 warning**	**A: Current**	**1 bit** **DPT 1.005**	**C, R, T**
See Threshold value 1.				
96	**Voltage**	**A: Voltage**	**4 Byte** **DPT 14.027**	**C, R, T**
This communication object is enabled if in parameter window A: Instrument and power values, page 77, the parameter *Monitor active power* has been selected with the option *yes*. The value of the communication object is sent in Volts on the bus.				
97	**Threshold 1 lower limit**	**A: Voltage**	**4 Byte** **DPT 14.027**	**C, R, W, T**
This communication object is enabled if in parameter window A: Monitor voltage, page 86, the parameter *Enable thresholds* has been selected with the option *yes*. *Threshold 1 lower limit* and *Threshold 1 upper limit* are the hysteresis limits of threshold value 1. If the value falls below the lower limit or exceeds the upper limit, a parameterized reaction occurs (warning is sent).				
98	**Threshold 1 upper limit**	**A: Voltage**	**4 Byte** **DPT 14.027**	**C, R, W, T**
See communication object 97.				

No.	Function	Object name	Data type	Flags
99	**Threshold 1 warning**	**A: Voltage**	**1 bit** **DPT 1.005**	**C, R, T**
This communication object is enabled if in parameter window A: Monitor voltage, page 86, the parameter *Enable thresholds* has been selected with the option *yes*. The warning is sent with the parameterized value if threshold value 1 is exceeded or fallen below.				
100	**Threshold 2 lower limit**	**A: Voltage**	**4 Byte** **DPT 14.027**	**C, R, W, T**
See Threshold value 1.				
101	**Threshold 2 upper limit**	**A: Voltage**	**4 Byte** **DPT 14.027**	**C, R, W, T**
See Threshold value 1.				
102	**Threshold 2 warning**	**A: Voltage**	**1 bit** **DPT 1.005**	**C, R, T**
See Threshold value 1.				
103	**Apparent power**	**A: Apparent power**	**4 Byte** **DPT 14.056**	**C, R, T**
This communication object is enabled if in parameter window A: Instrument and power values, page 77, the parameter *Enable object "Apparent power"* has been selected with the option *yes*. The value of the communication object is sent in VA on the bus.				
105	**Power factor**	**A: Power factor**	**4 Byte** **DPT 14.057**	**C, R, T**
This communication object is enabled if in parameter window A: Instrument and power values, page 77, the parameter *Enable object "Power factor"* has been selected with the option *yes*.				
106	**Crest factor**	**A: Crest factor current**	**4 Byte** **DPT 14.057**	**C, R, T**
This communication object is enabled if in parameter window A: Instrument and power values, page 77, the parameter *Enable object "Crest factor"* has been selected with the option *yes*.				

4 Planning and application

4.1 Functions

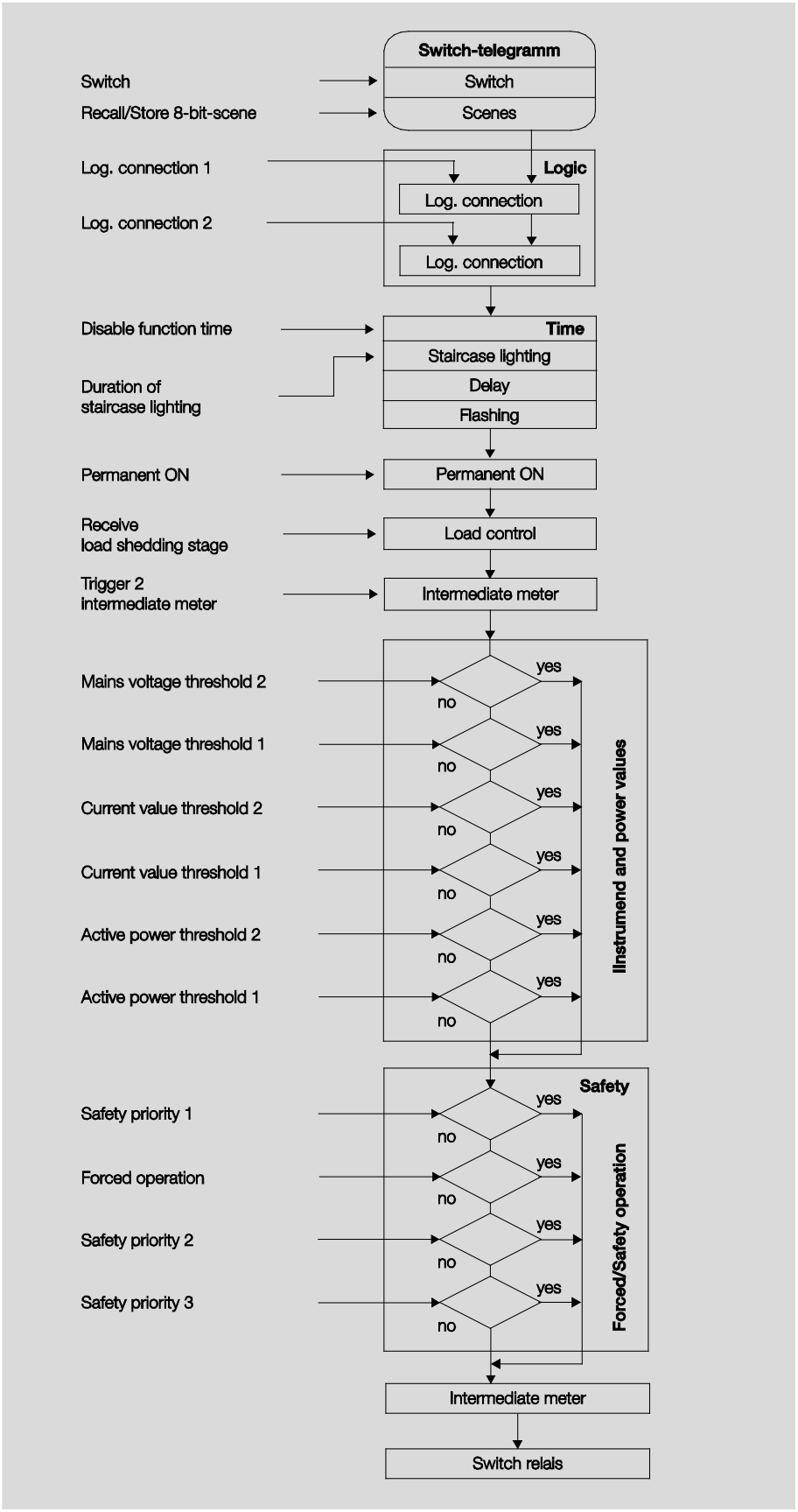
The following functions are available and are explained in this chapter. A detailed description of the parameters and communication objects can be found in chapter 3.

- Meter reading
- Instruments and power values
- Load control
- Time
- Scene
- Connection/logic
- Safety/forced operation

The following illustration indicates the sequence, in which the functions are processed. Communication objects, which lead to the same box, have the same priority and are processed in the sequence, in which the telegrams are received.

