JUNG

20.3°C

KNX®

The intelligent system
for smart buildings

The KNX bus system is a building management system with a control bus system tailored to suit the electrical installations. Leading European companies in electrical installation engineering – including JUNG – founded an organisation with the aim to achieve a standardisation of the system and widespread acceptance of the KNX in Europe and worldwide. KNX is a "Societe Coopérative" under Belgian law with its headquarters in Brussels. The trademark KNX visually underlines the system compatibility of the products.

$\widehat{KNX}$

The purpose of the organisation is to promote building management systems in a standardised form on the European market, to achieve fast, widespread market acceptance and develop the trademark to a seal of quality. Technical guidelines for the system and the products, together with quality regulations will be drawn up by the company accordingly. This will ensure that KNX bus equipment from various manufacturers within a system can communicate with each other.

The KNX system

The demands made on modern electrical installations in private homes and on business premises have changed considerably. More and more emphasis is being placed on safety, operational ease and flexible use. The limits for conventional-electrical installations with a confusing number of own functional networks for electrical power, heating, lighting and shutter control, burglar alarm system, smoke, gas and fire detectors, however, have long been reached.

Installation and power costs have risen. Subsequent upgrading, renovation and change of system operation is expensive and complicated. The KNX System offers a convincing perspective. The KNX System is an intelligent building management system for measuring, regulating, switching, controlling, signalling and monitoring. Laid additionally to the power supply network, information transmission is via a bus line suitable for all specific applications. This electronic control system does not require a central unit as it is located decentralized in every individual appliance. All consumers connected to this mutual bus line, such as switches, sensors, actuators, displays, control units etc. can exchange information via this communication line which can also be compiled logically for evaluation.

The bus line can be laid in line, star or tree structure. All devices can be selected freely and are interactive.
The information transmission can contain analog functions (temperature, time, quantity etc.) and digital functions (yes/no, on/off, light/dark, warm/cold, long/short, more/less). Dimmer functions are of course also possible.
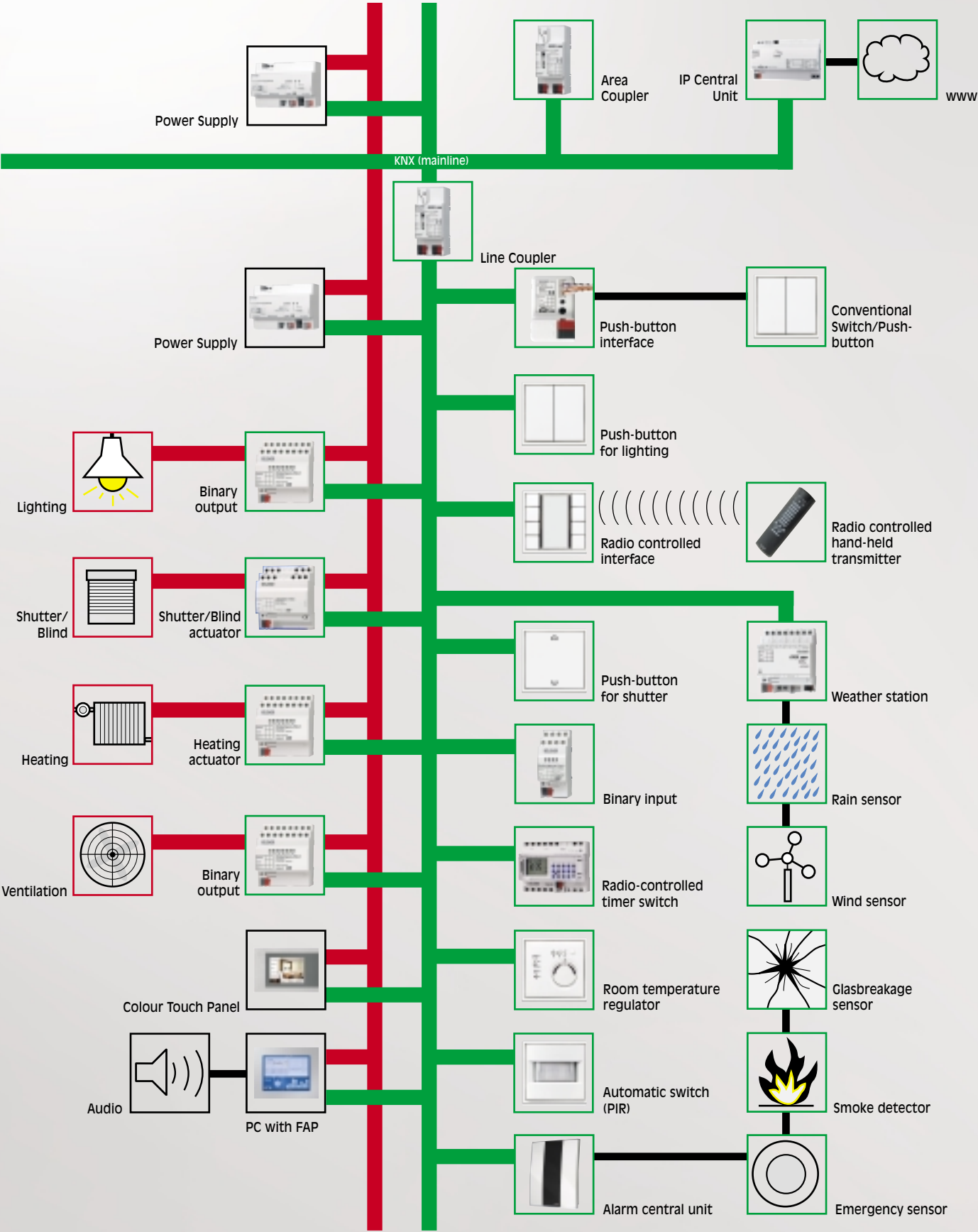
The advantages of the KNX System

1. Flexible planning and simple installation
2. Reduction of 230 V line lengths
3. Reduction of fire load
4. Power saving
5. Fast adaptation and high flexibility for change of usage
6. Problem-free enlargement
7. Intercommunication capabilities
8. No central unit required

Backbone

Power Supply

Area Coupler

IP Central Unit

www

KNX (mainline)

Line Coupler

Power Supply

Push-button interface

Conventional Switch/Push-button

Push-button for lighting

Lighting

Binary output

Radio controlled interface

Radio controlled hand-held transmitter

Shutter/ Blind

Shutter/Blind actuator

Push-button for shutter

Weather station

Heating

Heating actuator

Binary input

Rain sensor

Ventilation

Binary output

Radio-controlled timer switch

Wind sensor

Colour Touch Panel

Room temperature regulator

Glasbreakage sensor

Audio

PC with FAP

Automatic switch (PIR)

Smoke detector

Alarm central unit

Emergency sensor

The JUNG KNX System

With KNX, all devices are linked to the system and can communicate with each other. The devices send telegrams along the bus line.
These are coupled with an address number and can only be processed by the specified recipients with this address number. More than one recipient can be addressed simultaneously with this address so that it is possible to form groups. The recipient(s) receive(s) the telegram and decode(s) the message which in the end contains a command – e.g. to switch on/off or dim. Once the command has been carried out, a variation of this can be sent back to the sensor by actuator as confirmation that the command has been carried out. The complete KNX system is split up into lines. A maximum of 64 devices can be connected to each line. Up to 12 lines are connected to the main line by line couplers. The maximum length per line is 1000 m. The lines can be laid in line, star or tree form. The bus management is designed on a multi-master principle, i.e. a central unit is not necessary. The decentralized access system CSMA/CA (carrier sense multiple access/collision avoidance) ensures fault-free operation of the bus system.

Important signals are assigned greater priority to ensure faster, preferential processing of the telegrams. Priorities, devices address, functions etc. are drawn up on a PC using planning software. The program is loaded into the system locally by personal computer. The use of an intelligent building installation system is recommended particularly in those areas where all demands on an optimised installation have to be fulfilled with a maximum degree of flexibility and comfort and a minimum of expenditure.

Heating, ventilation and air-conditioning systems, detection and alarm systems, light and blind/shutter control and load management can be combined and integrated. The same also applies for the "normal" installations which, with their multifunctional structure, can be designed with much greater flexibility and ease.

Recommendation: the prophylactic installation of a bus line. The decisive advantage of using an KNX System becomes very apparent at the latest when additional installations are required. Practically all required additional functions can be achieved with the lowest possible wiring and a minimum of line materials. The use of higher ranking bus systems (e. g. backbone bus) makes it possible to equip large industrial and administrative buildings with the JUNG KNX System as well.

### The most important components and terminology

1. **Power supply/choke** supplies the necessary operating voltage for the connected KNX system equipment via the bus line.

2. **Sensors** provide information such as switch commands or physical measured quantities in telegram form via the bus line to the receiver devices (actuators).

3. **Actuators** receive telegrams sent by the sensors and convert the incoming commands into action (e.g. switching or dimming).

4. **Line couplers**
Equipment units which combine bus lines with each other and forward telegrams to other bus lines or limit to specific lines.
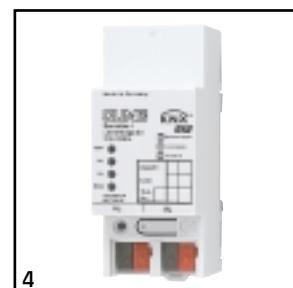

1

Lighting Spot 1

Lighting Spot 2
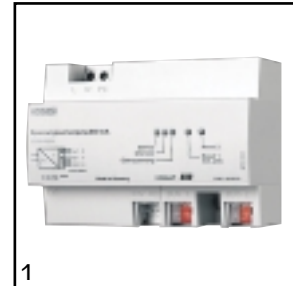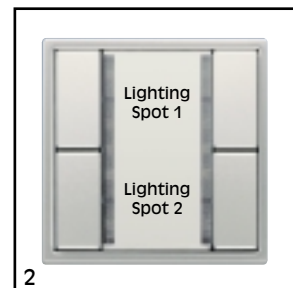
2
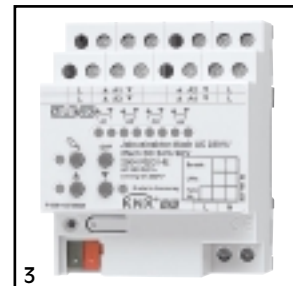
3

4

Blind/shutter control
The automatic lowering of blinds/ shutters according to room temperature avoids the room being heated up necessarily. The control can be central and decentral. Blinds/shutters mounted outside, are protected against damage from high winds by wind sensors which, coupled with the blind/shutter control, prevent or initiate lowering or raising.

Lighting control units can be controlled centrally and decentrally. The illuminance can be reduced by switching off or dimming at programmed times (breaks, weekends, end of working day, company holidays etc.) or according to the room or outside brightness. This saves energy and reduces operating costs as well.

New requirements can be met quickly and safely by reparametering if room usage has been changed. Of course, comfortable light scene controls as well

as a fully automated partition wall lighting control can be realised.

Heating, ventilation and air-conditioning systems
The reduction of the temperature in rooms not in use (meeting/conference rooms) is controlled by motion detectors. Time-dependent control of the room temperature also saves energy (e.g. at weekends and public holidays). A coupling with the blind/shutter control is recommended anywhere where there is

KNX®

Blind/shutter control

Monitoring and alarm installations

Lighting control

Entertainment

Heating, ventilation and air-conditioning systems

Interfaces

direct sunlight as this prevents the room from heating up extremely resulting in additional demands on the air-conditioning system. Displays allow constant control of current temperatures.

Monitoring and alarm installations
Using sensors (door and window contacts), monitors or displays indicate which building openings are open and which are closed. Locking can be initiated electromechanically. Faults in the parts of the building or system are also displayed and documented by printer.

This ensures that the complete building's installations are monitored.

Entertainment
There is and increasing desire to combine home ang building automation with streaming of digital music. This integration is also known as audio multi-room multi-source application. For instance lighting and music control can be integrated in scenes, which can be selected at the push of a buttom from anywhere in the building. Audio streams are transmitted over Ethernet or wireless (IEE 802.11)

networks from a server with the open-source software to music players, and in turn controlled by the visualisation package Facility-Pilot. Supported audio streams are for instance Internet Radio, MP3, WAV an Ogg Vorbis.

Interfaces enable the coupling of personal computers (PC's) or neighbouring bus systems to the instabus bus systems. PC's for programming or service purposes and printers for documentation can be connected using RS 232 (V24) interfaces.

One system for all functions

ADVANTAGES/BENEFITS

Convenience
- automatic control
- sensor technology
- central operation via visualisation/ panelboards of the master key system
- time-dependent control using clocks
- remote control
- telephone connection

In the following areas of application
- lighting
- security
- sun protection
- shutters
- heating
- ventilation

Functional reliability
- central, electronic master key system
- coded keys
- alarm functions
- time-dependent control
- presence simulation
- telephone connection

EMOTIONAL ASPECTS

Feeling of safety
- central combination of the functions
- automatic lighting control using observer/automatic switch/timer
- shutters/security grilles etc.
- sensor technology, door/window contacts, humidity/wind sensor
- missing keys are disabled (with an electronic master key system)

Comfort
- individual temperature settings
- sun protection
- controlled ventilation
- visual protection with shutters and blinds
- lighting aspects, light scenes, localised lighting

ECONOMICAL ASPECT

- automatic and interconnected building functions enable a reduction in energy consumption

The functions that are described can be used both in residential and functional buildings.

Entering the building:
The master key system automatically triggers the following functions:

Information is displayed on mini panelboards
- key recognition, name
- the occupants of the building
Alarm functions are switched off
- observer is disabled
- automatic switch is disabled

Shutters are raised
- can each be controlled manually

Room lighting can be switched/dimmed
- automatic brightness control
- individual lighting

Textile sun blinds in operation
- automatic control via sun sensors
- in the event of wind or rain, blinds are automatically retracted using sensor technology
- individual manual intervention

Individual room control
- from night reduction to individual temperature settings
- when the windows are opened, a reduction in the temperature is automatically triggered by the window contacts

Skylights

Ventilation

Leaving the building:
The master key system automatically triggers the following functions:

Triggering of central functions via a coded key

Alarm functions when system is set
- observer is enabled
- automatic switch
- window contacts are included
- alarm signals via telephone

Shutters are closed

Room lighting is switched off

Textile sun blinds are retracted

Individual room control
- night reduction

Skylights are closed

Ventilation is switched off

Reference: Haus Lämmerbuckel

The training centre of Daimler Chrysler is equipped with the JUNG KNX system.

With the Facility Pilot the entire building with all its technical functions is controlled and displayed.

In the conference rooms the individual control of lighting, heating and blinds is realised with room controller displays in the range LS 990 white.

The same control via room controller displays is also applied in the guest rooms of the training centre.

Contents

Contents

Accessories

AI	= Application interface
AM	= Application module
AP	= Surface mounted devices
BCU	= Bus coupling unit
PB	= Push-button
REG	= Series embodiment
SELV	= Safety extra low voltage
SU	= Units for data rails (series embodiment)
TC	= Telecontrol (Telecommunication interface)
UP	= Flush mounted devices
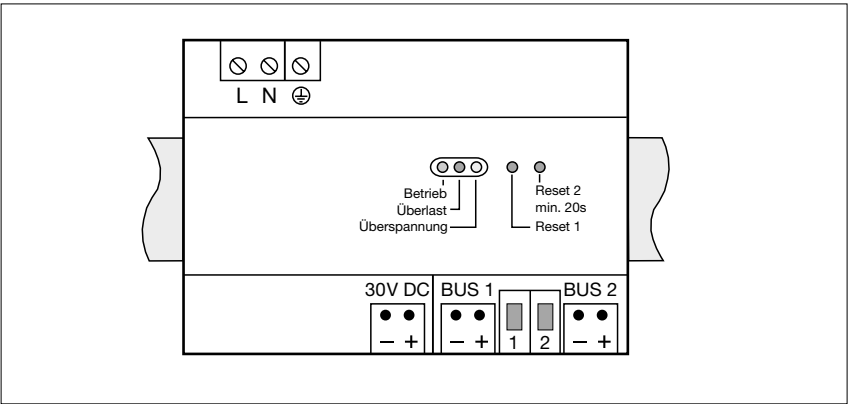
Abbreviations

System Devices

Power Supply

1

2

	Ref.-No.
KNX power supply 640 mA	**2002 REG**
ETS-product family:	System components
Product type:	Power supply
Series embodiment (SE)-device (7 units)	

3

The power supply 640 mA produces and controls the system power for two or three bus lines for an KNX system.

The devices can be connected to two independent bus lines via the terminal BUS 1 and BUS 2, without an additional choke.

Furthermore, the power supply offers a 30 V DC output to supply a further bus line (i.e. main line). For this an additional choke is required.

Alternatively, that output can be used as a power supply for any further low voltage equipment.

The connection of the bus by a bus terminal on the device does not require any data rail. According to the KNX regulations it is possible to connect the two outputs in parallel, when there is a minimum distance of 200 m between the bus terminals.

The distribution of the load (KNX devices) is flexible on all outputs, but the rated current of 640 mA is the total limit.

There are two reset switches on the device to short-circuit both bus lines separately. The operation time for a reset should be at least 20 sec.

Five LED´s are indicating the different operation status:

LED-indication:	1st red LED:	short-circuit or overload
	green LED:	normal operation
	yellow LED:	over voltage, when bus voltage > 31 V DC
	2nd red LED:	reset 1 for bus line 1
	3rd red LED:	reset 2 for bus line 2

4 Technical data:

Input supplying

Voltage: 161 V – 264 V AC, 50-60 Hz
                                     Operation with 2 lines of 110 V mains possible !
                                     176 V – 270 V DC (for emergency power supply)
Power consumption: < 5 W under normal operation
Connection: screen terminals   0.2 – 4 qmm single wire
                                                                 2 x 0.2 – 2.5 qmm single wire

Output

Number   3
                                     Bus terminal BUS 1
Rated voltage: 28 V – 31 V DC, SELV
Connection: KNX connection block
                                     Bus terminal BUS 2
Rated voltage: 28 V – 31 V DC, SELV
Connection: KNX connection block
                                     Bus terminal 30 V DC
Rated voltage: 28 V – 31 V DC, SELV
Connection: KNX connection block
Rated current: max. 640 mA (BUS 1 + BUS 2 + 30 V DC)
                                     short-circuit protection
Protection: IP 20
Operation temp.:   –5°C ... +45°C
Storage temp.:   –25°C ... +55°C / +70°C
Mounting: on DIN rail 35 x 7.5

System Devices
Power Supply

2
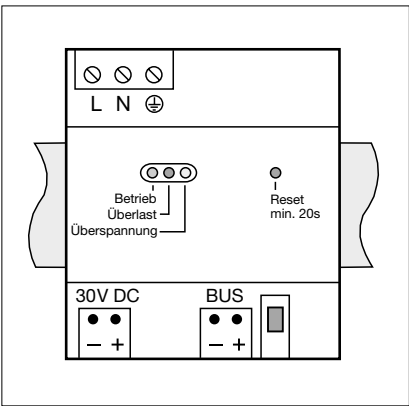
	Ref.-No.
KNX power supply 320 mA	**2005 REG**
ETS-product family:	System components
Product type:	Power supply
Series embodiment (SE)-device (4 units)	

3

The power supply 320 mA produces and controls the system power for the KNX. The devices can be connected to a bus line via the terminal BUS, without an additional choke.

Furthermore, the power supply offers a 30 V DC output to supply a further bus line (i.e. main line). For this an additional choke is required.

Alternatively, that output can be used as a power supply for any further low voltage equipment.

The connection of the bus by a bus terminal on the device does not require any data rail.

The distribution of the load (KNX devices) is flexible on both outputs, but the rated current of 320 mA is the total limit.

There is one reset switch on the device to short-circuit the bus line. The operation time for a reset should be at least 20 sec.

Four LED´s are indicating the different operation status:
LED-indication: 1st red LED: short-circuit or overload
green LED: normal operation
yellow LED: over voltage, when bus voltage > 31 V DC
2nd red LED: reset 1 for bus line 1

4 Technical data:

Input supplying
Voltage: 161 V – 264 V AC, 50-60 Hz
Operation with 2 lines of 110 V mains possible !
176 V – 270 V DC (for emergency power supply)
Power consumption: < 5 W under normal operation
Connection: screw terminals
0.2 – 4 qmm single wire
2 x 0.2 – 2.5 qmm single wire

Output
Number 2
Bus terminal BUS 1
Rated voltage: 28 V – 31 V DC, SELV
Connection: KNX connection block
Bus terminal 30 V DC
Rated voltage: 28 V – 31 V DC, SELV
Connection: KNX connection block
Rated current: max. 320 mA (BUS + 30 V DC)
short-circuit protection
Protection: IP 20
Operation temp.: –5°C ... +45°C
Storage temp.: –25°C ... +55°C / +70°C
Mounting: on DIN rail 35 x 7.5

System Devices

Power Supply

1

2

	Ref.-No.
KNX uninterrupted	
power supply 640 mA	**USV 640 MA**
ETS-product family:	System component
Product type:	Power supply
Series embodiment (SE)-device (8 units)	

3

The uninterrupted KNX power supply generates and monitors the system voltage.

The integrated choke decouples the power supply and the bus-line.

In order to buffer the KNX system-voltage during power failure, up to two 12 V lead-gel batteries can be connected.

The batteries are charged by the power supply. The charging voltage is controlled temperature depending by the temperature sensor.

In case of a power failure the uninterrupted power supply will be supplied by the batteries.

The temperature sensor must be connected for a proper charging of the batteries.

Via a floating change-over contact a failure of the uninterrupted power supply will be reported and stored. The following failures cause a switch-over: power failure, battery failure, overvoltage, over load and short circuit.

The max. charging time of the lead-gel battery amounts to 28 hours (1 x 12 Ah-battery) respectively 56 hours (2 x 12 Ah-batteries in parallel).