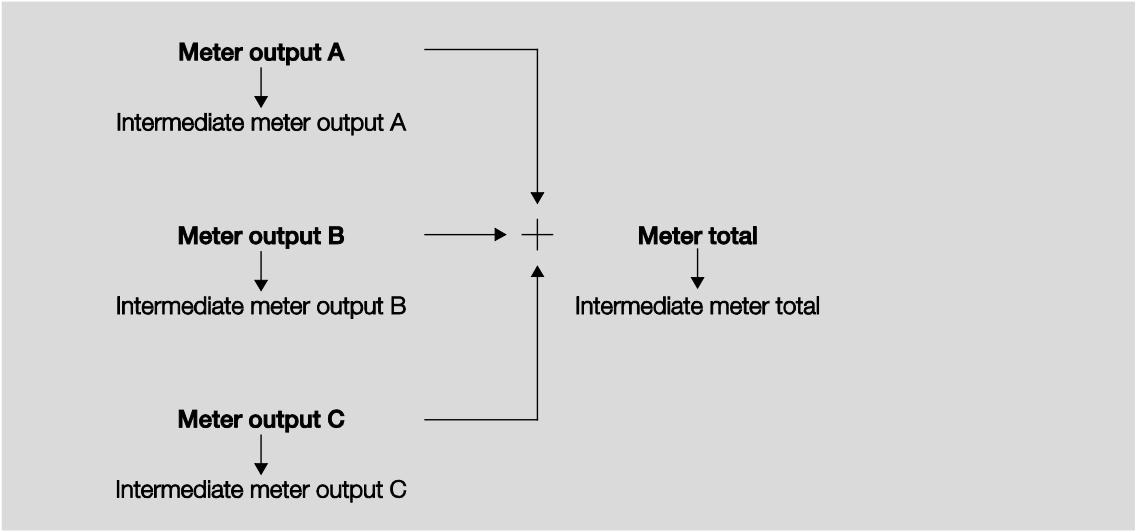
Example
If both communication objects *Logical connection x* are activated, a telegram received via a communication object *Switch* is connected to them. The result of this action serves as the input signal for the function *Time*. If this is not blocked, a corresponding switch signal is generated, e.g. delay or flashing. In the next step, a check is performed to determine if a shedding stage has been received, whether an intermediate meter has triggered a switch telegram or whether a value has exceed or is below a threshold value. Before the switch telegram of the relay is reached, the communication objects *Safety priority x* and *Forced operation* are checked and undertaken, if required, as a priority. Subsequently, the switching action is only dependent on the state of the bus voltage. The relay is switched if a switching action allows it.

4.1.1 Function chart



4.1.2 Meter reading

For each output, there is a meter and a flexibly parameterized intermediate meter for detection of the active energy consumption of the connected loads in Wh. The three meters of outputs A, B and C are added to give the *Meter total*, for which an intermediate meter is also available.



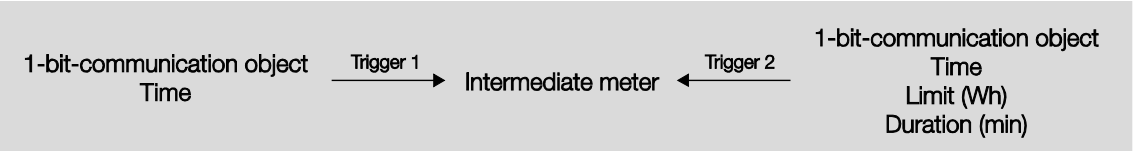
The general settings for all meters are made in the parameter window Metering (Wh), page 33 and the *Meter reading total (Wh)* is also enabled here. In parameter window A: General, page 51, the main and intermediate meters for the respective outputs are enabled.

In “normal” operation, the intermediate meters can be reset via 1 bit communication objects or defined events (*Trigger 1*, see below). If the main meter is also to be reset in exceptional cases, this can be undertaken using communication objects no. 11 and 12 (*Enable reset meters* and *Reset meter readings*). All main and intermediate meters are then stopped and reset.

The meter readings of the main meters (outputs A…C and total) can be sent cyclically and on request. They are buffered both in the event of mains voltage failure as well as bus voltage failure.

Functionality and configuration of the intermediate meters (Intermediate meter total and intermediate meter output) are always fundamentally the same. The only difference is: On the intermediate meters for the outputs, in contrast to the *Meter reading total*, the output can switch on or off depending on different events.

Configuration and function of the intermediate meters:



The meter readings of the intermediate meter are derived from the respective main meter. The meter reading is not lost in the event of a bus voltage failure; however at bus voltage failure or ETS reset, it is possible that a trigger may be “missed”. This is then indicated in the status byte of the intermediate meter.

Example
The intermediate meter should be started by the time 8:00. Due to a bus voltage failure, the time telegram “8:00” is not sent by the timer and the Energy Actuator receives “8:01” after “7:59”. As a result, the intermediate meter is not started and, the intermediate meter is then not correct. (However, the meter reading of the main meter is correct in this case).

Every intermediate meter has two triggers (trigger 1 and trigger 2).

Trigger 1 is the start event for the intermediate meter. It is possible to select whether the intermediate meter is started by the receipt of a 1 bit telegram or a time (external timer). Optionally, the meter reading at trigger 1 can be sent and/or reset. The start time can be parameterized but can also be changed via the bus.

The meter reading is sent on trigger 2. Optionally, the intermediate meter can be stopped with trigger 2. A switching reaction can be parameterized provided that the intermediate meter can be stopped by trigger 2. (The switch reaction can only be parameterized with the intermediate meters of the outputs; the intermediate meter total cannot trigger a switch reaction.) For trigger 2, a 1 bit communication object, a time, a duration (in minutes) or a limit (in Watt hours) can be selected.

In addition to trigger 1 and trigger 2, a 1 bit communication object *Enable reset meters* can be enabled.

This enables a very flexible parameterization of the intermediate meter.

Application examples

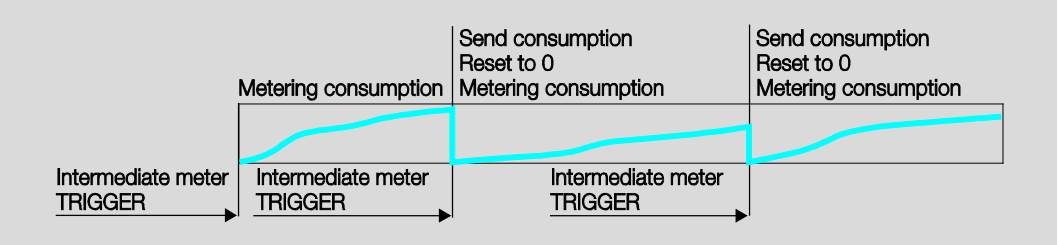
1. Parameterization:

Trigger 1 (Start) is activated by = 1 bit communication object
At Trigger 1 (Start)

Reset "Intermediate meter" = yes
At Trigger 1 (Start)

Send "Intermediate meter" = yes

Trigger 2 is activated by = 1 bit communication object
(trigger 2 is not used however)



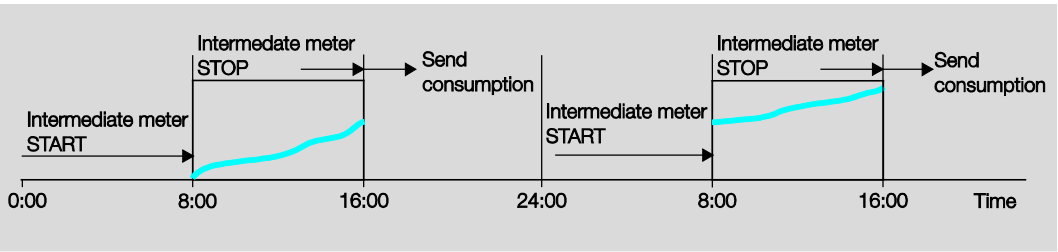
The intermediate meter is sent, reset and restarted every time a telegram with the value 1 is received on trigger 1 (1 bit).

2. Parameterization:

Trigger 1 (Start) is activated by = Time (8:00)

Trigger 2 is activated by = Time (16:00)

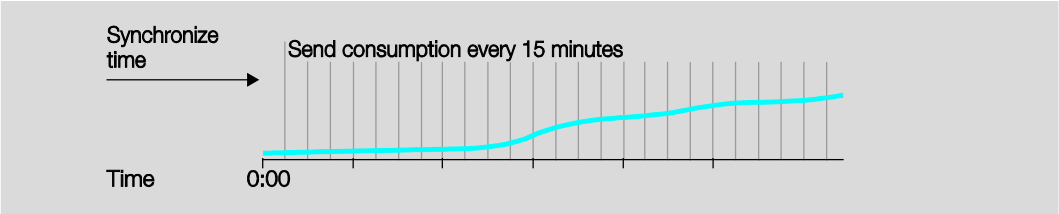
The intermediate meter records consumption every day from 8:00 to 16:00, then sends the meter readings and continues to count the following day.