4   Technical data:

Supplying
Voltage:	230 V AC, +10/–15 %, 45 ... 65 Hz
Power consumption:	< 60 VA
Power loss:	< 10 W

KNX Output

Number	1 line with integrated choke
Output voltage:	30 V DC, +1/–2 V, SELV
Nominal current:	640 mA, permanent short circuit proof
Permanent short-circuit current:	< 1.5 A
Mains failure bridgeover time:	200 ms (without connected battery)
Battery type:	lead-gel battery
Number:	max. 2 in parallel
Rated voltage:	recommended 1 Ah, 7 Ah, 12 Ah, 17 Ah
Rated battery charge current:	650 mA, at battery capacity > 5 Ah
	150 mA, at battery capacity < 5 Ah
Temperature control:	temperature-controlled charging voltage via temperature sensor

Floating contact
Rated voltage:	230 V AC resp. 12/24 V AC/DC
Max. switching current:	6 A AC resp. 4 A DC
Min. switching current:	100 mA (at U < 30 V AC/DC)

Connections
Change-over contact:	3 screw terminals each
Battery and temperatur sensor:	2 screw terminals each
Screw terminals:	0.2 ... 4 mm^2
Operation temperature:	–5°C ... +45°C

System Devices
Lead-gel battery

1

2

	Ref.-No.
Lead-gel battery	**BGA 12 AH**
12 V DC, 12 AH	

3

In combination with the uninterrupted KNX power supply, the lead-gel battery serves for the buffering of the system voltage.
Max. two lead-gel batteries can be connected in parallel to the power supply. In that case two equal lead-gel batteries must be used.
For the connection of a single battery the 4-wire cable-set must be used, for the connection of two batteries the 4-wire cable-set must be used for the first one, the second one must be connected with the 2-wire-cable-set.
The durability of lead-gel batteries adds up to 5 years.

4

Technical data:

Supplying
Voltage: 12 V DC
Capacity: 12 AH
Dimensions: 151 x 94 x 98 mm (w x h x d)
Weight: 4,2 kg
Operation temperature: −20°C ... +50°C

1
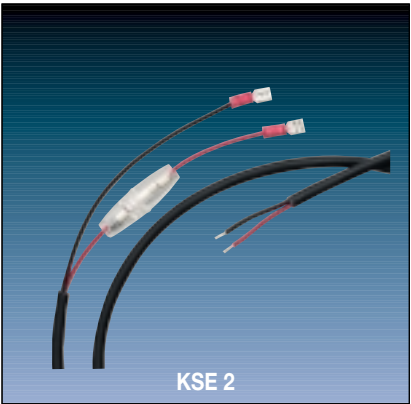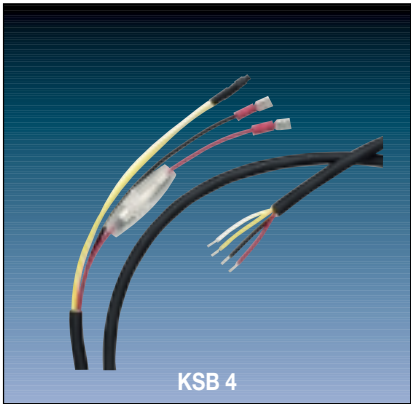
KSB 4

KSE 2

2

	Ref.-No.
Cable-set	
Basis	**KSB 4**
Extension	**KSE 2**

3

For the connection of the uninterrupted KNX power supply and the lead-gel battery the 4-wire cable-set (for one battery) respectively the 4-wire and the 2-wire set for two batteries must be used.
The 4-wire cable-set has an integrated fuse and a temperature sensor, the 2-wire cable-set has only an integrated fuse.

4

Technical data for:	**KSB 4**		**KSE 2**	
Cable:	4-wire cable		2-wire cable	
Diameter:	0,75 mm^2		0,75 mm^2	
Length:	2 m		2 m	
Colours				
Battery connection:	red	(12 V battery)	red	(12 V battery)
	black	(GND battery)	black	(GND battery)
Temperature sensor:	white	(12 V temp. sensor)		
	yellow	(GND temp. sensor)		
Connection				
Battery:	for the connection to the uninterrupted power supply: wire end sleeve for connection to the battery: cable lug		for the connection to the uninterrupted power supply: wire end sleeve for connection to the battery: cable lug	
Temperature sensor:	wire end sleeve			
Fuse:	5 x 20 mm, T6,3 H 250 V		5 x 20 mm, T6,3 H 250 V	

System Devices
Line coupler

1
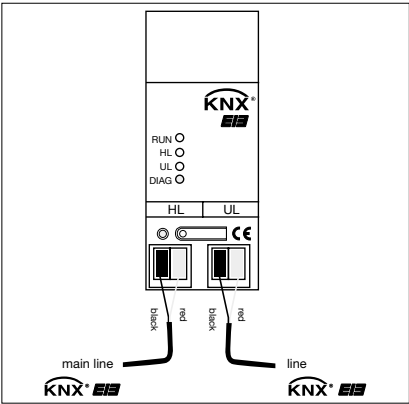
2

	Ref.-No.
KNX line coupler	**2142 REG**
ETS-product family:	System component
Product type:	Line coupler
Series embodiment (SE)-device (2 units)	

3 **Function:** The coupler connects two KNX lines together and guarantees electrical isolation between these lines.
The exact function of the device is defined by the address and the selected application.

Line coupler: Connection of a line and a main line with or without a filter function.
The coupler is physically assigned to the secondary line (here: line).

Backbone coupler: Connection of a main line and a backbone line with or without a filter function.
The coupler is physically assigned to the secondary line (here: main line).

Amplifier: Preparation and repetition of telegrams on a line, no filter function. Subdivision of a line into max. 4 independent line segments
= max. 3 line repeaters per line connected in parallel. A separate power supply including a choke is required for each line segment.

4 **Technical data:**

Power supply:	21 – 32 V DC via the primary line
Power consumption	
Primary line:	approx. 6 mA
Secondary line:	approx. 8 mA
Connection:	KNX connecting terminal for primary and secondary line
Ambient temperature:	–5°C ... +45°C
Storage temperature:	–25°C ... +70°C
Protection:	IP 20 in accordance with EN 60529
Protection class:	III in accordance with EN 61140

Note:
• The filter tables are stored in a non-volatile memory (flash). This means that the stored addresses are not lost after a bus voltage failure
  and that no internal backup battery is required.

5 Commissioning

During commissioning of a project with area/line couplers, the following sequence of operations should be observed:

1. Project design of the KNX installation (physical address, group addresses, parameters).
2. At first, the physical addresses of the couplers and their application programs must be programmed and then the physical addresses of the other KNX devices. Thereafter, the applications can be loaded into the KNX devices (actuators, sensors, etc.). For testing of a KNX installation, especially in the modification phase before project design completion, it is recommended to set the parameters "Group telegrams main line → line" and "Group telegrams line → main line" at first to "Transmit all". This means that any programmed filter tables are not yet taken into account in the testing phase.
3. The filter tables can then be generated on completion of project design and commissioning (in the ETS 2 under menu item: Commissioning/ Project design – generating filter tables / ETS 3 generates them automatically).
4. Finally, the filter tables should be programmed into the couplers. The filter tables are loaded automatically when the complete application is downloaded or also during partial programming of the "group addresses".

Especially with smaller projects, the filter tables can be generated and programmed already under item 2. (together with the programing of the physical addresses for the couplers). In larger projects, it is absolutely important to program filter tables in order to avoid unnecessarily high bus loads and thus communication problems.

The area/line coupler can be programmed from the higher-order but also from the subordinate line.

Topology

The area/line coupler transmits telegrams between a subordinate line and a higher-order line (line coupler: line – main line, area coupler: mainline – backbone bus). In the project design phase, the function of the device is defined by the physical address as follows:

Area coupler (AC)	A.0.0	$(1 \leq A \leq 15)$
Line coupler (LC)	A.L.0	$(1 \leq A \leq 15, 1 \leq L \leq 15)$

Each line has a power supply (PS) of its own and is electrically isolated from the bus. With line couplers, up to 15 lines can be grouped into an area. With area couplers (AC), up to 15 areas can be interconnected.

From a logical point of view, area/line couplers are assigned to the pertaining subordinate line. The hierarchy of line and area couplers in a KNX system is thus as follows:

AC = Area coupler
DEV = Bus device
LC = Line coupler
PS = Power supply
CH = Choke
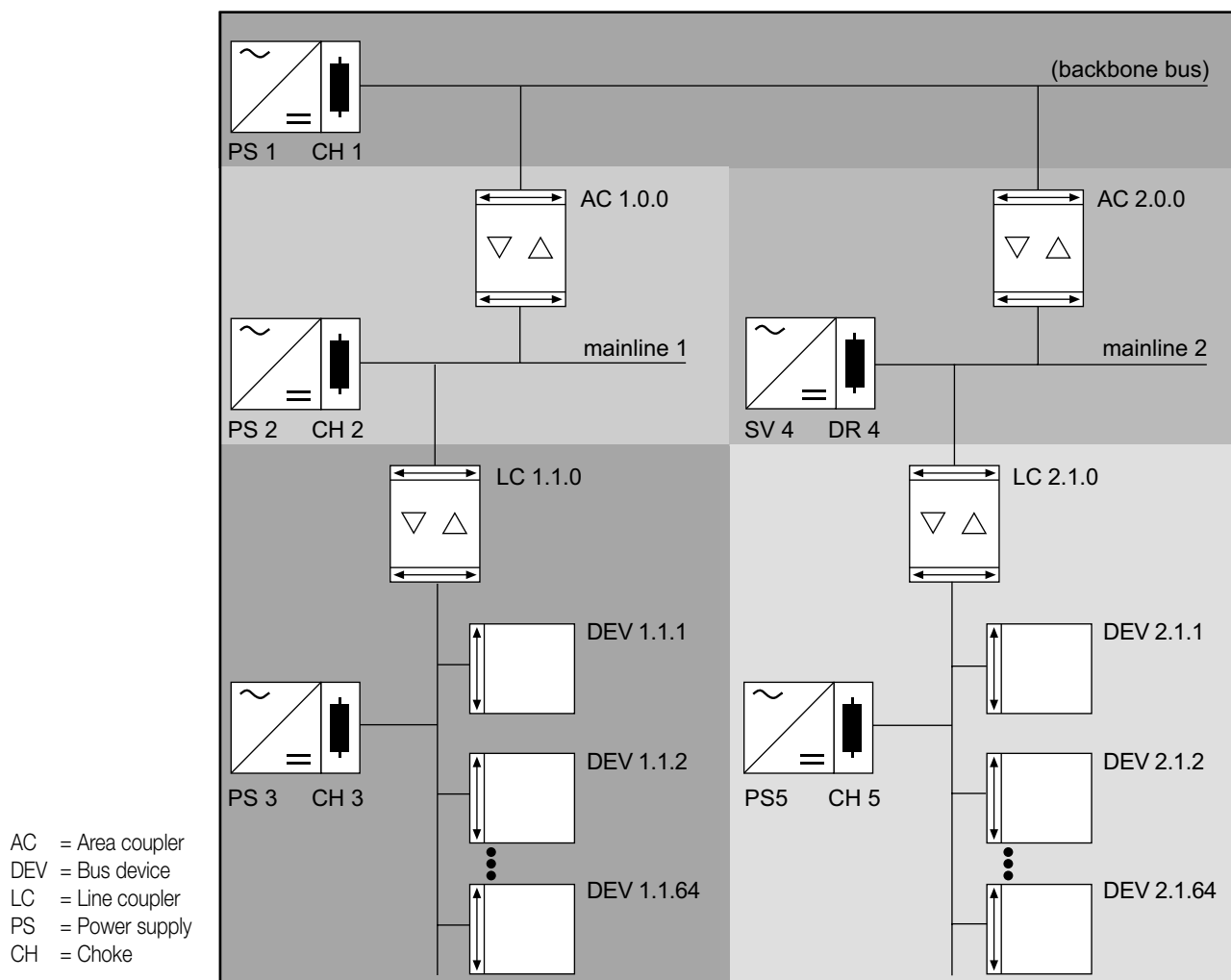
The coupler logics is supplied with electric power from the higher-order line.

System Devices
Bus coupling unit (BCU)

1
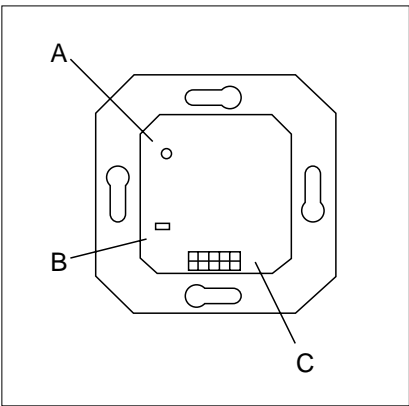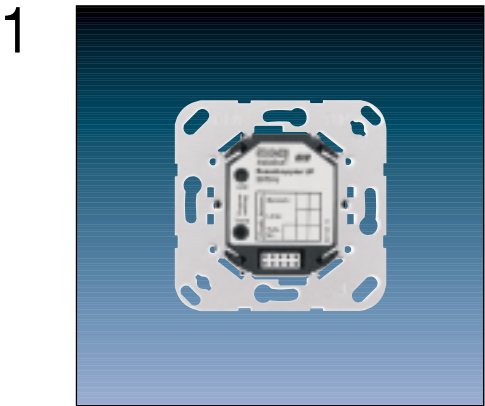
Operating elements:

A) LED red: Programming LED
B) Push-button: Programming push-button
C) AI: Application interface

2

	Ref.-No.
KNX bus coupling unit	
with supporting frame	**2070 U**
for flush mounting	
ETS-product family:	System components
Product type:	Bus coupling unit
suitable for wall boxes with Ø 60 mm	

3

The bus coupling unit (BCU) enables application modules (AM) to be connected to the KNX.
The AM could be a push-button, sensor or display fixed with the BCU.
The telegrams received via the KNX are processed by the BCU and passed on to the AM.
In the opposite direction, signals coming from the AM are converted into telegrams and transmitted to the bus.
With the help of the programming push-button and the programming LED the physical address is saved in the BCU.

4

Technical data:

Supply voltage:	24 V DC (+6 V / –4 V)
Power consumption:	max. 100 mW, max. 150 mW with application module
Connection:	KNX connection block

Notes to the AI
Output voltage:	5 V DC + 0,4 V; 24 V DC (+6 V / –4 V)
Output power:	max. 50 mW
Protection:	IP 20
Operation temperature:	–5°C ... +45°C
Storage temperature:	–40°C ... +55°C
Mounting:	fitted in wall box 60 mm
Dimensions:	Depth of recess: 32 mm

1

2

	Ref.-No.
KNX logic module	**2145 REGX**
ETS-product family:	Controller
Product type:	Controller
Series embodiment (SE)-device (2 units)	

3

The logic module is a DIN rail mounted device. With the logic controller and its sophisticated application software complex processes in building automation can be realized.

The graphic surface of the software offers different logic links and time elements, combined together by "drag and drop".

4

Technical data:

Supply voltage:	24 V DC (+6 V / −4 V)
Power consumption:	max. 150 mW
Connection:	KNX connection terminal
Protection:	IP 20
Operation temperatur:	−5°C to +45°C
Mounting:	on DIN rail 35 x 7,5
Dimensions:	90 x 36 x 64 mm (H x W x D)

5

Description of application   **Logic link, time 200 EA/1**

– Smart parameterization of logic links due to the graphic surface and the drag & drop function.
– Similar to SPS programming reffering to DIN 40900.
– The application software starts up after selecting parameter button.
– 200 objects for inputs or outputs, 250 assignments.
– 50 logic links, 50 tri-state gates, 30 time elements and timer functions.
– Types of logic links: AND, OR, EXOR.

System Devices
Serial data interface

1
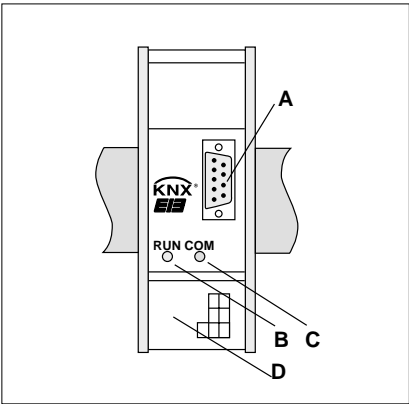
Operating elements:

A) SUB-D connector (RS-232 female)
B) green LED "RUN":   ready for operation
C) yellow LED "COM": data communiction
                      with connected PC
                      in progress
D) hinged lid: access to bus
                      connection,
                      programming push-
                      button and LED

2

	Ref.-No.
KNX serial data interface	**2131 REG**
ETS-product family:	Communication
Product type:	Serial
Series embodiment (SE)-device (2 units)	

3

The data interface permits connection to a PC via the serial RS-232 interface for addressing, programming and diagnosis of KNX components. The PC is connected to the data interface by means of a 9-pole Sub-D connector.

For operation of the data interface it is not required to load software into the device with the ETS! The operating software of the bus coupler is automatically configured by the hardware as serial asynchronous interface.

4

Technical data:

KNX supply voltage:	21 – 32 V DC SELV
Current consumption:	approx. 4.5 mA
Connection:	KNX connecting terminal

PC supply
Voltage:	± 5 V ... ± 15 SELV
Current consumption:	approx.10 mA
Rated insulation voltage:	2.5 kV
Response to bus voltage failure:	communication stopped
Response on return of bus voltage:	communication resumed

RS-232 transmission rate:	max. 9.6 kBaud
PC connection:	9-pole SUB-D connector
Max. line length:	15 m
Protection:	IP 20
Mark of approval:	KNX
Ambient temperature:	–5°C ... +45°C
Storage temperature:	–25°C ... +70°C (storage above +45°C reduces the lifetime)
Mounting position:	any
Fastening:	Snap-fastening on DIN rail

1
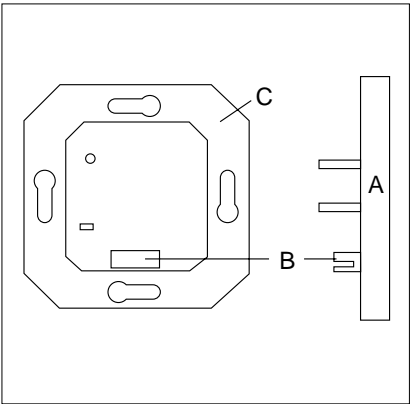
A: Application module (AM)
B: Application interface (AI)
C: Bus coupling unit (BCU)

2

	Ref.-No.
Data-interface	
ETS-product family:	Communication
Product type:	Serial
ivory	**2130**
white	**CD 2130 WW**
blue	**CD 2130 BL**
brown	**CD 2130 BR**
grey	**CD 2130 GR**
light grey	**CD 2130 LG**
red	**CD 2130 RT**
black	**CD 2130 SW**

On special request also available in stainless steel or aluminium (lacquared).

3

The integrated 9pole SUB D plug enables a PC to be connected to the KNX system and can be plugged onto any flush mounted BCU.
This serial interface is used for addressing, parameterizing and for diagnosis of bus devices.

4

Technical data:

Input
Number: 1
Connection: 9-pole SUB D plug
Protection: IP 20
Insulation voltage: referring to VDE 0829 part 230
Operation temperature: −5°C ... +45°C
Mounting: plugged onto a flush mounted BCU

System Devices

USB data-interface

1

2

	Ref.-No.
KNX USB data-interface	**2130 USB REG**
ETS-product family:	Communication
for DIN rail mounting	
Series embodiment (SE)-device (2 unit)	

3

The USB data interface enables the coupling of a PC for the addressing, programming and diagnoses of KNX components. The power is fully supplied by the connected PC via the USB interface. This means that the USB data interface is no longer connected for the KNX if the USB cable is not plugged in. The device is only programmed locally with a physical address via the connected PC and therefore does not have a programming button or programming LED. The firmware of the USB data interface can be updated via a PC and is therefore safeguarded for future standards.

For 2130 USB and 2130 USB REG

Note:
The USB data interface is supported by ETS 3 software from version "a" upwards and by the PC operating systems Windows 98, 98 SE, ME, 2000 and XP.

Connection:
The connection to the KNX is carried out with the aid of the bus connecting terminal. The USB connection is carried out with a certified USB cable (1 x B plug required) with a max. length of 5 m.

4

Technical data:

Power supply:	via USB port of the PC
Connection KNX:	KNX connecting terminal
USB port:	USB socket, type B
Transmission protocol:	compatible with USB 1.1/2.0
Length of USB cable:	max. 5 m
Ambient temperature:	–5°C ... +45°C
Storage temperature:	–25°C ... +70°C
Protection:	IP 20
Protection class:	II

1

2
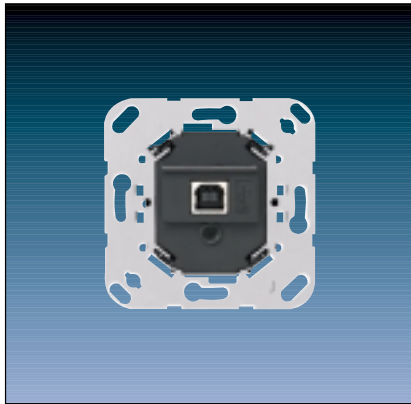
	Ref.-No.
KNX USB data-interface	**2130 USB**
ETS-product family:	Communication

3

The USB data interface enables the coupling of a PC for the addressing, programming and diagnoses of KNX components. The power is fully supplied by the connected PC via the USB interface. This means that the USB data interface is no longer connected for the KNX if the USB cable is not plugged in. The device is only programmed locally with a physical address via the connected PC and therefore does not have a programming button or programming LED. The firmware of the USB data interface can be updated via a PC and is therefore safeguarded for future standards.