3. Parameterization:

Trigger 1 (Start) is activated by = Time (00:00)

Trigger 2 is activated by = Duration (15 minutes)



The intermediate meter counts continuously and sends the meter reading every 15 minutes. Synchronization with the timer occurs daily at 0:00.

4. Parameterization:

Trigger 1 (Start) is activated by = 1 bit communication object

At Trigger 1 (Start)
Reset "Intermediate meter" = yes

Trigger 2 is activated by = Limit (5 kWh)

Reaction when
limit is reached = switch OFF until next switch operation

The intermediate counter is enabled and switched on (1 bit communication object) and switches off after 5 kWh has been consumed.

4.1.3 Instruments and power values

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

Instrument values

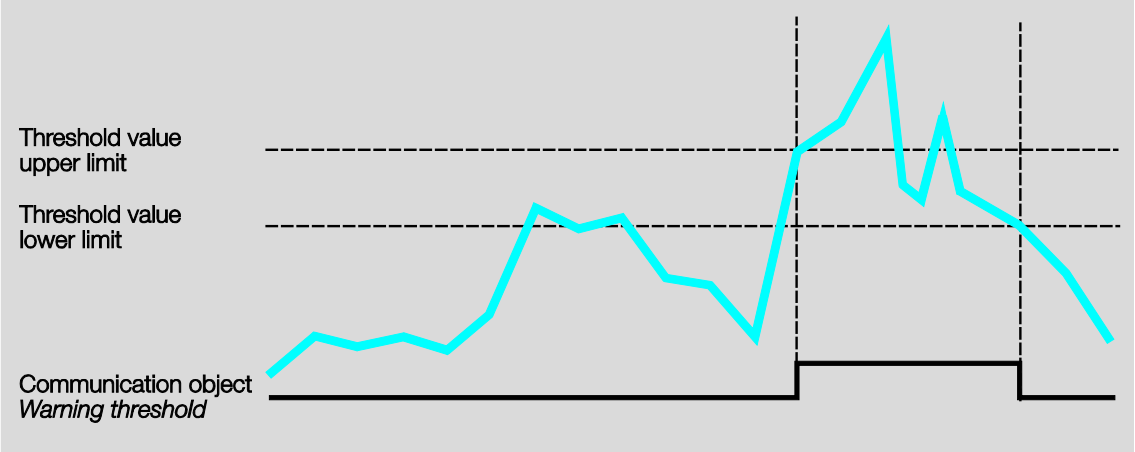
- Current value (per output)
- Voltage (per output)
- Frequency

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. (The switch reaction can only be adjusted with the threshold values that relate to an output, i.e. no switch reaction is possible dependent on the Frequency and *Active power total*.)

Each threshold value has an upper and lower limit. These are the hysteresis limits of the threshold values. Exceeding a threshold means that the upper limit is exceeded, falling below the threshold means that the lower limit is undershot.



Function of the threshold values

For every output, an evaluation delay can be set in parameter window A: General, page 51, i.e. before the evaluation delay, the threshold value will not be examined for a possible overshoot or undershoot. The delay for interpretation (evaluation) is at least 100 ms. Longer evaluation delay times may be useful when the equipment connected to the output requires longer than 100 ms until a stable state is established after a switching process (transient response).

If the evaluation delay has timed out and a threshold overshoot or undershoot is present, the warning is immediately sent with the parameterized value.

The *Delay for switching* can be set separately for every monitored value (active power, current value, voltage), i.e. the parameterized switching reaction of the threshold value at undershoot or overshoot can only be performed after the switching delay. Thus a brief undershoot or overshoot of a threshold value is allowed. If the value 0 is selected here, the switching action occurs immediately after the evaluation delay has been carried out.

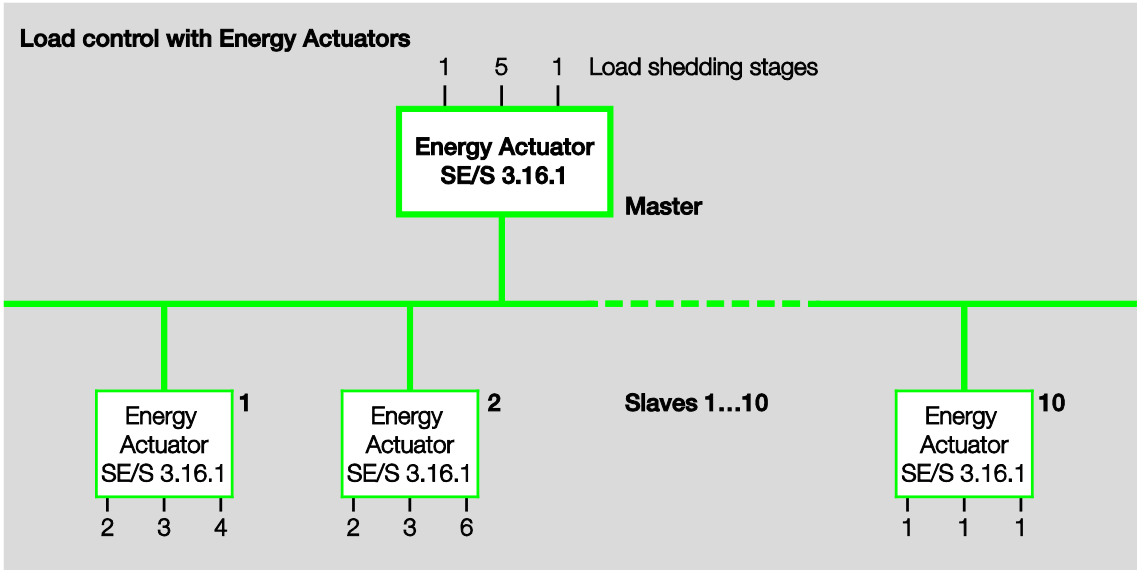
Apparent power, power factor and crest factor cannot be monitored with threshold values, but are available as communication objects for each output.

Note
The progression of the current and voltage curves is not analyzed, i.e., analysis of the signal waveform (e.g. FFT) is not undertaken. All values are determined by sampling the signal. Therefore, the power factor always results as the sum of the distortion power (e.g. dimmer currents) and displacement power (e.g. inductive or capacitive loads). This power factor does **not** (or only in special cases) comply with the cos φ (Cosine Phi) with a phase displacement current! It can also **not** be used for reactive power compensation!

4.1.4 Load control

The *Load control* is a functionality of the Energy Actuator, where the Energy Actuator is 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 *Send sum power values*. If the *Send sum power values* exceeds a parameterized load limit, the master sends *Load shedding stages* on the bus.

A separate *Load shedding stage* can be parameterized with every slave for each output. The slave receives the *Shedding stage* and switches all outputs off with the respective shedding stage. The master increases the *Shedding stage* until the *Send sum power values* falls below the allowed load limit.



The *Power values*, which the master receives, can be the respective *Active power total* of another Energy Actuator, the *Active power* of an individual output or the *Power values* of the master. Furthermore, the received power values can be the power values of another KNX device, e.g. the Meter Interface Module ZS/S.

Function of the load control

The number of shedding stages that the master can send is determined in accordance with the number of priority stages that should be switched with the slaves. If the system only has two priority stages available, for example (priority 1 = always on; priority 2 can be switched off if required), one shedding stage is sufficient.

A *Load limit* can be parameterized on the master that cannot be exceeded. Alternatively, a load limit is available that can be changed via the bus, or there are four load limits available that can be alternately actively switched via a communication object.

Up to ten communication objects can be enabled that receive power values. The *Power values 1…4* can also be internally logically linked, i.e. the *Active power Output A…C* or the *Active power total* of the master.

The received power values of the slave should generally be sent *after a change*. As soon as the master receives a new *Power value*, the sum of the power values is recalculated and a shedding stage is sent on the bus if necessary. Additionally, a cyclic monitoring time can be set. If the power values are not received within this monitoring period, the missing value is requested. If the value has still not been received, the corresponding bit in the diagnostic byte *Status load control* is set.

Depending on how fast the system should react, the reaction time is selected for when the load limit is exceeded and for when it is under the limit. If the value falls below the load limit, after the *Reaction time when exceeding load limit* has been completed, shedding stage 1 is sent on the bus. If the load limit is still exceeded, after a renewed *Reaction time when exceeding load limit* has been performed, the next shedding stage is sent until the value is again below the load limit. After the *Reaction time when a value falls below a load limit* has been completed, the master reduces the shedding stage (restart attempt).

The service life of the relay must be considered with the parameterization of the reaction times. The system must be designed to ensure that the Load control is only active at peak times or the reaction times for exceeding or falling below the load limit must be selected to be correspondingly long, so that frequent switching is avoided.

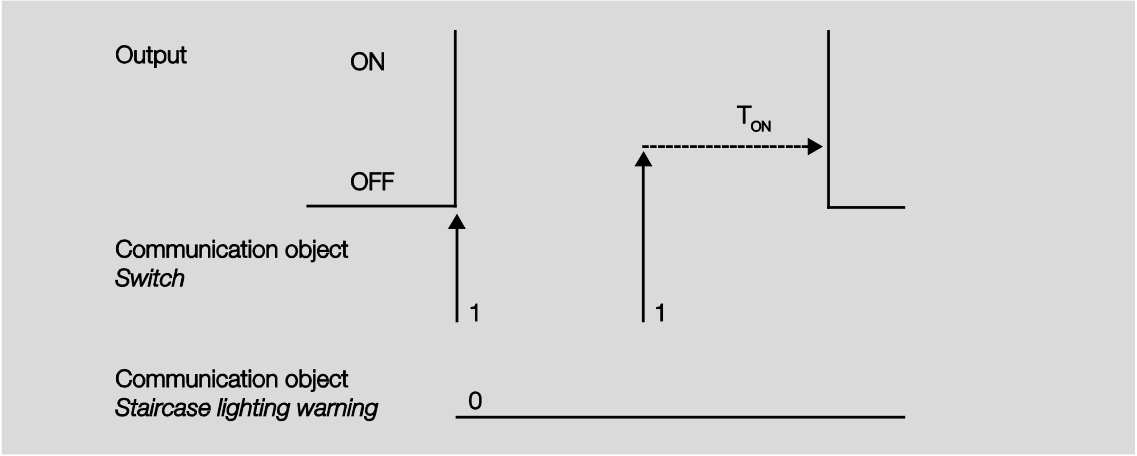
4.1.5 Function *Time*

The function *Time* can be enabled (value 0) and disabled (value 1) via the bus (1 bit communication object *Disable function time*). The output operates without a delay as long as the function *Time* is disabled. Different functions can be realised using the function *Time*:

- Staircase lighting
- Switching ON and OFF delay
- Flashing

4.1.5.1 Staircase lighting

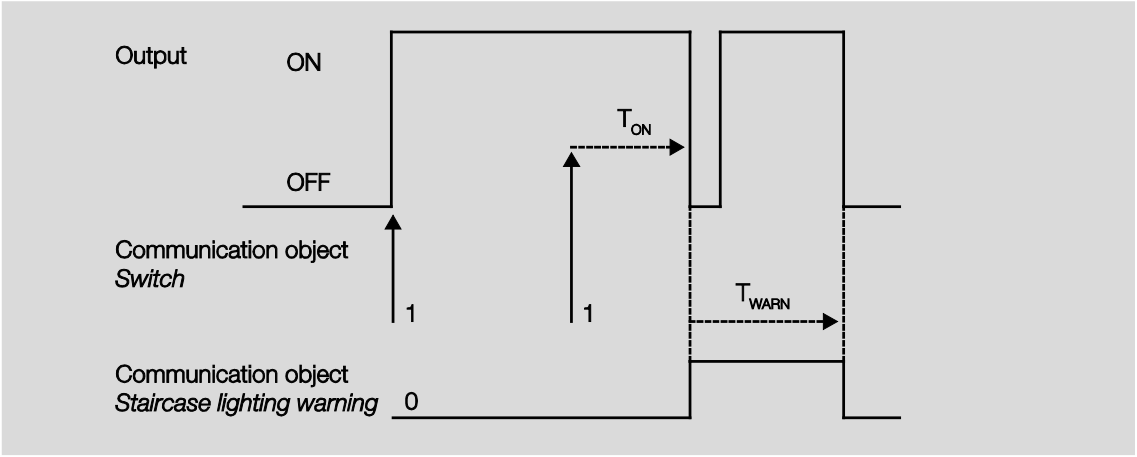
The output switches off automatically after the staircase lighting time $T_{ON.}$ With each telegram with value 1, the time restarts (retrigger function), if the parameter *Extending staircase lighting by multiple operation ("pumping up")* is set to yes in the parameter window A: Time, page 58, to *no, not retriggerable*.



This corresponds with the basic response of the function *Staircase lighting*, as long as a warning is not parameterized.

Warning

An additional warning function enables the user to be warned in good time before the staircase lighting time elapses. It can be carried out by switching the output on/off briefly or by sending a communication object.

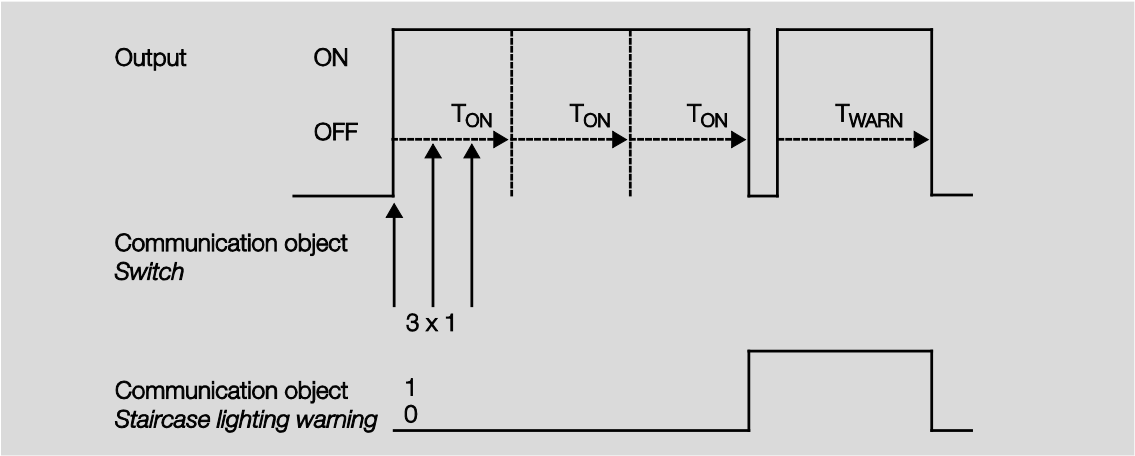


The warning time T_{WARN} extends the ON phase. At the start of the warning time, the output can be briefly switched on and off and/or the communication object *Staircase lighting warning* can be written with a value 1. The output is switched off briefly for the period T_{WARN}, before the staircase lighting time T_{ON} elapses and the communication object *Staircase lighting warning* is sent. As a result, for example, half of the lighting is switched off and a LED is switched on as a warning.

The entire staircase lighting time, in which the staircase lighting is on, corresponds with the time period T_{ON} plus T_{WARN}.

Retriggering

Via “pumping up”, that is actuation of the push button several time in succession, the user can adapt the staircase lighting to their current needs. The maximum duration of the staircase lighting time can be set in the parameters.



If the device receives a further ON telegram when the staircase lighting is switched on, the staircase lighting time is added to the remaining period.

The warning time is not changed by "pumping up" and is added to the extended ON time (x times T_{ON}).