Suitable covers:

AS 500 / A 500 / A plus
ivory	**A 569 PLT**
white	**A 569 PLT WW**
aluminium	**A 569 PLT AL**

CD 500 / CD plus   **with inscription plate**
		with inscription plate
ivory	**569 T**	**569 TNA**
white	**CD 569 T WW**	**CD 569 TNA WW**
blue	**CD 569 T BL**	**CD 569 TNA BL**
brown	**CD 569 T BR**	**CD 569 TNA BR**
grey	**CD 569 T GR**	**CD 569 TNA GR**
light grey	**CD 569 T LG**	**CD 569 TNA LG**
red	**CD 569 T RT**	**CD 569 TNA RT**
black	**CD 569 T SW**	**CD 569 TNA SW**
gold-bronze	**CD 569 T GB**	**CD 569 TNA GB**
platinum	**CD 569 T PT**	**CD 569 TNA PT**

LS 990 / LS plus / Aluminium / Stainless Steel / Anthracite / Chrom / Gold
ivory	**LS 969 T**
white	**LS 969 T WW**
light grey	**LS 969 T LG**
Metal versions	
aluminium	**AL 2969 T**
stainless Steel	**ES 2969 T**
anthracite (lacquered aluminium)	**AL 2969 T AN**
chrom	**GCR 2969 T**
gold (coloured)	**GO 2969 T**

MAXIMUM FLEXIBILITY DUE TO MODULAR DESIGN

Push-button module with integrated bus coupling unit

3071 TSM

Standard
push-button module
with BCU, 1-gang

3072 TSM

Standard
push-button module
with BCU, 2-gang

Cover for
push-button module
2-gang

Cover for
push-button module
4-gang

Cover for
push-button module
1-gang

Cover for
push-button module
2-gang

3091 TSML

Universal
push-button module
with white illuminated
inscription field
and BCU, 1-gang

3092 TSML

Universal
push-button module
with white illuminated
inscription field
and BCU, 2-gang

3091 TSM

Universal
push-button module
with BCU, 1-gang

3092 TSM

Universal
push-button module
with BCU, 2-gang

1-gang push-button
module with cover

2-gang push-button
module with cover

3-gang push-button
module with cover

4-gang push-button
module with cover

1-gang push-button
module with illuminated
incription field

2-gang push-button
module with illuminated
incription field

3078 TSM

Standard
push-button module
with BCU, 8-gang

3073 TSM

Standard
push-button module
with BCU, 3-gang

3074 TSM

Standard
push-button module
with BCU, 4-gang

Cover for
push-button module
3-gang

Cover for
push-button module
4-gang

Cover for
push-button module
2x4-gang

3093 TSM

Universal
push-button module
with BCU, 3-gang

3094 TSM

Universal
push-button module
with BCU, 4-gang

3098 TSM

Universal
push-button module
with BCU, 8-gang

The new generation of FD modules is already
fitted at the factory with an integrated bus
coupler. This saves time and money during the
installation. The devices are parameterised via
the push-buttons and not via the bus
coupler as usual. The range incorporates
two variants: standard and universal for 1- to
4-gang covers. The 8-gang push-button
module is completely new and offers up to
16 functions. There is also a version with an
illuminated labelling field in 1- and 2-gang
versions.
The new FD modules offer a further plus point
for architectural creativity since the current
30 series can now be combined with the
frames of the LS design. The installation is
carried out via a supporting frame which is
supplied with the respective push-button
module. The snapshots indicate the difference
between the two installations. When installing
FD frames, the collar is aligned with the flush-
type box. When using the LS design, it points
towards the frame. This special design creates
the requirement for integrating modules
both in the flat FD frames and the conventional
LS frames. The visual effect is equally convin-
cing in both versions.

FD-design
FD Standard push-button module

1

2
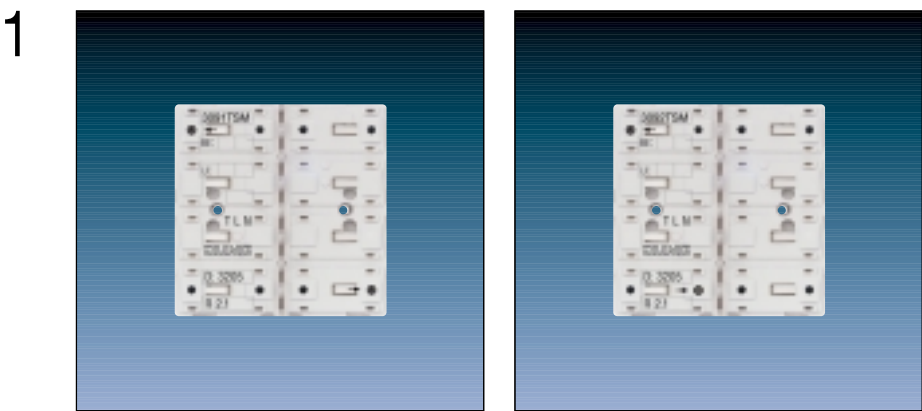
	Ref.-No.
FD Standard push-button module	
with integrated BCU	
1-gang	**3071 TSM**
2-gang	**3072 TSM**

3

After a press on the key, the push-button module will transmit software-dependent telegrams to the KNX. These may be telegrams for switching, push-button operation, dimming or for shutter control. It is also possible to program value-transmitting functions such as dimming value transmitter or light-scene extension units. The 1- and 2-gang versions allow also mixed applications.
A blue operation LED can serve as orientation lighting.

4

Technical data:

KNX supply
Voltage:	21 – 32 V DC (SELV)
Power consumption:	typically 150 mW
Connection:	Bus terminal (KNX Typ 5.1)
External supply:	–
Protection:	IP 20
Safety class:	III
Mark of approval:	KNX
Ambient temperature:	–5°C ... +45°C
Storage/transport temperature:	–25°C ... +70°C (storage above +45°C reduces the lifetime)
Mounting position:	any
Minimum distances:	none
Fastening:	Fixing to the supporting frame by means of the attached plastic screws

5

Software Applications:

No.	Summarized description		Version
1	Switching, status	Switching, status 100312	1.2
2	Switching, acknowledgement	Switching, acknowledgement 100A12	1.2
3	Dimming	Dimming 102A01	0.1
4	Shutter	Shutter 102B01	0.1
5	Shutter with status object	Shutter with status object 108C01	0.1
6	Dimming/shutter	Dimming/shutter 103A01	0.1
7	Switching/dimming	Switching/dimming 103C01	0.1
8	Switching/shutter	Switching/shutter 103B01	0.1
9	Switching/push-button operation	Switching/push-button operation 103101	0.1
10	Value transmitter	Value transmitter 101C01	0.1

Scope of functions:

Switching
- Function of operating LED and of status LED parameterizable.
- Command on key-press parameterizable (ON, OFF).
- The status LED indicates the current state of the object. If a key is pressed (e.g. ON) and if the push-button module does **not** get a positive acknowledgement (IACK) from an addressed actuator, the object status is updated, but the corresponding status LED is **not** lit up.
- Within application "Switching, acknowledgement" the status LED is ON for a parameterizable time in case of a positive acknowledgement from an addressed actuator.

Dimming
- Function of operating LED and of status LED parameterizable.

Shutter
- Both, the operation and also the status LED can be controlled by separate objects (status indication) or be permanently ON or OFF. The status LED can additionally act as key-press indicators.
- Operating concept for shutter control parameterizable.
- Time between short-time and long-time operation and slat adjustment time presettable depending on operating concept.
- Rocker configuration and key functions presettable.

Light-scene extension unit / Value transmitter
- When a key is pressed for less than 1 s, the parameterised light-scene is recalled and the pertaining status LED switched on for about 1 s. If a key is pressed during a light-scene recall with storage function for more than 5 s, a storage telegram corresponding to the parameterised light-scene will be transmitted and the status LED is lit up for 4 s. Pressing a key with storage function for a time between 1 s and 5 s is without effect.
- The status LED lights up after a key-press only in conjunction with a positive acknowledgement (IACK) from an addressed actuator.
- Function of operating LED and of status LED parameterizable.
- Mode of operation (value transmitter/light-scene recall with/without storage function) freely selectable.
- Values (1 byte) or light-scene numbers (1 ... 8) for all keys individually parameterizable.

FD-design

FD Standard push-button module

2
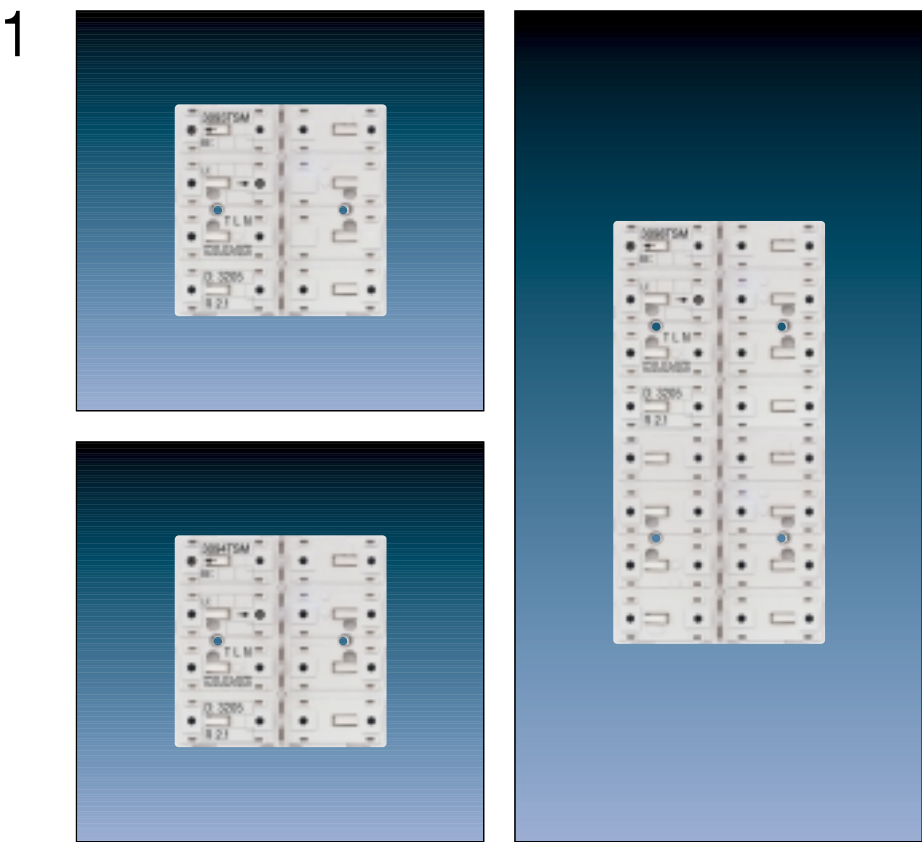
	Ref.-No.
FD Standard push-button module	
with integrated BCU	
3-gang	**3073 TSM**
4-gang	**3074 TSM**
8-gang	**3078 TSM**

3 After a press on the key, the push-button module will transmit software-dependent telegrams to the KNX. These may be telegrams for switching, push-button operation, dimming or for shutter control. It is also possible to program value-transmitting functions such as dimming value transmitter or light-scene extension units.
A blue operation LED can serve as orientation lighting.

5 **Software Applications:**

No.	Summarized description		Version
1	Switching, status	Switching, status 102E01	0.1
2	Switching, acknowledgement	Switching, acknowledgement 102F01	0.1
3	Dimming	Dimming 102D01	0.1
4	Shutter	Shutter 102C01	0.1
5	Value transmitter	Value transmitter 101D01	0.1

1
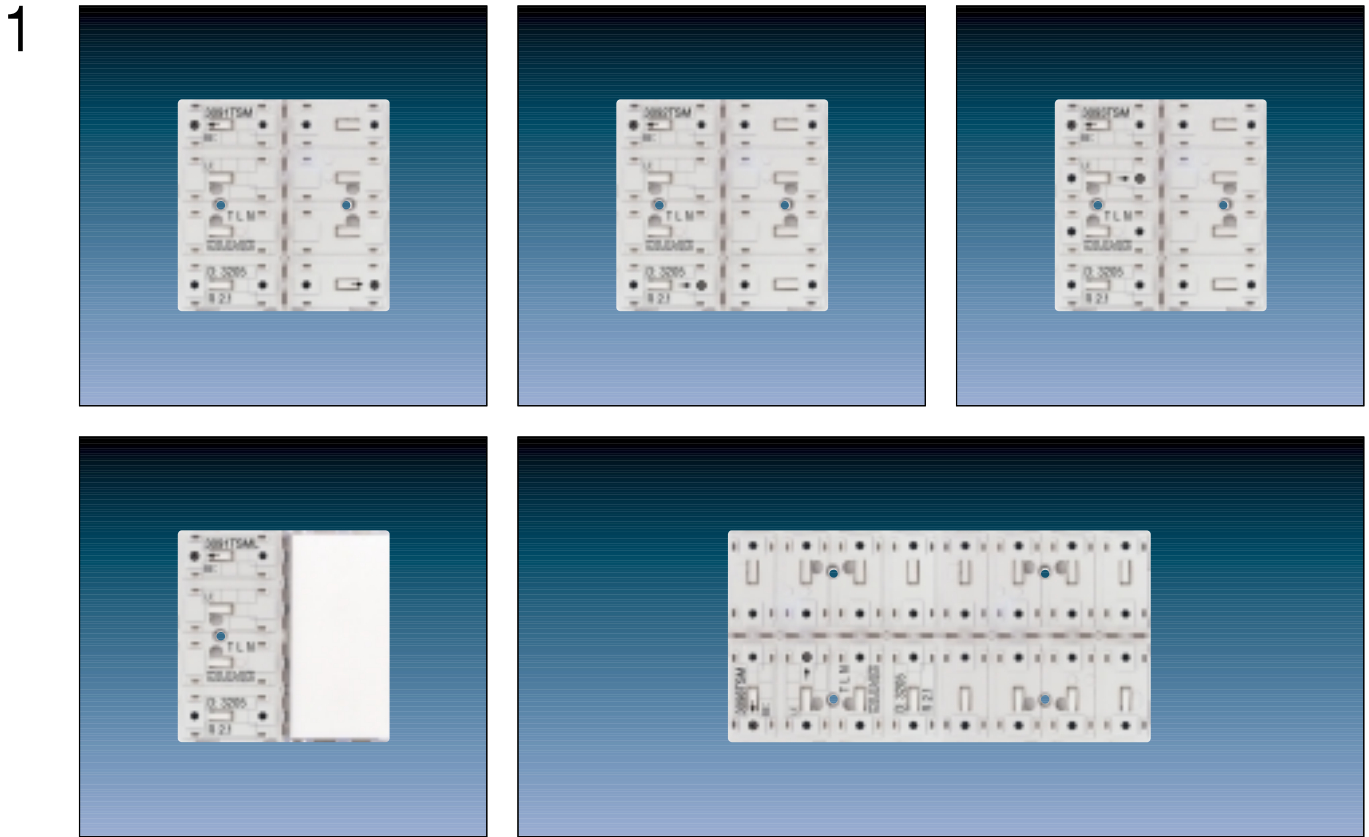
2

	Ref.-No.
FD Universal push-button module	
with integrated BCU	
1-gang	**3091 TSM**
2-gang	**3092 TSM**
3-gang	**3093 TSM**
4-gang	**3094 TSM**
8-gang	**3098 TSM**
with illuminated inscription field	
1-gang	**3091 TSML**
2-gang	**3092 TSML**

3 The FD universal push-button module is connected directly to the bus line and fixed to the metal supporting frame by means of the attached plastic screws.

Each of the square buttons can be used as one rocker or as two separate push-buttons (keys). The button can be operated either vertically or horizontally.
If a button is used as one rocker, with certain functions additional special functions can be called up by pressing the rocker centrally.
Depending on the adjusted function, it sends telegrams, e.g. to actuators for switching ON/OFF lights, for dimming lights, for recalling or saving light scenes, for moving shutters/blinds up or down and for adjusting louvers or value transmitter functions like dimming value, brightness value, light scene extension or temperature values.
Each button has two red LED which can be switched permanently ON or OFF, be used as status or operation indication or be controlled by a separate object.
A blue LED can serve as an orientating light, can be switched ON or OFF permanently or be controlled by a separate object.

The FD universal push-button modules have to be equipped with the chosen design covers.
The metal supporting frame can be turned. This way, it is possible to use the FD push-button module either with the special FD frames or with the standard LS 990, LS plus, ES, AL, AN, GO frames.

4 Technical data:

KNX supply
Voltage: 21 – 32 V DC (SELV)
Power consumption: typically 150 mW
Connection: Bus terminal (KNX Typ 5.1)
External supply: –

Protection: IP 20
Safety class: III
Mark of approval: KNX
Ambient temperature: –5°C ... +45°C
Storage/transport temperature: –25°C ... +70°C (storage above +45°C reduces the lifetime)
Mounting position: any
Minimum distances: none
Fastening: Fixing to the supporting frame by means of the attached plastic screws

Mounting:
(8-gang version)
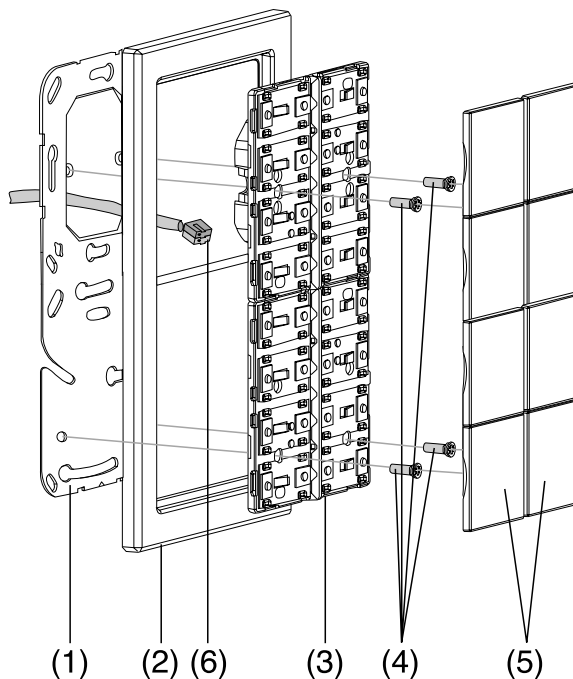
(1)   (2) (6)   (3) (4)   (5)

a. Metal supporting frame (1) to be mounted on a wall box. Marking "TOP" = on top; "A" in front for FD frame or "B" uin front for LS 990.
b. Attach design-frame (2) onto the supporting frame.
c. Connect push-button module (3) with standard bus terminal (6) to the KNX, and attach it to the supporting frame.
d. Fix the push-button module (3) to the supporting frame by means of the plastic screw (4)
   (dismounting/burglar protection) screw the plastic screws slightly only.
e. Download the physical address to the device before mounting the design covers (5).

ONLY for version 8-gang:
When mounting on a single wall box (no wall box under the lower part) generate space for the lower plastic screws in the wall, approx. 10 mm
(e.g. drill 6 mm). use the supporting frame for positioning.

5 Special features:

8-gang, Ref.-No. 3098 TSM
The device has an integrated temperature sensor. This way, the device can be integrated in the room temperature measurement in connection with e.g. a Room Controller (RCD) or to indicate the temperature on any display.

1-gang, Ref.-No. 3091 TSML
2-gang, Ref.-No. 3092 TSML
The devices offer an illuminated inscription field. The illumination with white LED can be switched ON or OFF permanently or be controlled by a separate object.

Scope of functions:

- Each button can be used as one rocker or as two separate push-buttons. The button can be operated either vertically or horizontally.
- Each button can be used for switching, dimming, shutter/blinds, value transmitter 1 or 2 byte or light scene extension.
- For each rocker or push-button, the operation of two independent channels can be adjusted while both channels have the same functions as a single push-button.
- For each button, two status LED are available.
- If a status LED is linked internally to a rocker/push-button, it can display the operation or the current status of a communication object.
- If a status LED is used independent of a rocker/push-button, it can be switched ON or OFF permanently, display the status of an own communication object, display the status of a room temperature sensor or the result of a comparator of 1 byte values with or without algebraic sign.
- The blue operation LED can be switched ON or OFF permanently, turned into a flashing mode, or be controlled by a communication object.
- Depending on the adjusted basic function, a rocker can also evaluate a centered push.
- In switching functions the reaction on pressing/releasing, switch ON, switch OFF or toggling can be adjusted.
- In dimming functions the adjustment for single level/two level control, times for short and long operation, dimming in steps, telegram repetition at long operation and a stop telegram at the end of operation is possible.
- In shutter function the single level/two level control, four different operation concepts, times for short and long operation and the blades adjustment can be defined.
- In the 1 or 2 byte value transmitter it is possible to adjust the range (0 ... 100 %, 0 ... 255, 0 ... 65535, 0 ... 1500 LUX, 0 ... 40°C), the value when pressing, value adjustment at long operation with various step width, times for an optional over flow when reaching the end of the value range.
- In light scene control it is possible to adjust: the internal storing of eight light scenes with eight output channels, the recall of the internal light scenes by an adjustable light scene number, the object type of the outputs, the blocking or releasing of the single output values of a light scene, the sending delay time for the single outputs.
  In the light scene extension function up to 64 light scenes can be recalled and stored.
- When used as a temperature controller satellite, adjustments are possible for:
  Changing between the operation modes with high or normal priority, defined choose of an operation mode, changing of the presence status, set value adjustment.
- All rocker/push-buttons can be inhibited by a 1 bit object. The polarity of the inhibit object and the behavior at the beginning of inhibit can be set. During an active locking, all rocker/push-buttons or single rocker/push-buttons can be without function, can release the function of a selected rocker/push-button or carry out one of two adjustable inhibit functions.
- All LEDs of the sensor can blink at the same time, e.g. to display an alarm.
  The value of the alarm object for the conditions alarm/no alarm, acknowledge of the alarm by pushing a button, transmitting the ACK to other devices can be adjusted.

FD-design
Cover for FD push-button module

1

2
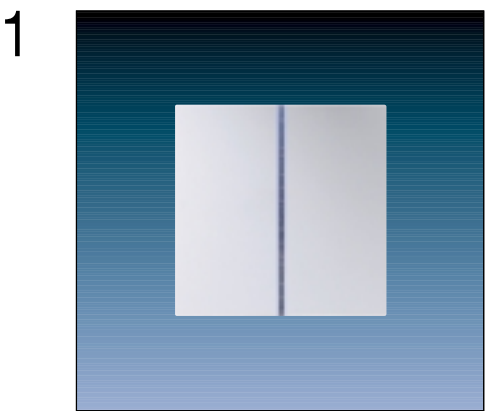
	Ref.-No.
Cover for FD push-button module	
to clip on push-button module 1-gang	
ivory	**FD 901 TSA**
white	**FD 901 TSA WW**
light grey	**FD 901 TSA LG**
Metal versions	
stainless steel	**FDES 2901 TSA**
aluminium	**FDAL 2901 TSA**
anthracite	**FDAL 2901 TSA AN**
Suitable modules:	**3071 TSM, 3091 TSM**
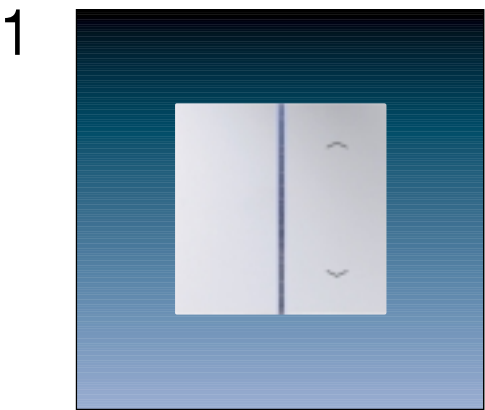
1

2

	Ref.-No.
Cover for FD push-button module with symbols	
to clip on push-button module 1-gang	
ivory	**FD 901 TSAP**
white	**FD 901 TSAP WW**
light grey	**FD 901 TSAP LG**
Metal versions	
stainless steel	**FDES 2901 TSAP**
aluminium	**FDAL 2901 TSAP**
anthracite	**FDAL 2901 TSAP AN**
Suitable modules:	**3071 TSM, 3091 TSM**

1

2

	Ref.-No.
Cover for FD push-button module with inscription plate 68.5 x 68.5 mm	
to clip on push-button module 1-gang	
ivory	**FD 901 TSANA**
white	**FD 901 TSANA WW**
light grey	**FD 901 TSANA LG**
Metal versions	
stainless steel	**FDES 2901 TSANA**
aluminium	**FDAL 2901 TSANA**
anthracite	**FDAL 2901 TSANA AN**
Suitable modules:	**3071 TSM, 3091 TSM**
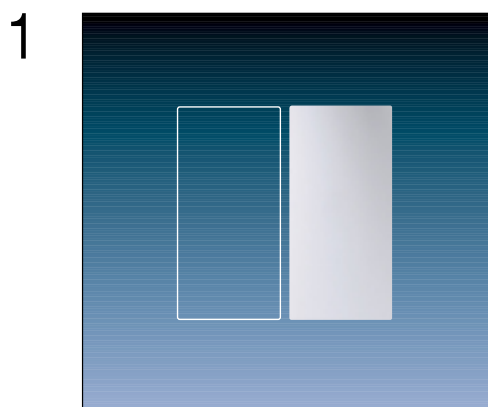
1

2

	Ref.-No.
Cover for FD push-button module	
to clip on push-button module 2-gang or 3-gang	
ivory	**FD 902 TSA**
white	**FD 902 TSA WW**
light grey	**FD 902 TSA LG**
Metal versions	
stainless steel	**FDES 2902 TSA**
aluminium	**FDAL 2902 TSA**
anthracite	**FDAL 2902 TSA AN**
Suitable modules:	**3072 TSM, 3073 TSM, 3092 TSM, 3093 TSM, 3091 TSML**

FD-design

Cover for FD push-button module
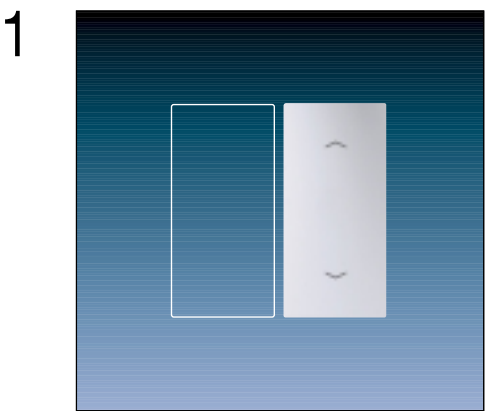
1

2

	Ref.-No.
Cover for FD push-button module with symbols	
to clip on push-button module 2-gang or 3-gang	
ivory	**FD 902 TSAP**
white	**FD 902 TSAP WW**
light grey	**FD 902 TSAP LG**
Metal versions	
stainless steel	**FDES 2902 TSAP**
aluminium	**FDAL 2902 TSAP**
anthracite	**FDAL 2902 TSAP AN**
Suitable modules:	**3072 TSM, 3073 TSM, 3092 TSM, 3093 TSM, 3091 TSML**

1

2
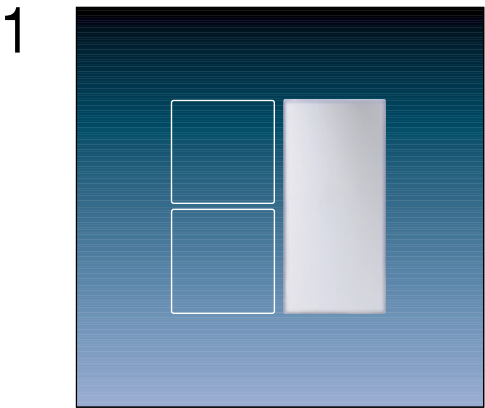
	Ref.-No.
Cover for FD push-button module with inscription plate 32 x 68.5 mm	
to clip on push-button module 2-gang or 3-gang	
ivory	**FD 902 TSANA**
white	**FD 902 TSANA WW**
light grey	**FD 902 TSANA LG**
Metal versions	
stainless steel	**FDES 2902 TSANA**
aluminium	**FDAL 2902 TSANA**
anthracite	**FDAL 2902 TSANA AN**
Suitable modules:	**3072 TSM, 3073 TSM, 3092 TSM, 3093 TSM, 3091 TSML**

1

2

	Ref.-No.
Cover for FD push-button module	
to clip on push-button module 3-gang or 4-gang	
ivory	**FD 904 TSA**
white	**FD 904 TSA WW**
light grey	**FD 904 TSA LG**
Metal versions	
stainless steel	**FDES 2904 TSA**
aluminium	**FDAL 2904 TSA**
anthracite	**FDAL 2904 TSA AN**
Suitable modules:	**3073 TSM, 3074 TSM, 3093 TSM, 3094 TSM, 3078 TSM, 3098 TSM, 3092 TSML**
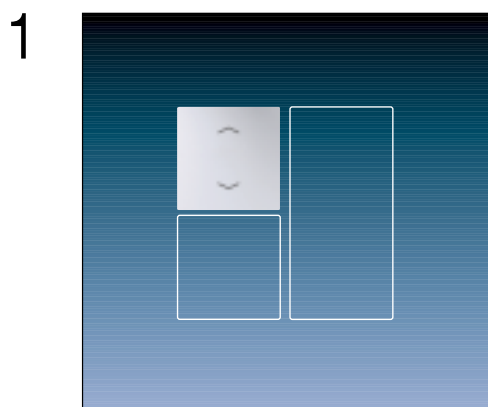
1

2

	Ref.-No.
Cover for FD push-button module with symbols	
to clip on push-button module 2-gang or 3-gang	
ivory	**FD 904 TSAP**
white	**FD 904 TSAP WW**
light grey	**FD 904 TSAP LG**
Metal versions	
stainless steel	**FDES 2904 TSAP**
aluminium	**FDAL 2904 TSAP**
anthracite	**FDAL 2904 TSAP AN**
Suitable modules:	**3073 TSM, 3074 TSM, 3093 TSM, 3094 TSM, 3078 TSM, 3098 TSM, 3092 TSML**

FD-design
Cover for FD push-button module

1

2
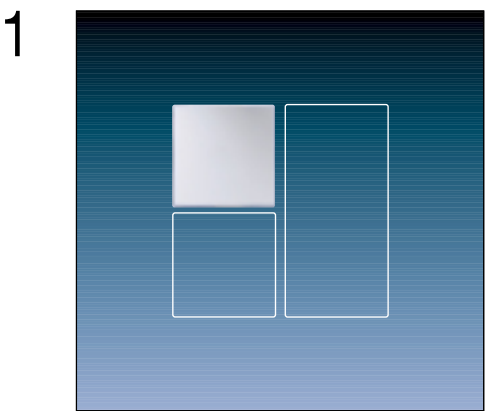
	Ref.-No.
Cover for FD push-button module with inscription plate 32 x 33 mm	
to clip on push-button module 3-gang or 4-gang	
ivory	**FD 904 TSANA**
white	**FD 904 TSANA WW**
light grey	**FD 904 TSANA LG**
Metal versions	
stainless steel	**FDES 2904 TSANA**
aluminium	**FDAL 2904 TSANA**
anthracite	**FDAL 2904 TSANA AN**
Suitable modules:	**3073 TSM, 3074 TSM, 3093 TSM, 3094 TSM, 3078 TSM, 3098 TSM, 3092 TSML**

1
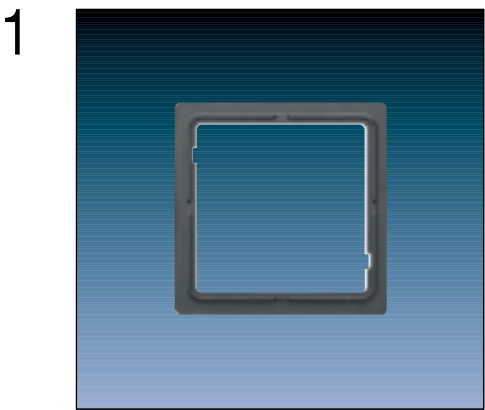
2

	Ref.-No.
Intermediate frame	**FD 981 Z**

3 For the installation of SCHUKO sockets, data/TV sockets and rotary dimmer of the design ranges LS 990, Stainless Steel, Aluminium and Anthracite into FD frames.

1
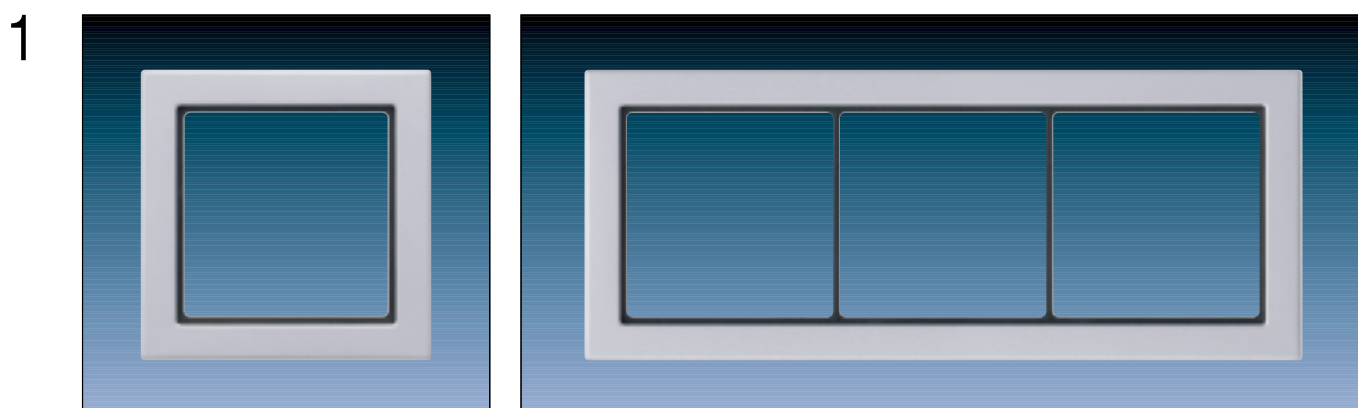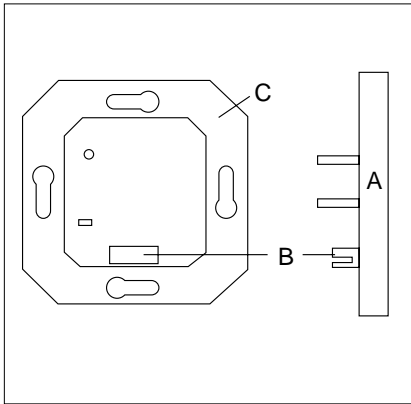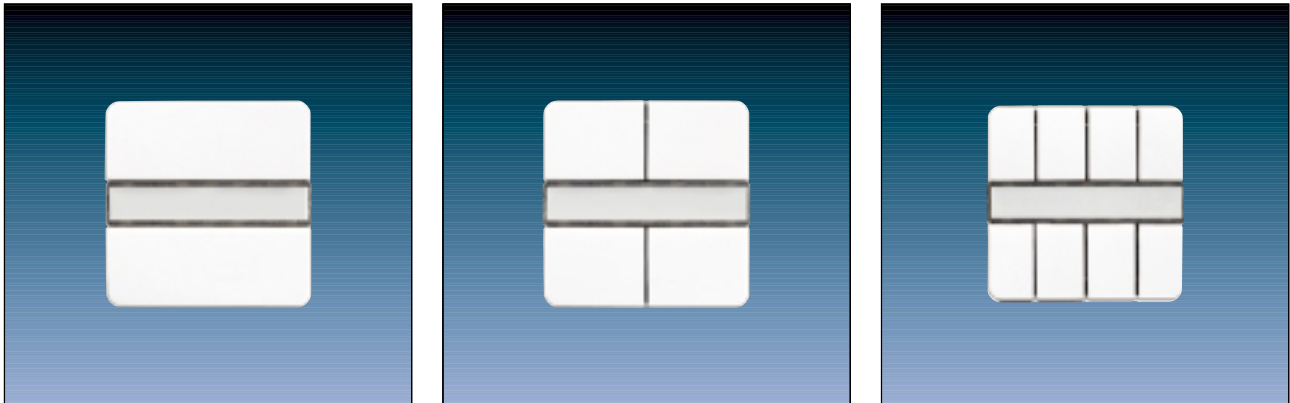
2

		Ref.-No.
Frames for vertical and horizontal installation		
ivory	1-gang 96 x 96 x 6.3 mm	**FD 981 W**
	2-gang 96 x 167 x 6.3 mm	**FD 982 W**
	3-gang 96 x 238 x 6.3 mm	**FD 983 W**
white	1-gang 96 x 96 x 6.3 mm	**FD 981 WW**
	2-gang 96 x 167 x 6.3 mm	**FD 982 WW**
	3-gang 96 x 238 x 6.3 mm	**FD 983 WW**
light grey	1-gang 96 x 96 x 6.3 mm	**FD 981 LG**
	2-gang 96 x 167 x 6.3 mm	**FD 982 LG**
	3-gang 96 x 238 x 6.3 mm	**FD 983 LG**
Metal versions		
aluminium	1-gang 96 x 96 x 6.3 mm	**FDAL 2981**
	2-gang 96 x 167 x 6.3 mm	**FDAL 2982**
	3-gang 96 x 238 x 6.3 mm	**FDAL 2983**
stainless steel	1-gang 96 x 96 x 6.3 mm	**FDES 2981**
	2-gang 96 x 167 x 6.3 mm	**FDES 2982**
	3-gang 96 x 238 x 6.3 mm	**FDES 2983**
anthracite	1-gang 96 x 96 x 6.3 mm	**FDAL 2981 AN**
	2-gang 96 x 167 x 6.3 mm	**FDAL 2982 AN**
	3-gang 96 x 238 x 6.3 mm	**FDAL 2983 AN**

Push-Buttons – Standard
CD 500 / CD plus

1

A: Application module (AM)
B: Application interface (AI)
C: Bus coupling unit (BCU)

2

	Ref.-No.
KNX push-button, 1-gang	
ETS-product family:	Push-button
Product type:	1-gang push-button
ivory	**2071 NABS**
white	**CD 2071 NABS WW**
blue	**CD 2071 NABS BL**
brown	**CD 2071 NABS BR**
grey	**CD 2071 NABS GR**
light grey	**CD 2071 NABS LG**
red	**CD 2071 NABS RT**
black	**CD 2071 NABS SW**
gold-bronze	**CD 2071 NABS GB**

3

The 1-gang push-button is plugged onto a flush mounted bus coupling unit. With an appropriate application program, it sends telegrams, for example, to actuators for switching on/off lights, for dimming lights, for recalling and saving light scenes, or for moving blinds/shutters up or down and for adjusting the louvres of blinds.
Status and operation indication is possible with 2 LED's.

Software applications:

Switching with status	100112	Vers. 1.2
Switching with transmission control	100912	Vers. 1.2
Dimming	100C12	Vers. 1.2
Shutter	100D12	Vers. 1.2
Value transmitting	101B01	Vers. 1
Switch/toggle	103001	Vers. 1

2

	Ref.-No.
KNX push-button, 2-gang	
ETS-product family:	Push-button
Product type:	2-gang push-button
ivory	**2072 NABS**
white	**CD 2072 NABS WW**
blue	**CD 2072 NABS BL**
brown	**CD 2072 NABS BR**
grey	**CD 2072 NABS GR**
light grey	**CD 2072 NABS LG**
red	**CD 2072 NABS RT**
black	**CD 2072 NABS SW**
gold-bronze	**CD 2072 NABS GB**

3

The 2-gang push-button is plugged onto a flush mounted bus coupling unit. With an appropriate application program, it sends telegrams, for example, to actuators for switching on/off lights, for dimming lights, for recalling and saving light scenes, or for moving blinds/shutters up or down and for adjusting the louvres of blinds.
Status and operation indication is possible with 3 LED's.

Software applications:

Switching with status	100312	Vers. 1.2
Switching with transmission control	100A12	Vers. 1.2
Dimming	102A01	Vers. 1
Shutter	102B01	Vers. 1
Value transmitting	101C01	Vers. 1
Switch/toggle	103101	Vers. 1
Dimming / shutter	103A01	Vers. 1
Switch / shutter	103B01	Vers. 1
Switch / dimming	103C01	Vers. 1

2

	Ref.-No.
KNX push-button, 4-gang	
ETS-product family:	Push-button
Product type:	4-gang push-button
ivory	**2074 NABS**
white	**CD 2074 NABS WW**
blue	**CD 2074 NABS BL**
brown	**CD 2074 NABS BR**
grey	**CD 2074 NABS GR**
light grey	**CD 2074 NABS LG**
red	**CD 2074 NABS RT**
black	**CD 2074 NABS SW**
gold-bronze	**CD 2074 NABS GB**

3

The 4-gang push-button is plugged onto a flush mounted bus coupling unit. With an appropriate application program, it sends telegrams, for example, to actuators for switching on/off lights, for dimming lights, for recalling and saving light scenes, or for moving blinds/shutters up or down and for adjusting the louvres of blinds.
Status and operation indication is possible with 5 LED's.

Software applications:

Switching with status	102E01	Vers. 1
Switching with transmission control	102F01	Vers. 1
Dimming	102D01	Vers. 1
Shutter	102C01	Vers. 1
Value transmitting	101D01	Vers. 1

4 Technical data

Supply
Voltage: 24 V DC (+6 V / –4 V) via BCU
Power consumption: max. 150 mW
Connection: 2 x 5-pole pin bar
Protection: IP 20
Insulation voltage: referring to VDE 0829 part 230

Behaviour at
Bus voltage drop: Object values will be set to "0".
                                                   LED's are going off, no telegram is sent.
Bus voltage return: Object values remain to "0".
                                                   LED's remain off, no telegram is sent.
Operation temperature: –5°C ... +45°C
Storage temperature: –25°C ... +75°C
Mounting: plugged onto a flush mounted BCU
Note: Mechanical theft protection of the application module
                                                   is provided.

1

A: Application module (AM)
B: Application interface (AI)
C: Bus coupling unit (BCU)

2

	Ref.-No.
KNX push-button, 1-gang	
ETS-product family:	Push-button
Product type:	1-gang push-button
ivory	**LS 2071 NABS**
white	**LS 2071 NABS WW**
light grey	**LS 2071 NABS LG**
Metal versions	
stainless steel	**ES 2071 NABS**
aluminium	**AL 2071 NABS**
anthracite	**AL 2071 NABS AN**
gold coloured	**GO 2071 NABS**
chrome	**GCR 2071 NABS**

3 The 1-gang push-button is plugged onto a flush mounted bus coupling unit. With an appropriate application program, it sends telegrams, for example, to actuators for switching on/off lights, for dimming lights, for recalling and saving light scenes, or for moving blinds/shutters up or down and for adjusting the louvres of blinds.
Status and operation indication is possible with 2 LED's.

Software applications:

Switching with status	100112	Vers. 1.2
Switching with transmission control	100912	Vers. 1.2
Dimming	100C12	Vers. 1.2
Shutter	100D12	Vers. 1.2
Value transmitting	101B01	Vers. 1
Switch/toggle	103001	Vers. 1

2

	Ref.-No.
KNX push-button, 2-gang	
ETS-product family:	Push-button
Product type:	2-gang push-button
ivory	**LS 2072 NABS**
white	**LS 2072 NABS WW**
light grey	**LS 2072 NABS LG**
Metal versions	
stainless steel	**ES 2072 NABS**
aluminium	**AL 2072 NABS**
anthracite	**AL 2072 NABS AN**
gold coloured	**GO 2072 NABS**
chrome	**GCR 2072 NABS**

3

The 2-gang push-button is plugged onto a flush mounted bus coupling unit. With an appropriate application program, it sends telegrams, for example, to actuators for switching on/off lights, for dimming lights, for recalling and saving light scenes, or for moving blinds/shutters up or down and for adjusting the louvres of blinds.
Status and operation indication is possible with 3 LED's.

Software applications:

Switching with status	100312 Vers. 1.2	Switch / toggle	103101 Vers. 1
Switching with transmission control	100A12 Vers. 1.2	Dimming / shutter	103A01 Vers. 1
Dimming	102A01 Vers. 1	Switch / shutter	103B01 Vers. 1
Shutter	102B01 Vers. 1	Switch / dimming	103C01 Vers. 1
Value transmitting	101C01 Vers. 1		

2

	Ref.-No.
KNX push-button, 4-gang	
ETS-product family:	Push-button
Product type:	4-gang push-button
ivory	**LS 2074 NABS**
white	**LS 2074 NABS WW**
light grey	**LS 2074 NABS LG**
Metal versions	
stainless steel	**ES 2074 NABS**
aluminium	**AL 2074 NABS**
anthracite	**AL 2074 NABS AN**
gold coloured	**GO 2074 NABS**
chrome	**GCR 2074 NABS**

3

The 4-gang push-button is plugged onto a flush mounted bus coupling unit. With an appropriate application program,
it sends telegrams, for example, to actuators for switching on/off lights, for dimming lights, for recalling and saving light scenes, or for moving blinds/shutters up or down and for adjusting the louvres of blinds.
Status and operation indication is possible with 5 LED's.