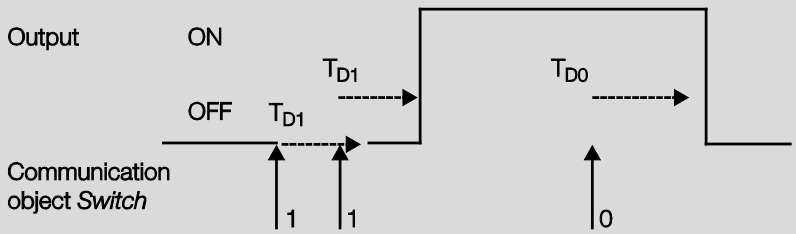
Application examples:

- Lighting control in stairwells
- Monitoring of telegrams

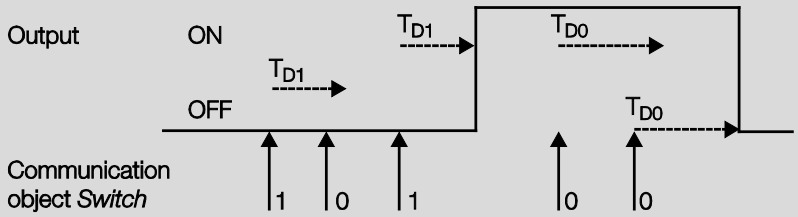
4.1.5.2 Switching ON and OFF delay

The switching ON and OFF delay delays switch on or switch off of the output.

Example 1:



Example 2:



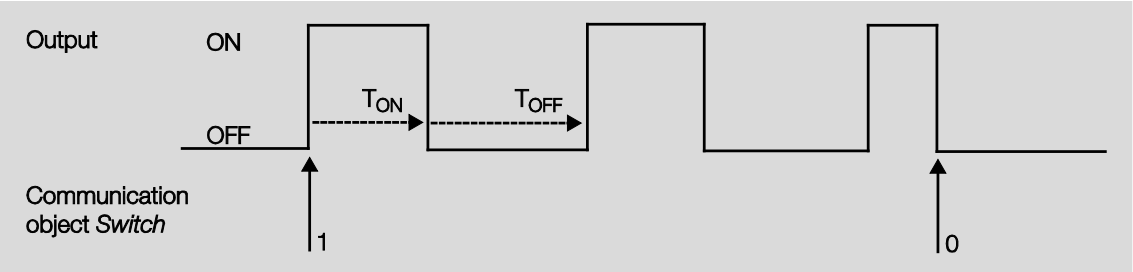
The delay time T_{D1} or T_{D0} starts after a switch telegram, and after it has timed out, the output executes the switch telegram.

If a new ON telegram with the value 1 is received during the switch on delay, the time of the switch on delay starts again. The same applies to switch off for the switch off delay. If a new OFF telegram with the value 0 is received during the switch off delay, the time for the switch off delay starts again.

Note
If the device receives an OFF telegram during the switch on delay T_{D1}, an ON telegram is disregarded.

4.1.5.3 Flashing

The output can flash when the output is switched on and off periodically.



The switch on time (T_{ON}) and switch off time (T_{OFF}) during flashing can be programmed.

Note
The contact life of the contacts should be considered and can be found in the technical data. A limitation of the number of switching operations with the parameter *Number of impulses* may be useful. Furthermore, a delay in the switching sequence is possible caused by the limited availability of switching energy with very frequent switching. The possible number of switching operations should be considered.

4.1.6 Function *Scene*

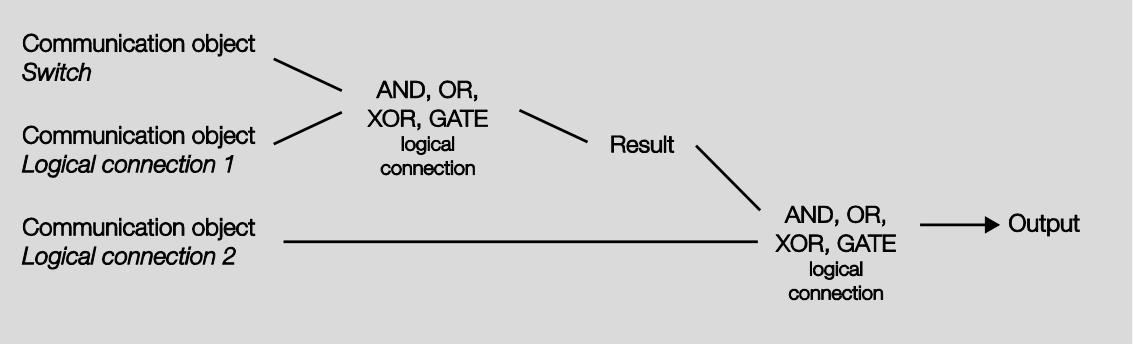
With the scene using 8 bits, the pushbutton issues the Energy Actuator with the instruction to call a scene. The scene is not stored in the push button but rather in the Energy Actuator. All Energy Actuators are addressed using the same group address. It is thus sufficient to send a single telegram to recall the scene.

For further information see: Parameter window A: Scenes 1…6, page 66, and communication object 8 bit scene (No. 67), page 110, and Code table scene (8 bit), page 144

Benefits
The function *Scene* with ABB i-bus® devices offers the following decisive advantage: All settings to be undertaken in a scene are stored in the device. Therefore, they must not be sent via the KNX with a scene recall, and only a figure value, which has been assigned to this scene, is necessary. This considerably reduces the load on the bus and prevents unnecessary telegram traffic on the KNX.

4.1.7 Function *Connection/Logic*

With the function *Connection/Logic*, it is possible to connect the switching of the output with certain conditions. Two connection objects are available:



At first, the communication object *Switch* is evaluated with the communication object *Logical connection 1*. The result is then linked with the communication object *Logical connection 2*.

The following functions *Connection/Logic* are possible:

Values of the communication objects						Explanations
Logical function	**Switch**	**Connection 1**	**Result**	**Connection 2**	**Output**	
AND	0	0	0	0	0	The result is 1 if both input values are 1. The output is 1 if both input values are 1.
	0	1	0	1	0	
	1	0	0	0	0	
	1	1	1	1	1	
OR	0	0	0	0	0	The result is 1 if one of both input values is 1.
	0	1	1	1	1	
	1	0	1	0	1	
	1	1	1	1	1	
XOR	0	0	0	0	0	The result is 1 when both input values have a different value.
	0	1	1	1	0	
	1	0	1	0	1	
	1	1	0	1	1	
GATE	0	disabled	-	disabled		The communication object (CO) *Switch* is only allowed through if the GATE (connection) is open. Otherwise, the receipt of the CO *Switch* is ignored.
	0	enabled	0	enabled	0	
	1	disabled	-	disabled		
	1	enabled	1	enabled	1	

The function *Connection/Logic* is always re-calculated when a communication object value is received.

Example GATE

The GATE logic is programmed, so that a disable is implemented as soon as the communication object *Logical connection x* receives a 0.

The output of the logical connection is 0.

The communication *Logical connection 1* receives a 0, i.e. the GATE blocks.

The communication object *Switch* receives 0, 1, 0, 1. The output of the logical connection remains 0.

The communication *Logical connection x* receives a 1, i.e. the GATE is enabled if it is set in the parameters.

The output of the logical connection is recalculated.

4.1.8 Function *Safety*

The function Safety is explained in detail under parameter window *A: Function*, page 55 and parameter window *A: Safety*, page 70.

4.2 Reaction on bus voltage failure

The reaction of each individual output at bus voltage failure can be parameterized in parameter window *A: General* with the parameter *Reaction on bus voltage failure*. This parameterisation acts directly on the relay and has the highest priority.

For further information see: Function chart, page 120

Before the first switching action is possible after bus voltage recovery, the SE/S will first store enough energy in order to ensure that enough energy is available to immediately bring all relays safely and immediately to the required (parameterized) position in the event of a renewed bus voltage failure.

With the parameterization *Contact unchanged*, the relay contact at bus voltage failure is not changed, i.e. with the function *Staircase lighting*, this remains active until bus voltage recovery and until a new switch action is received.

After the contact positions are set with bus voltage recovery, the Energy Actuator remains non-functional until the bus voltage recovers.