Software applications:

Switching with status	102E01 Vers. 1
Switching with transmission control	102F01 Vers. 1
Dimming	102D01 Vers. 1
Shutter	102C01 Vers. 1
Value transmitting	101D01 Vers. 1

4 Technical data

Supply

Voltage:	24 V DC (+6 V / –4 V) via BCU
Power consumption:	max. 150 mW
Connection:	2 x 5-pole pin bar
Protection:	IP 20
Insulation voltage:	referring to VDE 0829 part 230

Behaviour at

Bus voltage drop:	Object values will be set to "0".
	LED's are going off, no telegram is sent.
Bus voltage return:	Object values remain to "0".
	LED's remain off, no telegram is sent.
Operation temperature:	–5°C ... +45°C
Storage temperature:	–25°C ... +75°C
Mounting:	plugged onto a flush mounted BCU
Note:	Mechanical theft protection of the application module is provided.

Push-Buttons – Standard
AS 500 / A 500 / A plus

1

A: Application module (AM)
B: Application interface (AI)
C: Bus coupling unit (BCU)

2

	Ref.-No.
KNX push-button, 1-gang	
ETS-product family:	Push-button
Product type:	1-gang push-button
ivory	**A 2071 NABS**
white	**A 2071 NABS WW**
aluminium	**A 2071 NABS AL**

3

The 1-gang push-button is plugged onto a flush mounted bus coupling unit. With an appropriate application program, it sends telegrams, for example, to actuators for switching on/off lights, for dimming lights, for recalling and saving light scenes, or for moving blinds/shutters up or down and for adjusting the louvres of blinds.
Status and operation indication is possible with 2 LED's.

Software applications:

Switching with status	100112	Vers. 1.2
Switching with transmission control	100912	Vers. 1.2
Dimming	100C12	Vers. 1.2
Shutter	100D12	Vers. 1.2
Value transmitting	101B01	Vers. 1
Switch/toggle	103101	Vers. 1

2

	Ref.-No.
KNX push-button, 2-gang	
ETS-product family:	Push-button
Product type:	2-gang push-button
ivory	**A 2072 NABS**
white	**A 2072 NABS WW**
aluminium	**A 2072 NABS AL**

3

The 2-gang push-button is plugged onto a flush mounted bus coupling unit. With an appropriate application program, it sends telegrams, for example, to actuators for switching on/off lights, for dimming lights, for recalling and saving light scenes, or for moving blinds/shutters up or down and for adjusting the louvres of blinds.

Status and operation indication is possible with 3 LED's.

Software applications:

Switching with status	100312 Vers. 1.2	Switch / toggle	103I01 Vers. 1
Switching with transmission control	100A12 Vers. 1.2	Dimming / shutter	103A01 Vers. 1
Dimming	102A01 Vers. 1	Switch / shutter	103B01 Vers. 1
Shutter	102B01 Vers. 1	Switch / dimming	103C01 Vers. 1
Value transmitting	101C01 Vers. 1		

2

	Ref.-No.
KNX push-button, 4-gang	
ETS-product family:	Push-button
Product type:	4-gang push-button
ivory	**A 2074 NABS**
white	**A 2074 NABS WW**
aluminium	**A 2074 NABS AL**

3

The 4-gang push-button is plugged onto a flush mounted bus coupling unit. With an appropriate application program, it sends telegrams, for example, to actuators for switching on/off lights, for dimming lights, for recalling and saving light scenes, or for moving blinds/shutters up or down and for adjusting the louvres of blinds.

Status and operation indication is possible with 5 LED's.

Software applications:

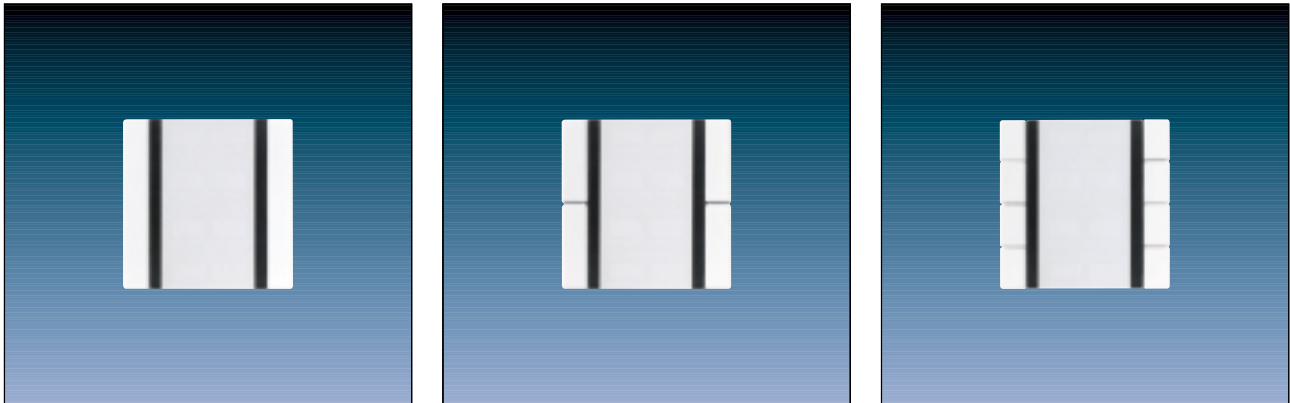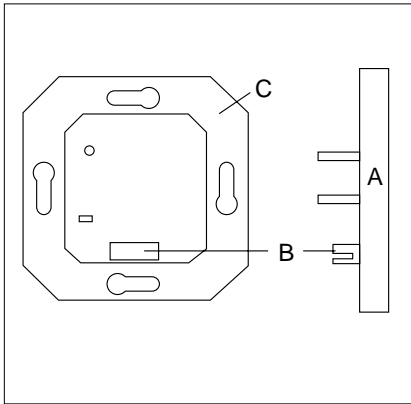|	
Switching with status	102E01 Vers. 1
Switching with transmission control	102F01 Vers. 1
Dimming	102D01 Vers. 1
Shutter	102C01 Vers. 1
Value transmitting	101D01 Vers. 1

4

Technical data

Supply

Voltage:	24 V DC (+6 V / –4 V) via BCU
Power consumption:	max. 150 mW
Connection:	2 x 5-pole pin bar
Protection:	IP 20
Insulation voltage:	referring to VDE 0829 part 230

Behaviour at

Bus voltage drop:	Object values will be set to "0".
	LED's are going off, no telegram is sent.
Bus voltage return:	Object values remain to "0".
	LED's remain off, no telegram is sent.
Operation temperature:	–5°C ... +45°C
Storage temperature:	–25°C ... +75°C
Mounting:	plugged onto a flush mounted BCU
Note:	Mechanical theft protection of the application module is provided.

1

A: Application module (AM)
B: Application interface (AI)
C: Bus coupling unit (BCU)

2

	Ref.-No.
KNX push-button, 1-gang	
ETS-product family:	Push-button
Product type:	1-gang push-button
ivory	**2091 NABS**
white	**CD 2091 NABS WW**
blue	**CD 2091 NABS BL**
brown	**CD 2091 NABS BR**
grey	**CD 2091 NABS GR**
light grey	**CD 2091 NABS LG**
red	**CD 2091 NABS RT**
black	**CD 2091 NABS SW**
gold-bronze	**CD 2091 NABS GB**
KNX push-button, 2-gang	
ETS-product family:	Push-button
Product type:	2-gang push-button
ivory	**2092 NABS**
white	**CD 2092 NABS WW**
blue	**CD 2092 NABS BL**
brown	**CD 2092 NABS BR**
grey	**CD 2092 NABS GR**
light grey	**CD 2092 NABS LG**
red	**CD 2092 NABS RT**
black	**CD 2092 NABS SW**
gold-bronze	**CD 2092 NABS GB**

2

	Ref.-No.
KNX push-button, 4-gang	
ETS-product family:	Push-button
Product type:	4-gang push-button
ivory	**2094 NABS**
white	**CD 2094 NABS WW**
blue	**CD 2094 NABS BL**
brown	**CD 2094 NABS BR**
grey	**CD 2094 NABS GR**
light grey	**CD 2094 NABS LG**
red	**CD 2094 NABS RT**
black	**CD 2094 NABS SW**
gold-bronze	**CD 2099 NABS GB**

3

The KNX universal push-button is plugged onto a flush mounted bus coupling unit. Its 2 to 8 rockers can be adjusted with different functions in various combinations (switching, dimming, blind sensor or light scene/brightness value sensor).

With the appropriate parameters, it sends telegrams, for example, to actuators for switching on/off lights, for dimming lights, for recalling and saving light scenes, or for moving blinds/shutters up or down and for adjusting the louvres of blinds and even to send temperature or brightness values (2 Bytes) to the bus.

Status and operation indication is possible with 3 up to 9 LED's, that means each rocker has its own status LED.

4

Technical data

Supply
Voltage:	24 V DC (+6 V / –4 V) via BCU
Power consumption:	max. 150 mW
Connection:	2 x 5-pole pin bar
Protection:	IP 20
Insulation voltage:	referring to VDE 0829 part 230

Behaviour at
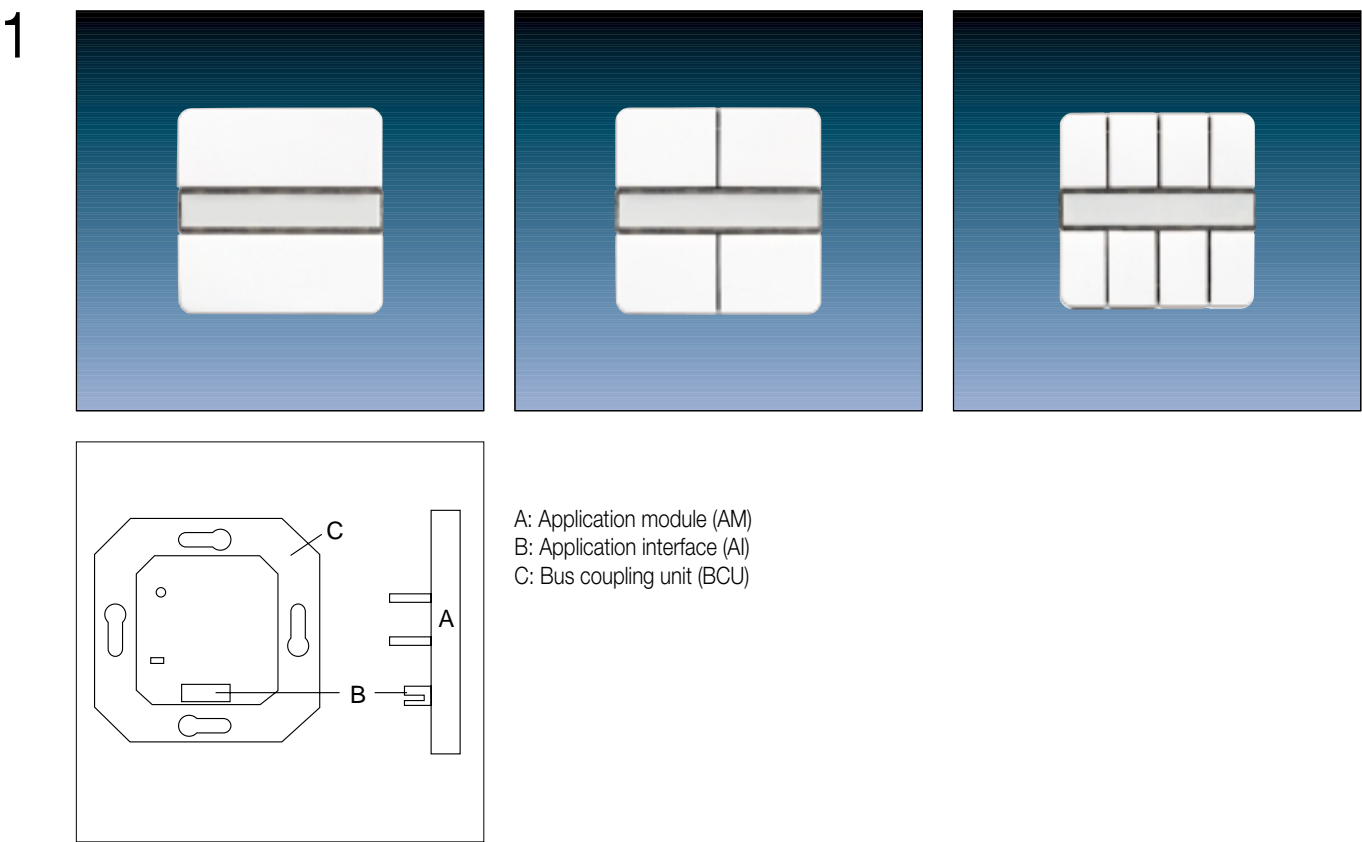|	
Bus voltage drop:	Object values will be set to "0".
	LED's are going off, no telegram is sent.
Bus voltage return:	Object values remain to "0".
	LED's remain off, no telegram is sent.
Operation temperature:	–5°C ... +45°C
Storage temperature:	–25°C ... +75°C
Mounting:	plugged onto a flush mounted BCU
Note:	Mechanical theft protection of the application module
	is provided.

5

Function switching:
• Command at pressing/releasing of the push-button adjustable (ON, OFF, Toggle, no function).

Function dimming:
• Push-button function darker (OFF), brighter (ON) or darker/brighter (Toggle) adjustable.
• Time between dimming and switching and the dimming steps adjustable.
• Telegram repetition and stop telegram possible.

Function shutter/blinds:
• Push-button function (Up, Down) and time between short and long-time operation adjustable.
• Louvres adjustment possible.

Function value transmitter:
• The push-button function, dimming value-, brightness value- or temperature value-transmitter as well as recalling and saving light scenes, can be parameterized.
• Value adjustment via long push operation (dimming-, brightness-, temperature-value).

5

Notes to software application:

Switching function
• For a two level operation (toggle function), the objects of the relevant push-buttons must have the same group adresses.

Dimming function:
• For a correct function of the single level operation, the connected dimming actuator must send its status back to the switching object of the push-button, too.
• With the single level operation only the switching object is retriggered internally and externally. The dimming object (dimming direction) is retriggered only internally so that in case of used extensions (2 or more sensors dim one lamp) the dimming direction will not always be changed at a new push action.
• For a two level operation, the objects of the relevant push-buttons must have the same group adresses.

Shutter/blinds function:
• This function supports the two level operation only. Therefore the „Step" and „Move" objects of the relevant push-buttons must have the same group adresses.

Value transmitter function:
• At value adjustment via long push operation, the new adjusted values are stored only within the RAM. After bus voltage drop or a bus reset, these values will be exchanged with the values programmed with the ETS.
The value adjustment always is carried out in negative direction. After reaching the minimal value, it will continue automatically with the maximal value.

1

A: Application module (AM)
B: Application interface (AI)
C: Bus coupling unit (BCU)

2

	Ref.-No.
KNX push-button, 1-gang	
ETS-product family:	Push-button
Product type:	1-gang universal push-button
ivory	**LS 2091 NABS**
white	**LS 2091 NABS WW**
light grey	**LS 2091 NABS LG**
Metal versions	
stainless steel	**ES 2091 NABS**
aluminium	**AL 2091 NABS**
anthracite	**AL 2091 NABS AN**
gold coloured	**GO 2091 NABS**
chrome	**GCR 2091 NABS**
KNX push-button, 2-gang	
ETS-product family:	Push-button
Product type:	2-gang universal push-button
ivory	**LS 2092 NABS**
white	**LS 2092 NABS WW**
light grey	**LS 2092 NABS LG**
Metal versions	
stainless steel	**ES 2092 NABS**
aluminium	**AL 2092 NABS**
anthracite	**AL 2092 NABS AN**
gold coloured	**GO 2092 NABS**
chrome	**GCR 2092 NABS**

2

	Ref.-No.
KNX push-button, 4-gang	
ETS-product family:	Push-button
Product type:	4-gang universal push-button
ivory	**LS 2094 NABS**
white	**LS 2094 NABS WW**
light grey	**LS 2094 NABS LG**
Metal versions	
stainless steel	**ES 2094 NABS**
aluminium	**AL 2094 NABS**
anthracite	**AL 2094 NABS AN**
gold	**GO 2094 NABS**
chrome	**GCR 2094 NABS**

3

The KNX universal push-button is plugged onto a flush mounted bus coupling unit. Its 2 to 8 rockers can be adjusted with different functions in various combinations (switching, dimming, blind sensor or light scene/brightness value sensor).

With the appropriate parameters, it sends telegrams, for example, to actuators for switching on/off lights, for dimming lights, for recalling and saving light scenes, or for moving blinds/shutters up or down and for adjusting the louvres of blinds and even to send temperature or brightness values (2 Bytes) to the bus.

Status and operation indication is possible with 3 up to 9 LED's, that means each rocker has its own status LED.

4

Technical data

Supply
Voltage:	24 V DC (+6 V / –4 V) via BCU
Power consumption:	max. 150 mW
Connection:	2 x 5-pole pin bar
Protection:	IP 20
Insulation voltage:	referring to VDE 0829 part 230

Behaviour at
Bus voltage drop:	Object values will be set to "0".
	LED's are going off, no telegram is sent.
Bus voltage return:	Object values remain to "0".
	LED's remain off, no telegram is sent.
Operation temperature:	–5°C ... +45°C
Storage temperature:	–25°C ... +75°C
Mounting:	plugged onto a flush mounted BCU
Note:	Mechanical theft protection of the application module is provided.

5

Function switching:
• Command at pressing/releasing of the push-button adjustable (ON, OFF, Toggle, no function).

Function dimming:
• Push-button function darker (OFF), brighter (ON) or darker/brighter (Toggle) adjustable.
• Time between dimming and switching and the dimming steps adjustable.
• Telegram repetition and stop telegram possible.

Function shutter/blinds:
• Push-button function (Up, Down) and time between short and long-time operation adjustable.
• Louvres adjustment possible.

Function value transmitter:
• The push-button function, dimming value-, brightness value- or temperature value-transmitter as well as recalling and saving light scenes, can be parameterized.
• Value adjustment via long push operation (dimming-, brightness-, temperature-value).

Notes to software application:

Switching function
• For a two level operation (toggle function), the objects of the relevant push-buttons must have the same group adresses.

Dimming function:
• For a correct function of the single level operation, the connected dimming actuator must send its status back to the switching object of the push-button, too.
• With the single level operation only the switching object is retriggered internally and externally. The dimming object (dimming direction) is retriggered only internally so that in case of used extensions (2 or more sensors dim one lamp) the dimming direction will not always be changed at a new push action.
• For a two level operation, the objects of the relevant push-buttons must have the same group adresses.

Shutter/blinds function:
• This function supports the two level operation only. Therefore the „Step" and „Move" objects of the relevant push-buttons must have the same group adresses.
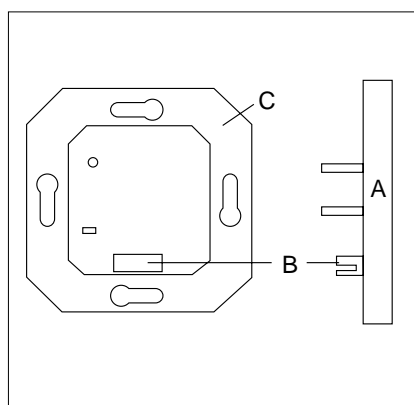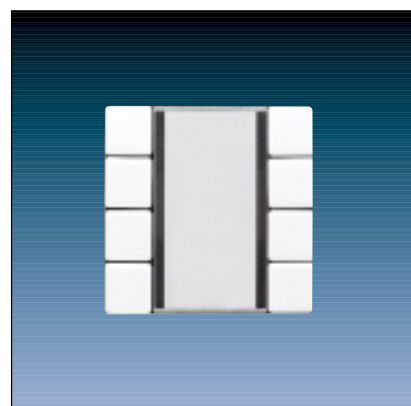
Value transmitter function:
• At value adjustment via long push operation, the new adjusted values are stored only within the RAM. After bus voltage drop or a bus reset, these values will be exchanged with the values programmed with the ETS.
The value adjustment always is carried out in negative direction. After reaching the minimal value, it will continue automatically with the maximal value.

Push-Buttons – Universal
AS 500 / A 500 / A plus

1

A: Application module (AM)
B: Application interface (AI)
C: Bus coupling unit (BCU)

2

	Ref.-No.
KNX push-button, 1-gang	
ETS-product family:	Push-button
Product type:	1-gang universal push-button
ivory	**A 2091 NABS**
white	**A 2091 NABS WW**
aluminium	**A 2091 NABS AL**
KNX push-button, 2-gang	
ETS-product family:	Push-button
Product type:	2-gang universal push-button
ivory	**A 2092 NABS**
white	**A 2092 NABS WW**
aluminium	**A 2092 NABS AL**
KNX push-button, 4-gang	
ETS-product family:	Push-button
Product type:	4-gang universal push-button
ivory	**A 2094 NABS**
white	**A 2094 NABS WW**
aluminium	**A 2094 NABS AL**

3

The KNX universal push-button is plugged onto a flush mounted bus coupling unit. Its 2 to 8 rockers can be adjusted with different functions in various combinations (switching, dimming, blind sensor or light scene/brightness value sensor).
With the appropriate parameters, it sends telegrams, for example, to actuators for switching on/off lights, for dimming lights, for recalling and saving light scenes, or for moving blinds/shutters up or down and for adjusting the louvres of blinds and even to send temperature or brightness values (2 Bytes) to the bus.
Status and operation indication is possible with 3 up to 9 LED's, that means each rocker has its own status LED.

4

Technical data

Supply

Voltage:	24 V DC (+6 V / –4 V) via BCU
Power consumption:	max. 150 mW
Connection:	2 x 5-pole pin bar
Protection:	IP 20
Insulation voltage:	referring to VDE 0829 part 230

Behaviour at

Bus voltage drop:	Object values will be set to "0".
	LED's are going off, no telegram is sent.
Bus voltage return:	Object values remain to "0".
	LED's remain off, no telegram is sent.
Operation temperature:	–5°C ... +45°C
Storage temperature:	–25°C ... +75°C
Mounting:	plugged onto a flush mounted BCU
Note:	Mechanical theft protection of the application module
	is provided.

5

Function switching:
• Command at pressing/releasing of the push-button adjustable (ON, OFF, Toggle, no function).

Function dimming:
• Push-button function darker (OFF), brighter (ON) or darker/brighter (Toggle) adjustable.
• Time between dimming and switching and the dimming steps adjustable.
• Telegram repetition and stop telegram possible.

Function shutter/blinds:
• Push-button function (Up, Down) and time between short and long-time operation adjustable.
• Louvres adjustment possible.