4.3 Reaction at bus voltage recovery, download, ETS reset and application update

The Energy Actuator draws the energy for switching the contacts from the bus. After bus voltage is applied, sufficient energy is only available after about 10 seconds to switch all contacts simultaneously, see Technical data, page 7. Depending on the set transmission and switching delay after recovery of bus voltage as set in the parameter window *General*, the individual outputs will only assume the contact positions that result from the function switching tree after this time. The SE/S will only switch a contact when sufficient energy is stored in the SE/S, in order to ensure that enough energy is available to immediately bring all outputs safely to the required switch state in the event of a renewed bus voltage failure.

Reaction at download and ETS reset

The following values of the communication objects can be changed via the bus:

- Time, duration and limit with the intermediate meters
- All threshold limits
- Load limit with load control
- Scene assignment
- Shedding stage of the output

Should you intend these values changed via the bus to be overwritten after a download or an ETS reset with the parameterized values, the corresponding parameters *Overwrite … with download or ETS reset* must be set to *yes*. With *no* the values changed via the bus on download and ETS reset are retained.

Reaction at bus voltage recovery and ETS reset

With the following communication objects, you can parameterize the value at which they should be written after bus voltage recovery or an ETS reset:

- Switch
- Disable function time
- Logical connection 1/2
- Forced operation
- Load control deactivation master (only the value of the communication object at bus voltage recovery can be parameterized)
- Load control deactivation slave (only the value of the communication object at bus voltage recovery can be parameterized)

What is an ETS reset?

Generally an ETS reset is defined as a reset of the device via the ETS. The ETS reset is initiated in the ETS3 under the menu point *Commissioning* with the function *Reset device*. This stops the user program and it is restarted.

What is the difference between a download and a full download or an application update?

In the ETS, a differentiation can normally be made between partial programming and a download of the complete application program. ABB i-bus® devices generally only perform a partial download even with the selection *Application program* under the menu item *Commissioning* > *Download*. A download of the complete application program, provided that only the parameter settings are changed, is unnecessary and takes time.

Note
The download column in the following table applies both for partial download as well as the download of the complete application. If the device is discharged via the ETS *(Commissioning* > *Unload…)* or if a new version of the application is loaded, the behaviour at full download/application update (right column applies).

In the following table, the behaviour of the Energy Actuator is represented in the overview:

Behaviour with:	Bus voltage recovery	Download	ETS reset	Full download / application update
Values of the communication objects	Generally, the values of the communication objects can be programmed. If not the communication object is written with the value 0.	Values are retained.	As with bus voltage recovery	As with bus voltage recovery
Values that can be modified via the bus	Values are retained.	Values are saved or overwritten with the parameterized values depending on the setting of the parameter *Overwrite … with download or ETS reset*.	As with download	Values are overwritten by the parameterized values.
Contact setting	Initially the contact setting after bus voltage recovery is unknown. It results however through the parameterization of the functions · Switch · Staircase lighting · Permanent ON · Forced operation · Meter reading after the send and delay time has elapsed. *ON/OFF delay* or *Flashing* does not play a role in the contact setting after bus voltage recovery. The communication object *Status switch* is only sent when the state of the contact is defined. If an output has been switched manually or via the scene, it will be reset if necessary.	Unchanged. Exception: Change of the forced operation and safety priorities. These changes are checked immediately and undertaken if necessary.	As with bus voltage recovery	As with bus voltage recovery
Safety priorities	Values are set to inactive, monitoring times are restarted.	Values are retained, monitoring times are restarted.	As with bus voltage recovery	As with bus voltage recovery

Load control master

Behaviour with:	Bus voltage recovery	Download	ETS reset	Full download / application update
Communication objects: *Receive power value X*	Power values are lost and set with the value 0.	Power values are retained.	As with bus voltage recovery	As with bus voltage recovery
Communication object: *Deactivate load control*	The response can be parameterized · active · not active · unchanged.	If the function *Load control master* was active before the download, it will be reactivated after a download. If the function was not active before a download, it will not be activate after a download.	Is set to the value 0.	Is set to the value 0.
Evaluation	The power values will be requested via Value Read. Evaluation starts after an evaluation delay of 10 s.	As with bus voltage recovery	As with bus voltage recovery	As with bus voltage recovery
Load limit	The active load limit before bus voltage failure will be set again after bus voltage recovery.	**Load limit can be changed = *yes, object writable*** The parameter *Overwrite load limit with download or ETS reset* determines whether the parameter values are accepted. **Load limit can be changed = *yes, 4 values selectable*** The parameter *Active load limit after download ETS reset* determines the limit to be set.	As with download	**Load limit can be changed = *yes, object writable*** The parameter *Overwrite load limit with download or ETS reset* determines whether the parameter values are accepted. **Load limit can be changed = *yes, 4 values selectable*** Load limit 1 is active.

Switch (Output A…C)

Behaviour with:	Bus voltage recovery	Download	ETS reset	Full download / application update
Communication object: *Switch*	Programmable (Parameter window X: General), the state that the output should assume at bus voltage failure. The value with which the CO *Switch* should be written after bus voltage recovery can also be parameterized. **write with 1:** The processing chain for the value 1 restarts. **write with 0:** The processing chain for the value 0 restarts. **not write:** The value before bus voltage failure is restored. The processing chain restarts. **Note:** Before the very first download (device fresh from the factory), the value before bus voltage failure is not defined. For this reason, the communication object is written with 0 and the contact is opened. If opening of the contact at bus voltage recovery before the first download (building phase) is not desired, this can be prevented by temporary removal of the KNX voltage.	Unchanged. Evaluation only after a new event has been received. **Remark:** Any manual switching that may have occurred will be reset.	Programmable (Parameter window X: General), the state that the output should assume at bus voltage failure. The value with which the CO Switch should be written after bus voltage recovery can also be parameterized. **write with 1:** The processing chain for the value 1 restarts. **write with 0:** The processing chain for the value 0 restarts. **not write:** The value before bus voltage failure is restored. The processing chain restarts.	Programmable (Parameter window *X: General*), when the setting unchanged is set, the state 0 is set.
Communication object: *Disable function time*	In Parameter window *X: Function*, you can set if the function Time is disabled or not disabled after bus voltage recovery. Timers are out of operation.	Unchanged. Timers are out of operation.	As with bus voltage recovery	As with bus voltage recovery

Behaviour with:	Bus voltage recovery	Download	ETS reset	Full download / application update
Staircase lighting	In Parameter window *X: Function*, you can set if the function Time is disabled or not disabled after bus voltage recovery. Otherwise, the value in CO *Switch* of the output determines the behaviour of the staircase lighting. **write with 1:** Staircase lighting starts **write with 0:** Staircase lighting switched off **not write:** If the staircase lighting or the warning time before bus voltage failure was active, staircase lighting restarts. The staircase lighting time changed via the bus is retained.	The staircase lighting time is set to the parameterized value. If the type of function *Time* has changed with the download, the following applies: If the output was **switched on** before download, the staircase lighting time restarts. If the type of function *Time* has **not** changed with the download, the following applies: If the staircase lighting or the warning time before bus voltage failure was active, staircase lighting restarts.	As with bus voltage recovery	In Parameter window *X: Function*, you can set if the function Time is disabled or not disabled after bus voltage recovery. Otherwise, the value in CO *Switch* of the output determines the behaviour of the staircase lighting. **write with 1:** Staircase lighting starts **write with 0:** Staircase lighting switched off **not write:** If the staircase lighting or the warning time before bus voltage failure was active, staircase lighting restarts. The staircase lighting time is overwritten with the parameterized value.
Switching ON and OFF delay	In Parameter window *X: Function,* you can set if the function *Time* is disabled or not disabled after bus voltage recovery. Otherwise the value in CO *Switch* of the output determines the delay. **write with 1:** Parameterized ON delay restarts. **write with 0:** Parameterized OFF delay restarts. **not write:** If a delay was active before bus voltage failure, this will restart.	Unchanged. Change only after an event has been received.	The switch telegram set by the communication object *Switch* is implemented without delay.	As with ETS reset
Flashing	In Parameter window *X: Function*, you can set if the function *Time* is disabled or not disabled after bus voltage recovery. Otherwise the value in CO *Switch* of the output determines the behaviour of flashing. **write with 1:** Flashing with ON restarts. **write with 0:** Flashing with OFF restarts. **not write:** If flashing was active before bus voltage failure, this will restart.	Unchanged. Change only after an event has been received.	The switch telegram set by the communication object *Switch* is implemented without flashing.	As with ETS reset