Function value transmitter:
• The push-button function, dimming value-, brightness value- or temperature value-transmitter as well as recalling and saving light scenes, can be parameterized.
• Value adjustment via long push operation (dimming-, brightness-, temperature-value).

Notes to software application:

Switching function
• For a two level operation (toggle function), the objects of the relevant push-buttons must have the same group adresses.

Dimming function:
• For a correct function of the single level operation, the connected dimming actuator must send its status back to the switching object of the push-button, too.
• With the single level operation only the switching object is retriggered internally and externally. The dimming object (dimming direction) is retriggered only internally so that in case of used extensions (2 or more sensors dim one lamp) the dimming direction will not always be changed at a new push action.
• For a two level operation, the objects of the relevant push-buttons must have the same group adresses.

Shutter/blinds function:
• This function supports the two level operation only. Therefore the „Step" and „Move" objects of the relevant push-button must have the same group adresses.
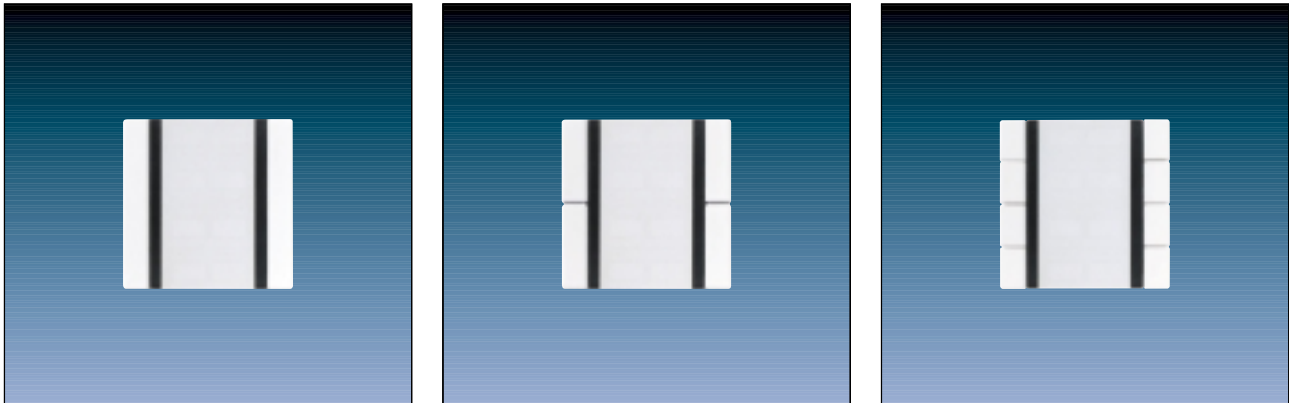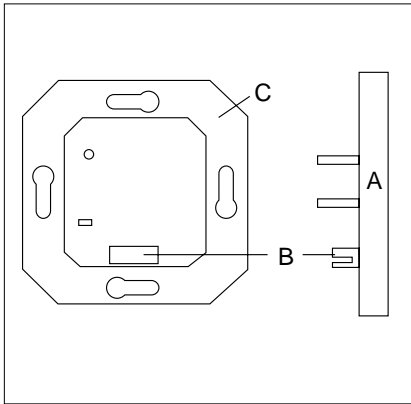
Value transmitter function:
• At value adjustment via long push operation, the new adjusted values are stored only within the RAM. After bus voltage drop or a bus reset, these values will be exchanged with the values programmed with the ETS.
The value adjustment always is carried out in negative direction. After reaching the minimal value, it will continue automatically with the maximal value.

Push-Buttons – Light Scene Control

1
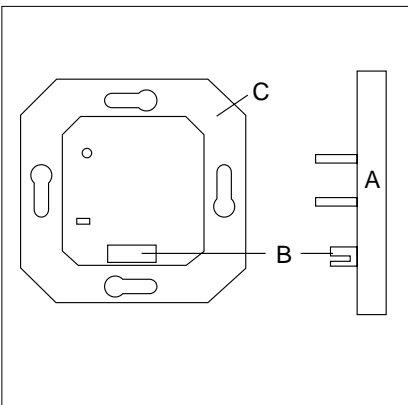
A: Application module (AM)
B: Application interface (AI)
C: Bus coupling unit (BCU)

2

	Ref.-No.
KNX light scene push-button,	
ranges CD 500/CD plus	
ETS-product family:	Push-button
Product type:	General push-button
ivory	**2094 LZ**
white	**CD 2094 LZ WW**
blue	**CD 2094 LZ BL**
brown	**CD 2094 LZ BR**
grey	**CD 2094 LZ GR**
light grey	**CD 2094 LZ LG**
red	**CD 2094 LZ RT**
black	**CD 2094 LZ SW**

1

A: Application module (AM)
B: Application interface (AI)
C: Bus coupling unit (BCU)

2

	Ref.-No.
KNX light scene push-button,	
ranges LS 990/LS plus, Stainless Steel, Aluminium, Anthracite, Gold, Chrome	
ETS-product family:	Push-button
Product type:	General push-button
ivory	**LS 2094 LZ**
white	**LS 2094 LZ WW**
light grey	**LS 2094 LZ LG**
Metal versions	
stainless steel	**ES 2094 LZ**
aluminium	**AL 2094 LZ**
anthracite	**AL 2094 LZ AN**
gold coloured	**GO 2094 LZ**
chrome	**GCR 2094 LZ**

1

A: Application module (AM)
B: Application interface (AI)
C: Bus coupling unit (BCU)

2
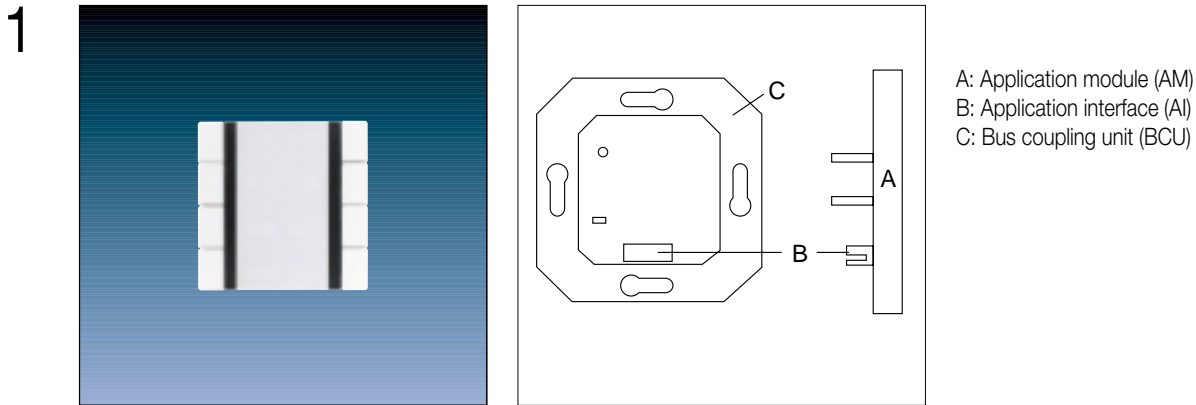
	Ref.-No.
KNX light scene push-button,	
ranges A 500/A plus	
ETS-product family:	Push-button
Product type:	General push-button
ivory	**A 2094 LZ**
white	**A 2094 LZ WW**
aluminium	**A 2094 LZ AL**

3

The KNX light scene push-button stores up to 8 different light scenes from incandescent, low/high voltage halogen and fluorescent lamps.
It is also possible to integrate blinds/shutters into the light scene control. The individual light scenes are stored by pressing any of the 8 rockers for about 5 seconds. A LED signals the correct storage procedure.
The brightness values for the different light scenes are recalled by pressing briefly. Operation from extension units (satellites) is possible as well.
The light scene push-button has three different operation modes. Besides saving and recalling light scenes, it is also possible to switch/dim up to 8 different lighting groups. Hence, there is no necessity of two additional 4-gang push-button to adjust the brightness values or the switching conditions ON/OFF.
Another mode facilitates a cascade of light scene push-buttons to have more than 8 different lighting groups integrated into the light scene control. Furthermore, special light effects can be realized in the cascade mode with endless operation.

4

Technical data

Supply
Voltage: 24 V DC (+6 V / −4 V) via BCU
Power consumption: max. 150 mW
Connection: 2 x 5-pole pin bar
Protection: IP 20
Insulation voltage: referring to VDE 0829 part 230

Behaviour at
voltage drop: all object values are deleted
Operation temperature: −5°C ... +45°C
Storage temperature: −25°C ... +75°C
Mounting: plugged onto a flush mounted BCU
Note: Mechanical theft protection of the application module
is provided.

5

Description of application   **Light scene mode**

The push button can save and recall up to eight different light scenes. Each light scene consists of up to eight different object values. These are either brightness values (dimming actuator, 0...255) or switch values (switch/shutter actuator, 0 or 1).
By a short push (<1 sec.) on the rocker, a light scene will be recalled. During the recalling action of one light scene all brightness values or switching values of the dimming or switching actuators are transmitted. By a long push (>5 sec.) on the rocker, an adjusted light scene will be saved. As an acknowledge the corresponding status LED switches on after about 5 sec. During the saving action all brightness values or switching values of the dimming or switching actuators are read out. To read out these values there has to be set a R-flag in the switch object of one switching actuator per group and a R-flag in the brightness value object of one dimming actuator per group. By the light scene extension input object, the light scenes can be recalled and saved from any satellite (other sensors, binary inputs, etc).

Description of application   **Switch- / Dimming-Mode**

By a special "Three-Rocker-Grip" you can switch-over to the switch-/dimming mode. That mode is indicated by the flashing operation LED (green).
With that mode the push button can be used as a switching or dimming sensor for eight lighting groups.
The device automatically switches-over into the light scene mode as long as there is no manual toggling selected.
The switch-over time can be parameterized.
If the manual toggling is selected, the Three-Rocker-Grip has to be repeated.
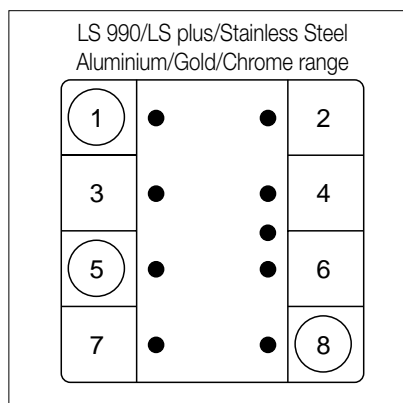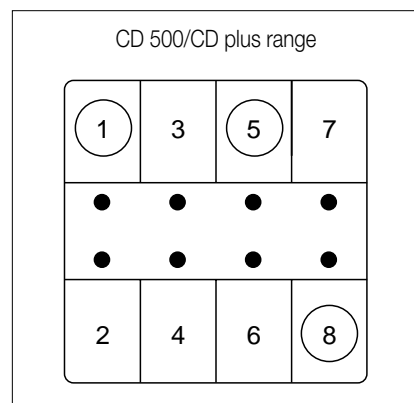
Objects

Number of addresses (dynamic):	22
Number of assignments (dynamic):	22
Communication objects:	20

Object	Name	Function	Type	Flag
0	Output 1	Value 1 switch/dimming	1 / 8 Bit	C, W, T
1	Output 2	Value 2 switch/dimming	1 / 8 Bit	C, W, T
2	Output 3	Value 3 switch/dimming	1 / 8 Bit	C, W, T
3	Output 4	Value 4 switch/dimming	1 / 8 Bit	C, W, T
4	Output 5	Value 5 switch/dimming	1 / 8 Bit	C, W, T
5	Output 6	Value 6 switch/dimming	1 / 8 Bit	C, W, T
6	Output 7	Value 7 switch/dimming	1 / 8 Bit	C, W, T
7	Output 8	Value 8 switch/dimming	1 / 8 Bit	C, W, T
8	Output 1	Dimming	4 Bit	C, T
9	Output 2	Dimming	4 Bit	C, T
10	Output 3	Dimming	4 Bit	C, T
11	Output 4	Dimming	4 Bit	C, T
12	Output 5	Dimming	4 Bit	C, T
13	Output 6	Dimming	4 Bit	C, T
14	Output 7	Dimming	4 Bit	C, T
15	Output 8	Dimming	4 Bit	C, T
16	Input	Light scene cascade	1 Byte	C, W, T
17	Input	Light scene extension	1 Byte	C, W, T
18	Output	Light scene cascade	1 Byte	C, T
19	Disable	Operation	1 Bit	C, W, T

1
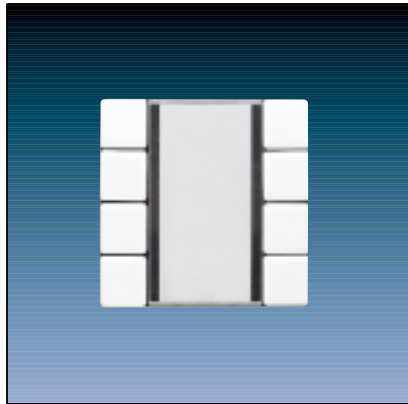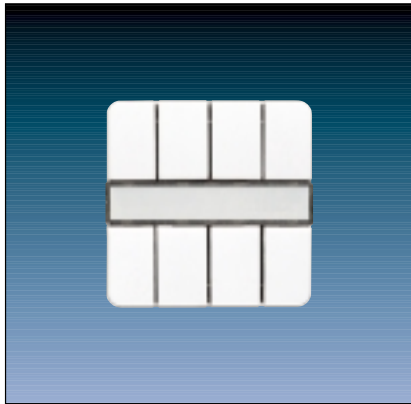
2

	Ref.-No.
KNX 4-gang universal push-button	
Radio-controlled	
ETS-product family:	Push-button
Product type:	General push-button
ranges CD 500/CD plus	
ivory	**2094 F**
white	**CD 2094 F WW**
blue	**CD 2094 F BL**
brown	**CD 2094 F BR**
grey	**CD 2094 F GR**
light-grey	**CD 2094 F LG**
black	**CD 2094 F SW**
ranges LS 990/LS plus, Stainless Steel, Aluminiu, Gold, Chrome	
ivory	**LS 2094 F**
white	**LS 2094 F WW**
light-grey	**LS 2094 F LG**
Metal versions	
stainless steel	**ES 2094 F**
aluminium (laquered)	**AL 2094 F**
anthracite	**AL 2094 F AN**
gold coloured	**GO 2094 F**
chrome	**GCR 2094 F**

3

The radio controlled 4-gang universal push-button is plugged onto a flush mounted bus coupling unit. Its 8 rockers can be adjusted to four different functions separately (switching, dimming, blind/shutter control or value transmitter).
Depending on the adjusted function, it sends telegrams, e.g. to actuators for switching ON/OFF lights, for dimming lights, for recalling or saving light scenes, for moving shutters/blinds up or down and for adjusting the louvres and even to send brightness or temperature values (2 Bytes) to the bus.
Due to the integrated radio receiver, no status LED's are available.

Additionally to the manual operation, the push button can integrate radio controlled transmitters to the KNX.
The received radio signals will be transmitted to appropriate KNX-telegrams. The data transfer is unidirectional.
The following radio transmitters can be thought-in to the radio controlled push button:

> Hand-held transmitters : 48 KFH, 48 FH, 42 FH.
> Wall-mounted transmitters: 1-gang, 2-gang, 4-gang (the 4-gang transmitter can only control up to 4 channels of the 2094 F)
> Flat wall-mounted transmitters: 1-gang, 2-gang, 4-gang (the 4-gang transmitter can only control up to 4 channels of the 2094 F)
> Universal transmitter: FUS 22 UP
> Multifunction transmitter: FMS 4 UP
> Observer: FW 180 WW
> Presence detector: FPM 360 WW

4 Technical data

Supply
Voltage: 24 V DC (+6 V / –4 V) via BCU
Power consumption: max. 150 mW
Connection: 2 x 5-pole pin bar
Input
Number: max 8 radio-controlled transmitters with max 12 channel
Transmission: radio frequency
Carrier frequency: 433.42 MHz
Modulation: ASK (Amplitude Shift Keying)
Transmission range: max. 30 m (free field)
Protection: IP 20
Behavior at bus voltage
drop: no reaction
recovery: delete all object values
Operation temperature: –5°C ... +45°C
Storage temperature: –25°C ... +70°C

5 Guide line for progamming:

When working with the radio controlled push button the ETS design work should be finished before radio transmitters are thought-in.
The following diagram shows the process:
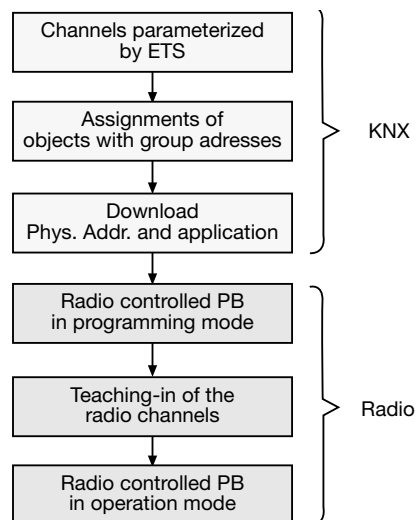
Programming mode of radio controlled push button:

By a special "Three-Rocker-Grip" you can switch over from the operation mode into the programming mode to teach-in the radio transmitters. Push-buttons 1, 5 and 8 have to be pressed until the green LED is flashing. Then the radio channels can be selected and the red LED is flashing until a transmitter channel is thought-in.
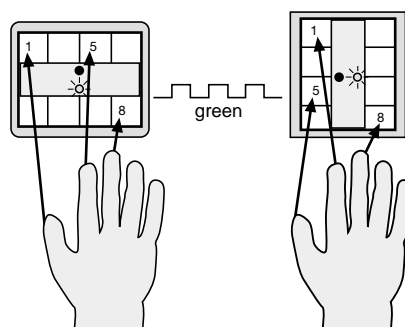
5

Description of software application:
- Free assignment of the functions switching, dimming, shutter/blind and value transmitter to the 8 push-buttons.
- The received radio signals will be transmitted to appropriate KNX-telegrams. The data transfer is unidirectional.
- For each push-button, up to 12 transmitters with 8 different functions can be taught-in.
- Operation display by the green LED.

Function switching:
- Command at pressing/releasing of the push-button adjustable (ON, OFF, Toggle, no function).

Function dimming:
- Push button function darker (OFF), brighter (ON) or darker/brighter (Toggle) adjustable.
- Time between dimming and switching and the dimming steps adjustable.
- Telegram repetition and stop telegram possible.

Function shutter/blinds:
- Push button function (Up/Down) and time between short and long-time operation adjustable.
- Louvres adjustment possible.

Function value transmitter:
- The push button function, dimming value-, brightness value- or temperature value-transmitter as well as recalling and saving light scenes, can be parameterized.
  Value adjustment via long push operation (dimming-, brightness-, temperature-value).

Objects:

Number of addresses: 27
Number of assignments: 27
Communication objects: 17

Object	Name	Function	Type	Flag
0	Output 1	Switch	1 Bit	W, C, T
1	Output 2	Switch	1 Bit	W, C, T
2	Output 3	Switch	1 Bit	W, C, T
3	Output 4	Switch	1 Bit	W, C, T
4	Output 1	Logic link	1 Bit	W, C, T
5	Output 2	Logic link	1 Bit	W, C, T
6	Output 3	Logic link	1 Bit	W, C, T
7	Output 4	Logic link	1 Bit	W, C, T
Function: Switching (for all push buttons *)				
0 – 7	PB1-PB8	Switching	1 Bit	C, W, T, (R)
Function: Dimming (for all push buttons *)				
0 – 7	PB1-PB8	Switching	1 Bit	C, W, T, (R)
8 – 5	PB1-PB8	Dimming	4 Bit	C, T
Function: shutter/blinds (for all push buttons *)				
0 – 7	PB1-PB8	Short time operation	1 Bit	C, T, (R)
8 – 15	PB1-PB8	Long time operation	1 Bit	C, T
Function: value transmitter (light scene control, for all push buttons *)				
8 – 15	PB1-PB8	Light scene extension	1 Byte	C, T
Function: value transmitter (temperature value transmitter, for all push buttons *)				
8 – 15	PB1-PB8	Temp. value transmitter	2 Byte	C, T
Function: value transmitter (brightness value transmitter, for all push buttons *)				
8 – 15	PB1-PB8	Brightness value transmitter	2 Byte	C, T
Function: value transmitter (dimming value transmitter, for all push buttons *)				
8 – 15	PB1-PB8	Dimming value transmitter	1 Byte	C, T
Alarm function, data format 1Bit				
16	PB sensor	Alarm	1 Bit	C, W, (R)
Alarm function, data format 1Byte				
16	PB sensor	Alarm	1 Byte	C, W, (R)

Objects marked with (R): Object value can be read out (set R-flag!)
Functions marked with *: The functions (switching, dimming, shutter/blinds, value transmitter) can be chosen for each PB separately.
                          Due to this choice the communication objects and the object table will change.

5   Notes to software application:

Switching function
- For a two level operation, the objects of the relevant push-buttons must have the same group adresses.

Dimming function:
- For a correct function of the single level operation, the connected dimming actuator must send its status back to switching object of the push-button, too.
- With the single level operation only the switching object is retriggered internally and externally. The dimming object (dimming direction) is retriggered only internally so that in case of used extensions (2 or more sensors dim one lamp) the dimming direction will not always be changed at a new push action.
- For a two level operation, the objects of the relevant push-buttons must have the same group adresses.

Shutter/blinds function:
- This function supports the two level operation only. Therefore the „Step" and „Move" objects of the relevant push-button must have the same group adresses.

Value transmitter function:
- At value adjustment via long push operation, the new adjusted values are stored only within the RAM. After bus voltage drop or a bus reset, these values will be exchanged with the values programmed with the ETS.
  The value adjustment always is carried out in negative direction. After reaching the minimal value, it will continue automatically with the maximal value.

1

Programming push-button

2071.01 LED

2

	Ref.-No.
KNX push-button BCU, 1-gang	**2071.01 LED**
ETS-product family:	Push-button
Product type:	Push-button, 1-gang

3

The 1-gang push-button BCU is an interface between an integrated conventional push-button and the KNX.
The conventional rocker plate has a **switch position** and can operate one switching group.
With the application program, it sends telegrams, for example, to actuators for switching on/off lights, for dimming lights and saving light scenes.
Status indication is possible with one LED.