Behaviour with:	Bus voltage recovery	Download	ETS reset	Full download / application update
Communication object *Permanent ON*	The value is retained. If *Permanent ON* was active before bus voltage failure, *Permanent ON* will be reactivated after bus voltage recovery.	If *Permanent ON* has not been assigned to a group address, *Permanent ON* remains off. Otherwise the state of *Permanent ON* remains unchanged.	*Permanent ON* is no longer active.	As with ETS reset
Scenes	The scene values saved in the actuator are restored. The values of the CO *Scenes* are lost. If an output has been switched via *Scene*, it will be reset if necessary.	Overwriting of the scene values can be parameterized (parameter window *X: Function*). The values of the CO *Scenes* are lost.	As with download	The scene values are overwritten with the parameterized scene assignments.
Logic (communication object *Logical connection x*)	Programmable (Parameter window *X: Logic*)	If *Logical connection x* has not been assigned to a group address, the corresponding connections are without function. Otherwise the values of *Logical connection x* are retained. However, an evaluation is performed only after the next event.	As with bus voltage recovery	As with bus voltage recovery
Forced operation	Programmable (Parameter window *X: Safety*)	If *Forced operation* has not been assigned to a group address, the *Forced operation* remains inactive. Otherwise, the value of *Forced operation* is retained.	As with bus voltage recovery	As with bus voltage recovery

Load control slave (Output A…C)

Behaviour with:	Bus voltage recovery	Download	ETS reset	Full download / application update
Communication objects: *Load shedding stage output X*	Is retained.	A parameter decides whether the values in the parameters are accepted.	As with download	Parameters are accepted.
Communication object: *Deactivate load control*	The response can be parameterized · active · not active · unchanged	Is retained.	Is set to the value 0.	Is set to the value 0.

Meter (total and output A…C)

Behaviour with:	Bus voltage recovery	Download	ETS reset	Full download / application update
Value of the communication object	Is retained.	Is retained.	Is retained.	Is retained.

Intermediate meter (total and output A…C)

Behaviour with:	Bus voltage recovery	Download	ETS reset	Full download / application update
Value of the communication object	Is retained.	Is retained.	Is set to the value 0.	Is set to the value 0.
Start/stop event	**Trigger 1 (Start):** Is retained. **Trigger 2 (Stop):** Is retained. **Time:** Every new event that concerns a parameterized start / stop time leads to an event, e.g.: The intermediate meter (IM) should start at 15:00. Before bus voltage failure, the time 15:00:01 is received; the IM starts. The bus fails. After bus voltage recovery, the time 15:00:45 is received; the IM restarts.	A parameter decides whether the values in the parameters are accepted.	As with download	As with download
Metering process	If the IM did not meter before bus voltage failure, then IM will not meter after bus voltage recovery. If the IM metered before bus voltage failure, the following applies: **1 bit object:** The IM continues to meter after bus voltage recovery. **End time:** The IM continues to meter after bus voltage recovery. **Duration:** The IM continues to meter after bus voltage recovery. The IM calculates its remaining time, completes it and then stops. **Metering volumes:** The IM continues to meter after bus voltage recovery. The IM continues to meter until the metering volume is reached.	If the IM did not meter before download, then IM will not meter after download. If the IM metered before download, then the IM will meter after download. If Trigger 1/2 of the IM has been changed at download, or the parameter should be accepted at download, the IM is set to the value 0 and stopped.	Is stopped and the metered value is set to the value 0.	As with ETS reset

Voltage, current, power, active power total, frequency (output A…C)

Behaviour with:	Bus voltage recovery	Download	ETS reset	Full download / application update
Value of the communication object	Is set to the value 0 and refreshed with the next transmission of the measuring processor.	As with bus voltage recovery	As with bus voltage recovery	As with bus voltage recovery
Values of the communication objects *Threshold value x*	Are retained.	A parameter decides whether the values are accepted.	As with download	Parameterized values are accepted.
Values of the communication objects *Threshold value warning*	Are sent after the first evaluation of the threshold with the current value, if the corresponding value is either larger than the upper limit or less than the lower limit, and the warning should be sent.	As with bus voltage recovery	As with bus voltage recovery	As with bus voltage recovery
Evaluation	The evaluation of the threshold values restart. The state of the hysteresis is lost.	As with bus voltage recovery	As with bus voltage recovery	As with bus voltage recovery

A Appendix

A.1 Scope of delivery

The ABB i-bus® KNX Energy Actuator SE/S 3.16.1 is supplied together with the following components.

Please check the items received using the following list.

- 1 pc. SE/S 3.16.1, MDRC
- 1 pc. installation and operating instructions
- 1 pc. bus connection terminal (red/black)

A.2 Code table *Scene (8 bit),* DPT 18.001

The following table indicates the telegram code for an 8 bit scene in hexadecimal and binary code with the first 64 scenes. Normally when retrieving or storing a scene, an 8 bit value must be sent.

Bit No.		7	6	5	4	3	2	1	0		
8 bit value	Hexadecimal	Recall 0 Store 1	Not defined	Binary meter codes	Binary meter codes	Binary meter codes	Binary meter codes	Binary meter codes	Binary meter codes	Scene number	Recall (A) Store (S) no reaction
0	00	0								1	A
1	01	0							n	2	A
2	02	0						n		3	A
3	03	0						n	n	4	A
4	04	0					n			5	A
5	05	0					n		n	6	A
6	06	0					n	n		7	A
7	07	0					n	n	n	8	A
8	08	0				n				9	A
9	09	0				n			n	10	A
10	0A	0				n		n		11	A
11	0B	0				n		n	n	12	A
12	0C	0				n	n			13	A
13	0D	0				n	n		n	14	A
14	0E	0				n	n	n		15	A
15	0F	0				n	n	n	n	16	A
16	10	0			n					17	A
17	11	0			n				n	18	A
18	12	0			n			n		19	A
19	13	0			n			n	n	20	A
20	14	0			n		n			21	A
21	15	0			n		n		n	22	A
22	16	0			n		n	n		23	A
23	17	0			n		n	n	n	24	A
24	18	0			n	n				25	A
25	19	0			n	n			n	26	A
26	1A	0			n	n		n		27	A
27	1B	0			n	n		n	n	28	A
28	1C	0			n	n	n			29	A
29	1D	0			n	n	n		n	30	A
30	1E	0			n	n	n	n		31	A
31	1F	0			n	n	n	n	n	32	A
32	20	0		n						33	A
33	21	0		n					n	34	A
34	22	0		n				n		35	A
35	23	0		n				n	n	36	A
36	24	0		n			n			37	A
37	25	0		n			n		n	38	A
38	26	0		n			n	n		39	A
39	27	0		n			n	n	n	40	A
40	28	0		n		n				41	A
41	29	0		n		n			n	42	A
42	2A	0		n		n		n		43	A
43	2B	0		n		n		n	n	44	A
44	2C	0		n		n	n			45	A
45	2D	0		n		n	n		n	46	A
46	2E	0		n		n	n	n		47	A
47	2F	0		n		n	n	n	n	48	A
48	30	0		n	n					49	A
49	31	0		n	n				n	50	A
50	32	0		n	n			n		51	A
51	33	0		n	n			n	n	52	A
52	34	0		n	n		n			53	A
53	35	0		n	n		n		n	54	A
54	36	0		n	n		n	n		55	A
55	37	0		n	n		n	n	n	56	A
56	38	0		n	n	n				57	A
57	39	0		n	n	n			n	58	A
58	3A	0		n	n	n		n		59	A
59	3B	0		n	n	n		n	n	60	A
60	3C	0		n	n	n	n			61	A
61	3D	0		n	n	n	n		n	62	A
62	3E	0		n	n	n	n	n		63	A
63	3F	0		n	n	n	n	n	n	64	A