Software applications:

Switching	105501
Switching, dimming, value transmitting	107401

1

Programming push-button

2071.02 LED

2
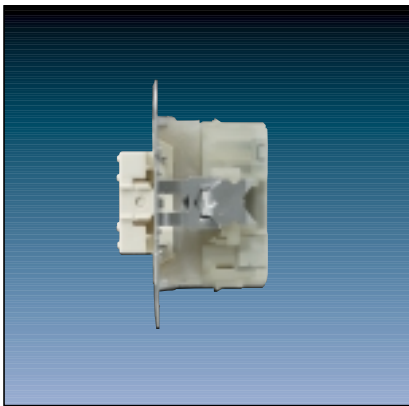
	Ref.-No.
KNX push-button BCU, 1-gang	**2071.02 LED**
ETS-product family:	Push-button
Product type:	Push-button, 1-gang

3

The 1-gang push-button BCU is an interface between an integrated conventional push-button and the KNX.
The conventional rocker plate has a **neutral position** and can operate up to two different groups (with switch function).
With the appropriate parameters it sends telegrams, for example, to actuators for switching on/off lights, for dimming lights, for recalling and saving light scenes or for moving blinds/shutters up or down and for adjusting the louvres of blinds. Status indication is possible with one LED and a specific LED object.

Software applications:

Switch, dimming, shutter	105601
Switch, dimming, shutter, value transmitting	107301

Push-Button BCU 2-gang
(switch/neutral position)

1

Programming push-button

2072.01 LED

2
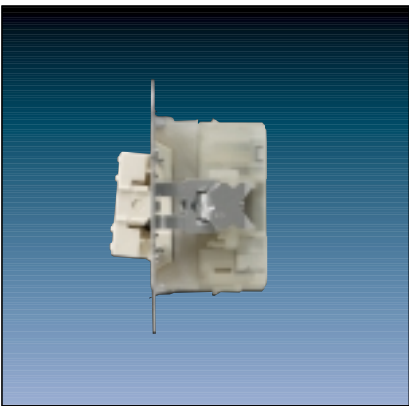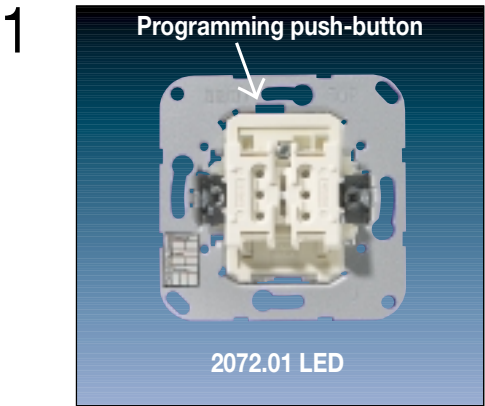
	Ref.-No.
KNX push-button BCU 2-gang	**2072.01 LED**
ETS-product family:	Push-button
Product type:	Push-button, 2-gang

3 The 2-gang push-button BCU is an interface between an integrated conventional push-button and the KNX. The conventional rocker plate has a **switch position** and can operate up to two different groups (with switch function).

With the appropriate parameters it sends telegrams, for example, to actuators for switching on/off lights, for dimming lights, for recalling and saving light scenes or for moving blinds/shutters up or down and for adjusting the louvres of blinds. Status indication is possible with two LED's.

Software applications:

Switch, dimming, shutter	105701
Switch, dimming, shutter, value transmitting	106701

1

Programming push-button

2072.02 LED

2
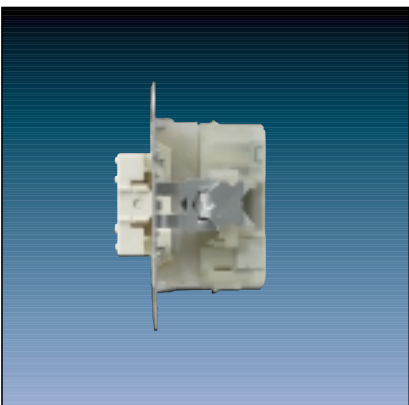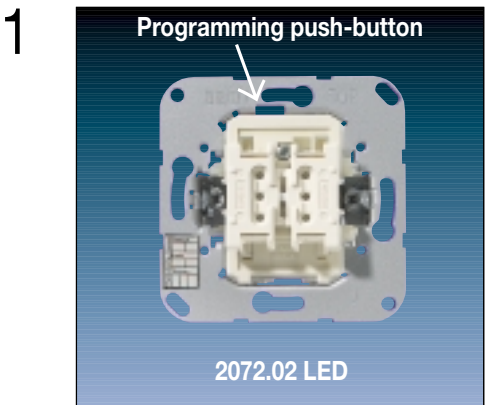
	Ref.-No.
KNX push-button BCU 2-gang	**2072.02 LED**
ETS-product family:	Push-button
Product type:	Push-button, 2-gang

3 The 2-gang push-button BCU is an interface between an integrated conventional push-button and the KNX. The conventional rocker plate has a **neutral position** and can operate up to four different groups (with switch function).

With the appropriate parameters it sends telegrams, for example, to actuators for switching on/off lights, for dimming lights, for recalling and saving light scenes or for moving blinds/shutter up or down and for adjusting the louvres of blinds. Status indication is possible with two LED's.

Software applications:

Switch, dimming, shutter	105801
Switch, dimming, shutter, value transmitting	106001

4

Technical data

Supply
Voltage: 24 V DC (+6 V / –4 V)
Power consumption: max. 150 mW
Connection: KNX connection block
Protection: IP 20
Behaviour at
  Bus voltage drop: Object values will be set to "0".
                                        LED's are switched off, no telegram is sent.
Bus voltage returns: Object values remain "0".
                                        LED's remain off, no telegram is sent.
Operation temperature: –5°C ... +45°C
Storage temperature: –40°C ... +55°C

The push-button BCU fits in every JUNG range like
CD 500/CD plus, LS 990/LS plus, Stainless Steel, Aluminium, AS 500/A 500/A plus and SL 500.
The corresponding Ref.-No. are shown in the main catalogue.

Programs

AS 500
A 500
CD 500
SL 500
LS 990
Stainless Steel
Aluminium
Anthracite
Gold
Chrom

Push-Button BCU 1-gang
WG 800   IP 44   breakproof

1

2

	Ref.-No.
KNX push-button BCU, 1-gang	
switch position	**8071.01 LED W**
ETS-product family:	Push-button
Product type:	Push-button, 1-gang

3 Function Switching, dimming, value transmitting
Status indication with one LED.
Depending on the version of the push-button BCU – 1-gang rocker or 2-gang rocker – center plates are used with and without indication lights. The "upper" or "lower" rockers can be controlled with the push-button with "neutral position", while only the "lower" rocker can be pressed with the push-button with "switch position". The push-button BCU can only function with an application program i.e. the push-button BCU consists of the device (hardware) and the application program (software).

1

2

	Ref.-No.
KNX push-button BCU, 1-gang	
neutral position	**8071.02 LED W**
ETS-product family:	Push-button
Product type:	Push-button, 1-gang

3 Function Switching, dimming, value transmitting
Status indication with one LED and specific LED object.
Depending on the version of the push-button BCU – 1-gang rocker or 2-gang rocker – center plates are used with and without indication lights. The "upper" or "lower" rockers can be controlled with the push-button with "neutral position", while only the "lower" rocker can be pressed with the push-button with "switch position". The push-button BCU can only function with an application program i.e. the push-button BCU consists of the device (hardware) and the application program (software).

1

2

	Ref.-No.
KNX push-button BCU, 2-gang	
switch position	**8072.01 LED W**
ETS-product family:	Push-button
Product type:	Push-button, 1-gang

3 Function Switching, dimming, value transmitting
Status indication with two LEDs.
Depending on the version of the push-button BCU – 1-gang rocker or 2-gang rocker – center plates are used with and without indication lights. The "upper" or "lower" rockers can be controlled with the push-button with "neutral position", while only the "lower" rocker can be pressed with the push-button with "switch position". The push-button BCU can only function with an application program i.e. the push-button BCU consists of the device (hardware) and the application program (software).

1

2

	Ref.-No.
KNX push-button BCU, 2-gang	
neutral position	**8072.02 LED W**
ETS-product family:	Push-button
Product type:	Push-button, 1-gang

3 Function Switching, dimming, value transmitting
Status indication with one LED and specific LED object.
Depending on the version of the push-button BCU – 1-gang rocker or 2-gang rocker – center plates are used with and without indication lights. The "upper" or "lower" rockers can be controlled with the push-button with "neutral position", while only the "lower" rocker can be pressed with the push-button with "switch position". The push-button BCU can only function with an application program i.e. the push-button BCU consists of the device (hardware) and the application program (software).

Push-Button BCU 1-gang

WG 800   IP 44   breakproof

1

800 NT

800 P

800 NA

2

Center plates for push-button BCU	Ref.-No.
1-gang rocker	**800 NT**
Suitable inserts:	**8071.01 LEDW, 8071.02 LED W**
1-gang rocker with 2 symbols for up/down	**800 P**
Suitable inserts:	**8071.02 LED W**
1-gang rocker with inscription field	**800 NA**
Suitable inserts:	**8071.01 LEDW, 8071.02 LED W**

1

2

Center plates for push-button BCU	Ref.-No.
1-gang rocker with transparent lens	**800 KO**
Suitable inserts:	**8071.01 LEDW, 8071.02 LED W**
Symbols	
anthracite, light	**33 AN L**
anthracite, bell	**33 AN K**
anthracite, door	**33 AN T**
anthracite, neutral	**33 AN N**
anthracite, STOP	**33 AN STOP**
green, neutral	**33 GN**
transparent	**33 KLAR**
red, neutral	**33 N R**

1

| 805 NT | 805 P | 805 MP |
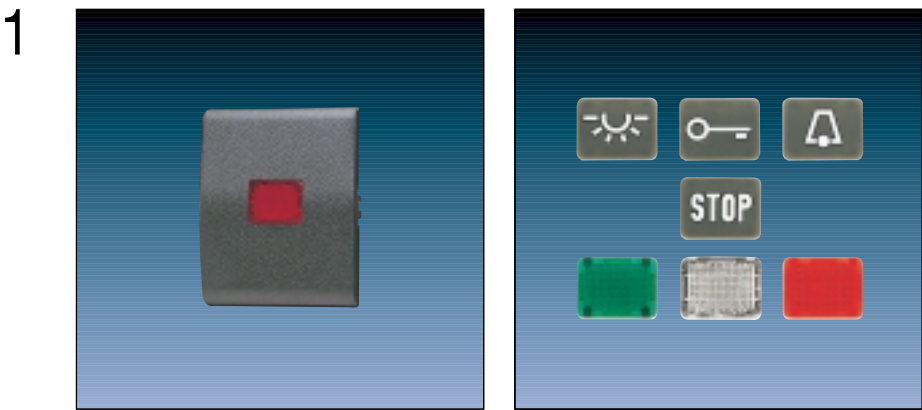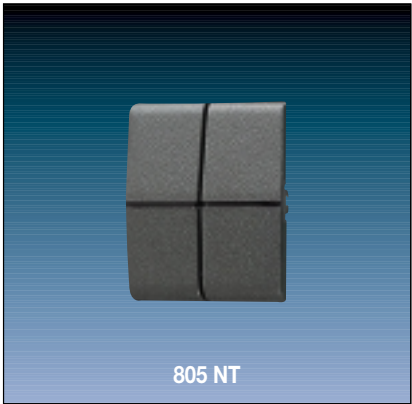
2

	Ref.-No.
Center plates for push-button BCU	
2-gang rocker	**805 NT**
Suitable inserts:	**8072.01 LEDW, 8072.02 LED W**
2-gang rocker with 2 symbols for up/down	**805 P**
Suitable inserts:	**8072.01 LED W**
2-gang rocker with 4 symbolds for up/down	**805 MP**
Suitable inserts:	**8072.02 LEDW**

Room controller

LS 990 / LS plus
Stainless Steel / Aluminium

1

| RCDES 2021 | RCDES 2022 | RCDES 2023 | RCDES 2024 | RCDES 2044 |

2

		Ref.-No.
KNX room controller display		
ETS-product family:	Heating, ventilation, A/C	
Product type:	Regulator	
3-gang	ivory	**RCD 2021**
	white	**RCD 2021 WW**
	light grey	**RCD 2021 LG**
	stainless steel	**RCDES 2021**
	aluminium (laquered)	**RCDAL 2021**
	anthracite (laquered)	**RCDAL 2021 AN**
	gold coloured	**RCDGO 2021**
4-gang	ivory	**RCD 2022**
	white	**RCD 2022 WW**
	light grey	**RCD 2022 LG**
	stainless steel	**RCDES 2022**
	aluminium (laquered)	**RCDAL 2022**
	anthracite (laquered)	**RCDAL 2022 AN**
	gold coloured	**RCDGO 2022**
5-gang	ivory	**RCD 2023**
	white	**RCD 2023 WW**
	light grey	**RCD 2023 LG**
	stainless steel	**RCDES 2023**
	aluminium (laquered)	**RCDAL 2023**
	anthracite (laquered)	**RCDAL 2023 AN**
	gold coloured	**RCDGO 2023**
6-gang	ivory	**RCD 2024**
	white	**RCD 2024 WW**
	light grey	**RCD 2024 LG**
	stainless steel	**RCDES 2024**
	aluminium (laquered)	**RCDAL 2024**
	anthracite (laquered)	**RCDAL 2024 AN**
	gold coloured	**RCDGO 2024**
8-gang	ivory	**RCD 2044**
	white	**RCD 2044 WW**
	light grey	**RCD 2044 LG**
	stainless steel	**RCDES 2044**
	aluminium (laquered)	**RCDAL 2044**
	anthracite (laquered)	**RCDAL 2024 AN**
	gold coloured	**RCDGO 2024**

3

The KNX room controller with display combines three devices:
– Universal push-button plus additional features
– Room thermostat with continuous control or 2 point switch control method for heating and/or cooling and additional heating/cooling system,
  plus additional features
– LCD display (visible: 30 mm / 35 mm), with restricted functions
– Fan Coil Control

Via corresponding symbols the different operation modes are indicated. The device has a green operation LED and each push-button has its own red status LED with the option of an own communication object.
The device comes with a separate software which contains the application software as well as the data base. That software has to be installed first within the directory of the used ETS version. Then the data base has to be imported as usual within the ETS. By opening the parameters the embedded software is started automatically.
The room controller can be extended with additional push-buttons or socket outlets by using 3- to 5-gang frames.
The BCU is already integrated into the device.

Note: The device comes together with the software.
The latest software can be downloaded from our web-page: www.jung.de

4

Technical data

Supply

Voltage:	24 V DC (+6 V / –4 V) via integrated BCU
Power consumption:	max. 240 mW
Connection:	KNX connection block
Range of measurement:	0 ... 40°C
Comfort temperature:	7 ... 40°C
Set point offset:	max. ± 10 K
Protection:	IP 20
Operation temperature:	–5°C ... +45°C
Storage temperature:	–25°C ... +75°C

5

Connection and mounting of RCD 20xx:
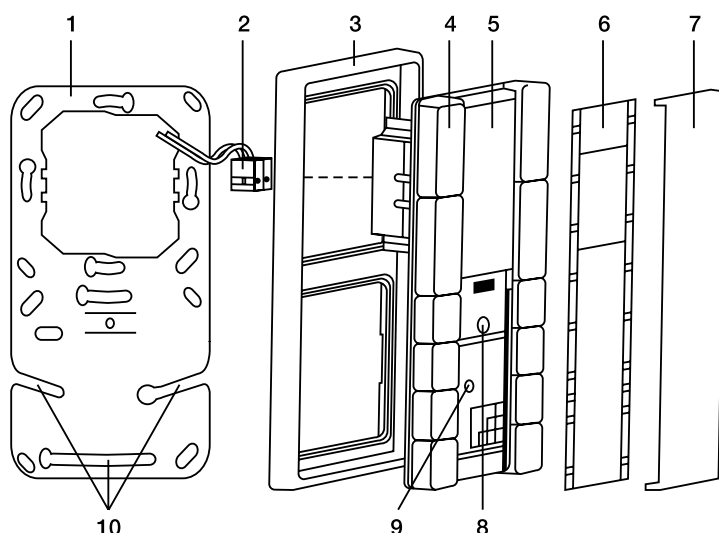
Mounting:
a. Metal supporting frame (1) to be mounted on one or two vertically arranged wall boxes.
   When using only one box, the lower part has to be screwed via the fixing holes (10).
b. Attach the frame (3) to the RCD.
c. Connect the bus terminal (2) at the back side.
d. Attach the RCD (4) and frame (3) on the metal supporting frame (1).
e. Screw on the fixing screw (8).
f. Remove the protection foil (5) from the display.
g. Put on the transparent cover (7) with the inscription foil (6) to the RCD.

The programming mode is activated by pushing the programming button (9).

Note: Do not mount the device next to heat sources due to the influence of the integrated
temperature sensor.

5

Description of software application:

There are two operation levels to operate the room controller:
1. complete universal push-button functionality on **all** push-buttons
2. temperature adjustment with the four push-button beside the LCD display

By pressing the upper two push-buttons simultaneously for approx. 3 sec. the second level is activated. After the adjustments in this level, the change over into the first level is dependent on the parameter.

1. Operation level:
  – Switching, toggling
  – Dimming (single level / two level dimming)
  – Shutter / blind control (single level / two level control)
  – Value transmitter
  – Light scene recall with memory
  – Light scene recall without memory
  – Brightness value transmitter (0 ... 1500 Lux)
  – Presence push-button for thermostat (comfort / stand by mode)
  – Set temperature offset adjustment (+ / –)
  – Enable / disable function for single push-buttons or for the whole RCD
  – Status LED for each push-button with separate objects
  – Display indication: – week day, time
               – set or real temperature
               – actual operation mode of the thermostat
               – external value (e.g. wind speed, outside temperature, etc.)
  – Fan coil control: – manual in 3 or 4 steps
               – automatic

Default setting:

In operation level 1 all push-buttons have the parameterised function. The LCD can display either the actual temperature, the actual set-temperature of the continuous regulator, the actual time, the actual date or an external value. When more than one information has to be displayed, the display is alternating.
In the default setting, the push-button on the left and right side of the display serve the presence and the set-temperature adjustment.

According to the needs, the default setting can be changed to the full function of an universal push-button.

Switch-over
between comfort-temperature
and
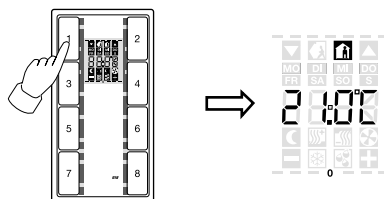
standby-temperature.
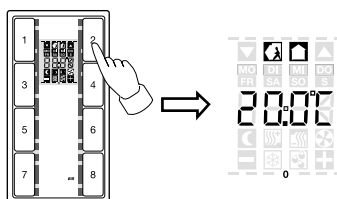
Adjusting the comfort-temperature:

Left push-button: lower the comfort-temperature
Right push-button: raise the comfort-temperature

or

5
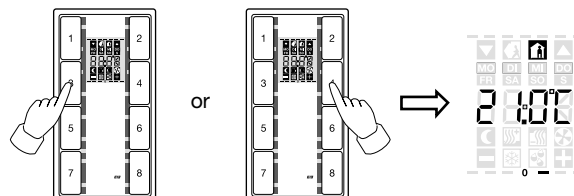
Description of software application:

2. Operation level:
– First display in this level can be parameterized
– First pair of push-buttons: scroll function of the operation modes with their corresponding temperatures values, as comfort temperature, standby / night shift back, display contrast and display segment test
– Second pair of push-buttons: adjustment of the different functions
– Rest of the push-buttons: no function

Via long push-button action (> 3 s) of push-button 1 + 2 the device switches over to the 2nd operation level. In this operation level the set-values of the continuous regulator and the contrast of the LC-Display can be adjusted. Scroll through the menu using push-buttons next to ▲ / ▼ symbols.
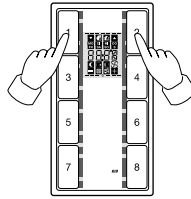
While the display flashes, the set-values can be adjusted.
With the push-buttons next to the ± symbols the values can be changed.
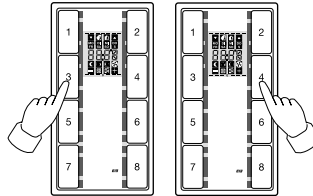
Long push-button action (> 3s) of the push-buttons 1 + 2:
Storing and back to operation level 1.
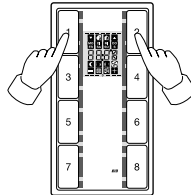
The first indication of the display in the 2nd operation level can be parameterised.
Hence the menu guidance can differ from the display at the device.