Bit No.		7	6	5	4	3	2	1	0		
8 bit value	Hexadecimal	Recall 0 Store 1	Not defined	Binary meter codes	Binary meter codes	Binary meter codes	Binary meter codes	Binary meter codes	Binary meter codes	Scene number	Recall (A) Store (S) no reaction
128	80	1								1	S
129	81	1							n	2	S
130	82	1						n		3	S
131	83	1						n	n	4	S
132	84	1					n			5	S
133	85	1					n		n	6	S
134	86	1					n	n		7	S
135	87	1					n	n	n	8	S
136	88	1				n				9	S
137	89	1				n			n	10	S
138	8A	1				n		n		11	S
139	8B	1				n		n	n	12	S
140	8C	1				n	n			13	S
141	8D	1				n	n		n	14	S
142	8E	1				n	n	n		15	S
143	8F	1				n	n	n	n	16	S
144	90	1			n					17	S
145	91	1			n				n	18	S
146	92	1			n			n		19	S
147	93	1			n			n	n	20	S
148	94	1			n		n			21	S
149	95	1			n		n		n	22	S
150	96	1			n		n	n		23	S
151	97	1			n		n	n	n	24	S
152	98	1			n	n				25	S
153	99	1			n	n			n	26	S
154	9A	1			n	n		n		27	S
155	9B	1			n	n		n	n	28	S
156	9C	1			n	n	n			29	S
157	9D	1			n	n	n		n	30	S
158	9E	1			n	n	n	n		31	S
159	9F	1			n	n	n	n	n	32	S
160	A0	1		n						33	S
161	A1	1		n					n	34	S
162	A2	1		n				n		35	S
163	A3	1		n				n	n	36	S
164	A4	1		n			n			37	S
165	A5	1		n			n		n	38	S
166	A6	1		n			n	n		39	S
167	A7	1		n			n	n	n	40	S
168	A8	1		n		n				41	S
169	A9	1		n		n			n	42	S
170	AA	1		n		n		n		43	S
171	AB	1		n		n		n	n	44	S
172	AC	1		n		n	n			45	S
173	AD	1		n		n	n		n	46	S
174	AE	1		n		n	n	n		47	S
175	AF	1		n		n	n	n	n	48	S
176	B0	1		n	n					49	S
177	B1	1		n	n				n	50	S
178	B2	1		n	n			n		51	S
179	B3	1		n	n			n	n	52	S
180	B4	1		n	n		n			53	S
181	B5	1		n	n		n		n	54	S
182	B6	1		n	n		n	n		55	S
183	B7	1		n	n		n	n	n	56	S
184	B8	1		n	n	n				57	S
185	B9	1		n	n	n			n	58	S
186	BA	1		n	n	n		n		59	S
187	BB	1		n	n	n		n	n	60	S
188	BC	1		n	n	n	n			61	S
189	BD	1		n	n	n	n		n	62	S
190	BE	1		n	n	n	n	n		63	S
191	BF	1		n	n	n	n	n	n	64	S

empty = value 0

n = value 1, applies

A.3 Code table *Receive load shedding stage* (no. 10), DPT 236.001

The following table shows the telegram code of the shedding stages in hexadecimal and binary code.

Bit No.		7	6	5	4	3	2	1	0			
8 bit value	Hexadecimal	Load control active (0) Not active (1)	Priority if more than 1 master (must be 0)			Shedding stage				Shedding stage	Shedding stage will be evaluated	Enable all slaves
0	00	0	0	0	0					0	n	n
1	01	0	0	0	0				n	1	n	
2	02	0	0	0	0			n		2	n	
3	03	0	0	0	0			n	n	3	n	
4	04	0	0	0	0		n			4	n	
5	05	0	0	0	0		n		n	5	n	
6	06	0	0	0	0		n	n		6	n	
7	07	0	0	0	0		n	n	n	7	n	
8	08	0	0	0	0	n				8	n	
9	09	0	0	0	0	n			n	9	n	
10	0A	0	0	0	0	n		n		10	n	
11	0B	0	0	0	0	n		n	n	11	n	
12	0C	0	0	0	0	n	n			12	n	
13	0D	0	0	0	0	n	n		n	13	n	
14	0E	0	0	0	0	n	n	n		14	n	
15	0F	0	0	0	0	n	n	n	n	15	n	
16	10	Not allowed.								-	n	
...										-		
127	7F									-		
128	80	1	x	x	x	x	x	x	x	0		n
...										0		n
255	FF	1								0		n

empty = value 0

n = value 1, applies

x = any value

A.4 Code table Status *intermediate meter* (nos. 33, 76, 136 and 196), NON DPT

The following table shows you the telegram code of the status of the intermediate meter total and outputs A…C in hexadecimal and binary code.

Bit No.		7	6	5	4	3	2	1	0
8 bit value	Hexadecimal	Not assigned.	Not assigned.	Not assigned.	Not assigned.	Not assigned.	Not assigned.	Download or bus voltage failure since last reset of the intermediate meter	Meter is started (1) or stopped (0)
0	00								
1	01								n
2	02							n	
3	03							n	n
4	04	Not defined							
...									
255	FF								

empty = value 0

n = value 1, applies

A.5 Code table *Status byte* Output A (No. 62), NON DPT

The following table shows you the telegram code of the status byte in hexadecimal and binary code using output A as an example.

Bit No.		7	6	5	4	3	2	1	0
8 bit value	Hexadecimal	Not assigned.	Not assigned.	Active power negative (1) positive (0)	Function Time active (1) not active (0)	Forced operation active (1) not active (0)	Safety priority 3 active (1) not active (0)	Safety priority 2 active (1) not active (0)	Safety priority 1 active (1) not active (0)
0	00								
1	01								n
2	02							n	
3	03							n	n
4	04						n		
5	05						n		n
6	06						n	n	
7	07						n	n	n
8	08					n			
9	09					n			n
10	0A					n		n	
11	0B					n		n	n
12	0C					n	n		
13	0D					n	n		n
14	0E					n	n	n	
15	0F					n	n	n	n
16	10				n				
17	11				n				n
18	12				n			n	
19	13				n			n	n
20	14				n		n		
21	15				n		n		n
22	16				n		n	n	
23	17				n		n	n	n
24	18				n	n			
25	19				n	n			n
26	1A				n	n		n	
27	1B				n	n		n	n
28	1C				n	n	n		
29	1D				n	n	n		n
30	1E				n	n	n	n	
31	1F				n	n	n	n	n
32	20			n					
33	21			n					n
34	22			n				n	
35	23			n				n	n
36	24			n			n		
37	25			n			n		n
38	26			n			n	n	
39	27			n			n	n	n
40	28			n		n			
41	29			n		n			n
42	2A			n		n		n	
43	2B			n		n		n	n
44	2C			n		n	n		
45	2D			n		n	n		n
46	2E			n		n	n	n	
47	2F			n		n	n	n	n
48	30			n	n				
49	31			n	n				n
50	32			n	n			n	
51	33			n	n			n	n
52	34			n	n		n		
53	35			n	n		n		n
54	36			n	n		n	n	
55	37			n	n		n	n	n
56	38			n	n	n			
57	39			n	n	n			n
58	3A			n	n	n		n	
59	3B			n	n	n		n	n
60	3C			n	n	n	n		
61	3D			n	n	n	n		n
62	3E			n	n	n	n	n	
63	3F			n	n	n	n	n	n

empty = value 0

n = value 1, applies

A.6 Ordering Information

Device designation	Product name	Order code	bbn 40 16779 EAN	Price group	Weight 1 pc. [kg]	Pack unit [Pcs]
SE/S 3.16.1	Energy Actuator, 3F, 16/20 A, MDRC	2CDG 110 136 R0011	**70977 4**	P2	0.265	1

Notes

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