Segment test

adjusted
comfort-temperature
display flashes

contrast-adjustment
display of the RCD-type

lower
stand-by operation heating
display flashes

raise
night operation cooling
display flashes

lower
night operation heating
display flashes

raise
stand-by operation cooling
display flashes

5
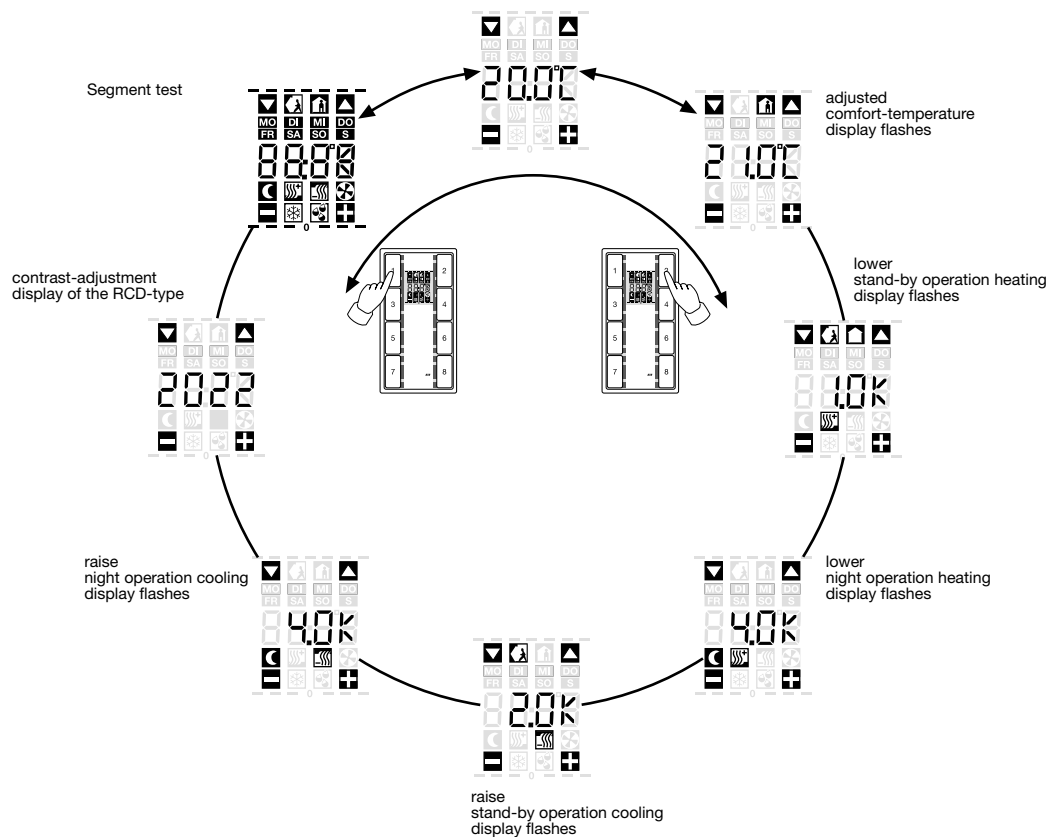
Description of software application:

A) Enable / disable function:

It is possible to disable single push-buttons or all push-buttons. When a disabled push-button is pressed (or released) there is either no reaction or a command, which is normally released by another push-button.

Furthermore, there are parameters to define telegrams even during the blocking and at the end of blocking.

B) Shutter / blind operation modes:

Concept 1: Step-Move-Step („normal universal push-button concept").

A push-button (PB) action causes a step telegram. The step-move time (T1) runs. Releasing the push-button within T1 causes no further telegram. By pressing the PB longer than T1, a move telgram will be send, the louvres adjustment time (T2) starts. Releasing the PB within T2 causes a step telegram while pressing longer than T2 causes no further telegram.

Press PB

| T1 | T2 | |
| Release = no action | release = step | no action |

Step   Move

T1 = Time between Move and Step
T2 = louvre adjustment time
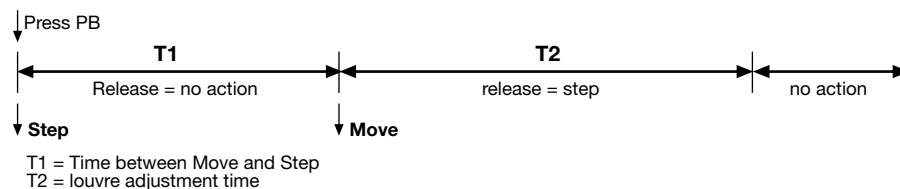
Concept 2: Move-Step

A PB action causes a move telegram. The louvers adjustment time (T2) runs. Releasing the PB within T2 causes a step telegram while pressing longer than T2 causes no further telegram.

Press PB

| T2 | |
| Release = step | no action |

Move

T2 = louvre adjustment time
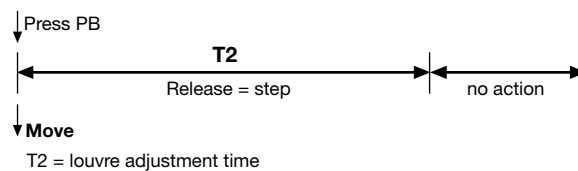
Concept 3: Step-Move

A PB action causes a step telegram. The step-move time (T1) runs. Releasing the PB within T1 causes no further telegram. By pressing the PB longer than T1, a move telegram will be send.

Press PB

| T1 | |
| Release = no action | no action |

Step   Move

T1 = Time between Move and Step
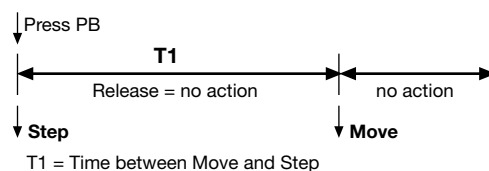
Concept 4: Move-Step or Step

This concept is similar to concept 1. In difference, the first PB action causes no step telegram. The step-move time (T1) starts. Releasing the push-button within T1 causes a step telegram. By pressing the PB longer than T1, a move telegram will be send, the louvers adjustment time (T2) starts. Releasing the PB before T2 is finished causes a step telegram while pressing longer than T2 causes no further telegram.

Press PB

| T1 | T2 | |
| Release = step | release = step | no action |

Move

T1 = Time between Move and Step
T2 = louvre adjustment time
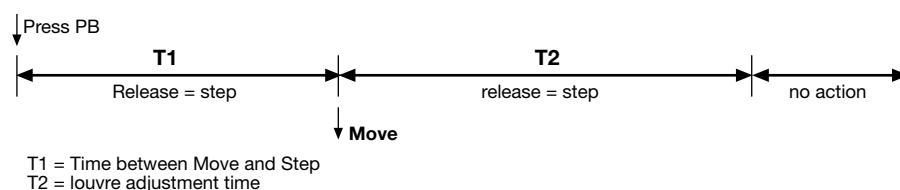
T1 = Time between Move and Step
T2 = Louvre adjustment time

5

C) Fan coil control

The use of **fan coil control** requires the "constant PI-control" or the "PWM control" for regulation.

The fan coil control can be carried out:
• Automatically operated
• Manually operated

Automatic operation mode:
The **set value** of the **controller** is used for the internal control of **the fan level**.
When changing between fan levels, it can only be changed to the next higher or lower fan level to secure a possibly required leadtime of the heating/cooling medium.

Manual operation mode:
By means of pressing the button with the function "Manual control" the RCD differs if it is in automatic or manual operation mode.
If it is in automatic operation mode, it will switch into manual operation mode and the fan will be switched OFF.
If the RCD is already in the manual operation mode, it will switch into the next higher fan level.
If the RCD is in the manual operation mode and the fan is in the highest level, the fan will be switched OFF.

Push-button functions "fan level"
The push-button function "fan level" can be parameterised in two ways:
Fan control in automatic operation mode or fan control in manual operation mode
By means of pressing the button with the function "automatic", the automatic operation mode will be active.
By means of pressing the button with the function "manual control", the manual operation mode will be active.
The push-button function "fan level" has no communication objects. This function refers directly to the object values and the automatic object.

Indication on Display
When the fan is running, a symbol for the fan appears in the display of the RCD. The actual fan level will be displayed in the upper segment line from right to the left.
For example the fan level 3 will be displayed with the 3 upper segments on the right side.

Forced position
With the parameter "forced position" **a specific** fan levels can be predefined. When the respective object receives the value 1, the "forced position" is activated. Then only the predefined fan level is activated and can not be changed with automatic or manual operation mode to another fan level. When the respective object receives the value 0, the "forced position" is deactivated.

Level restriction
With the parameter "level restriction" a **maximum** fan level can be predefined. When the respective object receives the value 1, the "level restriction" is activated.
Only the predefined level and lower fan levels can be selected with the automatic or manual operation mode. (Exception: Forced position)
If a higher fan level is switched on before activation of the "level restriction", the parameterised fan level will be activated.

Switching of operation modes (fan)
The switch over between manual and automatic operation mode will be enabled via:
switch objects (1 bit)
value objects (1 byte)

Fan level switching via switch object (1 bit)
Each fan level has a switch object. When changing between fan levels, the active fan level will be switched off before the new selected fan level will be switched on.
The switch objects of the respective switch actuator are **only** allowed to be switched from the RCD. Only the RCD should be able to send writing telegrams.

Fan level switching via value object (1 byte)
Each fan level is assigned to one value of the value object (see chart). The respective switch actuator must be able to read values of the 1 byte object to switch the desired fan level contact. Only the RCD should be able to send writing telegrams.

Object No. 89 "Fan, fan level 1 – 3 (4)"

Object value	Fan level
0	OFF level
1	Level 1
2	Level 2
3	Level 3
4	Level 4
5	

5

D) First operation level

In the first operation level it is possible to parameterise up to 5 indications. If more than 1 indication is parameterised, these will alternate.

In the first operation level can be displayed:

• Actual value

• Set value

• Date

• Time

• External value

For better identification of actual and setpoint temperature an additional "s" is indicated in the display together with the **set** temperature.

The external value can be displayed in format 1 byte or 2 byte. It can be added a leading sign or a measuring unit. When the external value is displayed, all other display symbols are not indicated. The external value will always be displayed without decimal places. The range of values depends on the parameterisation.

Range of values (1 byte)

	with measuring unit	without measuring unit
With leading sign	–99 ... 99	–128 ... 127
Without leading sign	0 ... 255	0 ... 255

Range of values (2 byte)

	with measuring unit	without measuring unit
With leading sign	–99 ... 99	–999 ... 999
Without leading sign	0 ... 999	0 ... 9999

E) Second operation level

In the second operation level the switch over between standby and comfort mode can be released with the prameter "changing of operation mode in operation level 2". If the changing is released, the operation mode can be switched over in the second display of the second operation level.

Consideration of outdoor temperature

If the parameter "Consideration of outdoor temperature" will be parameterised with "yes", the ECON generates the object "outdoor temperature" (object 95) of type EIS 5. The connected function limits the setting of the setpoint temperature to max. 6 Kelvin. This also means, that the setpoint temperature will be adjusted to the outdoor temperature (outdoor temperature minus 6 K).

This parameter and the connected functionality is only visible, if the operation mode "cooling" or "heating & cooling" is parameterised.

Commissioning note:

When an ETS project with an RCD has to be exported and imported into another PC, please ensure that the software is also installed on the target PC!

6 Symbols
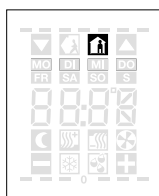
Comfort mode	Heat protection (dew point)
Standby mode	Heating
Night mode	Cooling
Frost protection	Date, time or temperature display
Menu operation	Set point adjustment
Step 1 – 4 FanCoil	Set temperature
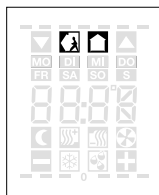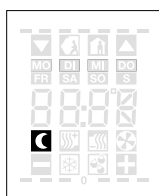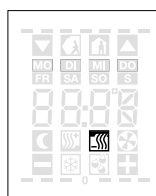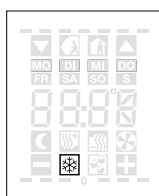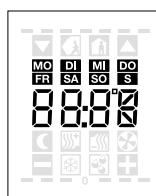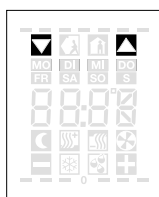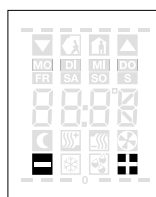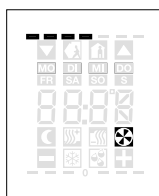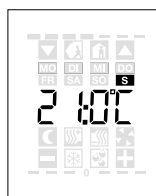
FD Room controller

LS 990 / LS plus

Stainless Steel / Aluminium / Anthracite

1

FD RCD 4-gang

FD RCD 6-gang

2

		Ref.-No.
KNX FD room controller display (RCD)		
ETS-product family:	Heating, A/C, ventilation or push-button	
Product type:	Regulator or temperature	
FD RCD 4-gang	ivory	**RCD 3094 M**
	white	**RCD 3094 M WW**
	light grey	**RCD 3094 M LG**
	stainless steel	**RCDES 3094 M**
	aluminium	**RCDAL 3094 M**
	anthracite	**RCDAL 3094 M AN**
FD RCD 6-gang	ivory	**RCD 3096 M**
	white	**RCD 3096 M WW**
	light grey	**RCD 3096 M LG**
	stainless steel	**RCDES 3096 M**
	aluminium	**RCDAL 3096 M**
	anthracite	**RCDAL 3096 M AN**

3
The KNX FD room controller display (RCD) combines three devices:
– Universal FD push-button functions including light scene plus additional features.
– Room temperature controller with continuous PI control , switching PI control (pulse width modulation) or a switching two-step control
  for heating or cooling and additional heating/cooling system, plus additional features.
– Fan coil application with up to 4 fan speeds and auto function.
– LCD display is freely programmable (14 byte string text) with up to 4 pages with up to 3 lines. After push an info text with status indication
  (pop-up text) can be displayed as an option instead an inscription on the rockers.

Via corresponding symbols the different operation modes are indicated. The device has a blue operation LED and each push-button has its own
red status LED with the option of an own communication object.
The key arrangement (operation) is optional either top / bottom or left / right.
The device comes with a vd 4 data base which includes the plug-in software already which makes the handling more easier.
The room controller can be extended with additional FD push-buttons by using 3- to 5-gang frames and can be implemented in the various
LS design range by means of using the twistable supporting frame.
The BCU is already integrated into the device.

Note: Due to the dynamic software it is recommended to check the latest software status on our web-page: www.jung.de.
Attention: The software requires at least the ETS 3 version d !

4   Technical data

KNX Supply

Voltage:	21 – 32 V DC
Power consumption:	typ. 150 mW
Connection:	bus terminal (KNX type 5.1)
Protection:	IP 20
Operation temperature:	−5°C ... +45°C
Storage temperature:	−25°C ... +75°C (storage above +45 °C results in shorter life time)
Type of fastening:	Fixing to the supporting frame by means of the attached plastic screws

Connection and mounting of the FDRCD ..309x M..:
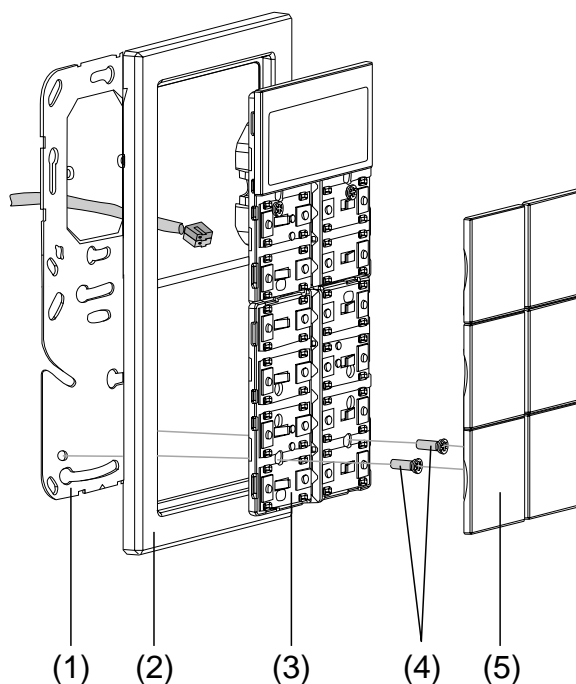
(1)   (2)   (3)   (4)   (5)

a. Metal supporting frame (1) to be mounted on a wall box. Marking "TOP" = on top; "A" in front for FD frame or "B" in front for LS 990, LS plus frame.

b. Attach design-frame (2) onto the supporting frame.

c. Connect FD RCD module (3) with standard bus connector to the KNX and attach it to the supporting frame.

d. When mounting on a single wall box (no wall box under the lower part) generate space for the lower plastic screws in the wall, approx. 10 mm (e.g. drill 6 mm). Use the supporting frame for positioning.

e. Fix the FD RCD module (3) to the supporting frame by means of the plastic screws (4) → dismounting / burglar protection. Screw the plastic screws slightly only.

f. Download the physical address into the device before mounting the design covers (5).

Note: Do not mount the device next to heat sources due to the influence of the integrated temperature sensor !

5   Description of software application:

During printing stage the technical manual was not yet available.
For further description of the application please refer to the FD universal push-button ref.-no. 309x TSM and
the room temperature controller 2178.
The complete documentation will be available for download on our web-page.

Physical Sensors

Automatic Switch – Standard

1

2
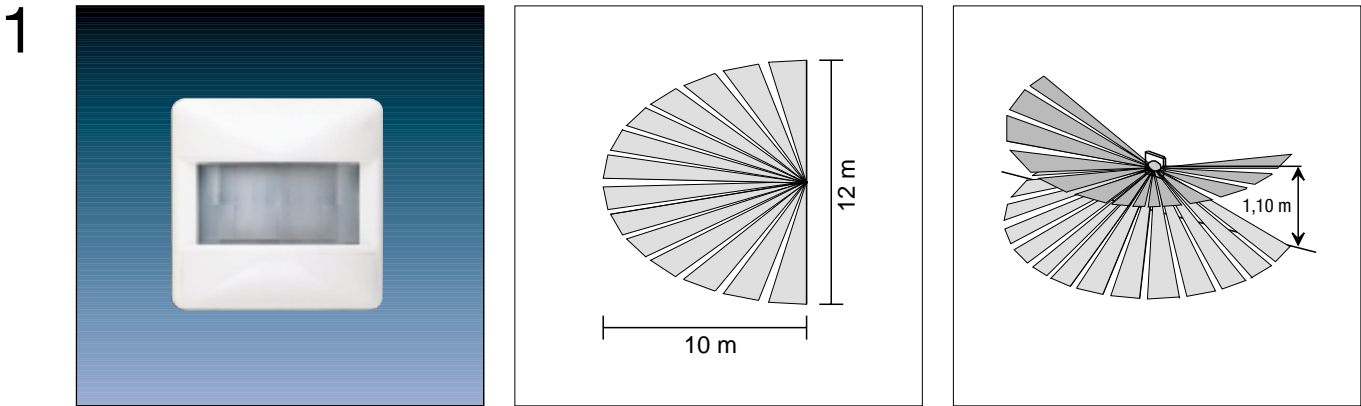
	Ref.-No.
KNX PIR automatic switch 180°	
1.1 m, standard	
ETS-product family:	Physical sensors
Product type:	Movement
ranges CD 500/CD plus	
ivory	**3180**
white	**CD 3180 WW**
blue	**CD 3180 BL**
brown	**CD 3180 BR**
grey	**CD 3180 GR**
light grey	**CD 3180 LG**
red	**CD 3180 RT**
black	**CD 3180 SW**
ranges LS 990/LS plus/Stainless Steel/Aluminium/Anthracite/Gold/Chrome	
ivory	**LS 3180**
white	**LS 3180 WW**
light grey	**LS 3180 LG**
Metal versions	
stainless steel	**ES 3180**
aluminium	**AL 3180**
anthracite	**AL 3180 AN**
gold coloured	**GO 3180**
chrome	**GCR 3180**
ranges AS 500/A 500/A plus	
ivory	**A 3180**
white	**A 3180 WW**
aluminium	**A 3180 AL**

3

The KNX automatic switch is plugged onto a flush mounted bus coupling unit. It reacts to changes in temperature like people moving into the detection area. This causes switching commands to devices such as binary outputs to switch groups of lights.
The automatic switch has a detection angle of 180° and an area of 10 x 12 m. This angle can be restricted to 90° with a slip-on screen.
The device has to be mounted at a height of 1.1 m.

Software applications:

PIR single unit	A00101	Vers. 1
PIR master	A00201	Vers. 1
PIR extension	A00301	Vers. 1

1

12 m

4,5 m

12 m

2
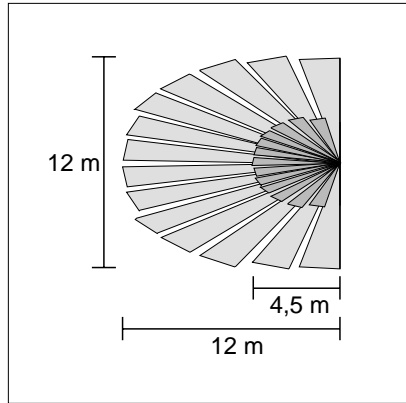
	Ref.-No.
KNX PIR automatic switch 180°	
2.2 m, standard	
ETS-product family:	Physical sensors
Product type:	Movement
ranges CD 500/CD plus	
ivory	**3280**
white	**CD 3280 WW**
blue	**CD 3280 BL**
brown	**CD 3280 BR**
grey	**CD 3280 GR**
light grey	**CD 3280 LG**
red	**CD 3280 RT**
black	**CD 3280 SW**
ranges LS 990/LS plus/Stainless Steel/Aluminium/Anthracite/Gold/Chrome	
ivory	**LS 3280**
white	**LS 3280 WW**
light grey	**LS 3280 LG**
Metal versions	
stainless steel	**ES 3280**
aluminium	**AL 3280**
anthracite	**AL 3280 AN**
gold coloured	**GO 3280**
chrome	**GCR 3280**
ranges AS 500/A 500/A plus	
ivory	**A 3280**
white	**A 3280 WW**
aluminium	**A 3280 AL**

3

The KNX automatic switch is plugged onto a flush mounted bus coupling unit. It reacts to changes in temperature like people moving into the detection area. This causes switching commands to devices such as binary outputs to switch groups of lights.
The automatic switch has a detection angle of 180° and an area of 12 x 12 m. This angle can be restricted to 90° with a slip-on screen.
The device has to be mounted at a height of 2.2 m.

Software applications:

PIR single unit	A00101	Vers. 1
PIR master	A00201	Vers. 1
PIR extension	A00301	Vers. 1

4

Technical data:

Supply
Voltage:	24 V DC (+6 V / –4 V) via BCU
Power consumption:	max. 110 mW
Connection:	2 x 5-pole pin bar
Protection:	IP 20
Insulation voltage:	referring to V VDE 0829 part 230

Behaviour at
Bus voltage drop:	no telegrams are sended
Bus voltage return:	object values = 0, **out of function for approx. 80 sec.**
Operation temperature:	–5°C ... +45°C
Storage temperature:	–25°C ... +75°C
Mounting:	plugged onto a flush mounted BCU

5

Description of application
1. Single unit A 00101

After detection of any movement the device will send an ON-telegram. At the end of detection and after the default min. delay time of 10 sec an OFF-telegram will be released. The evaluation of detection and the delay time can also be changed by parameters.
To avoid malfunctions after releasing the OFF-telegram (e.g. wrong detection by cooling down of a switched off halogen lamp), the device is locked-out for about 3 sec. In between these 3 sec no detection can be evaluated. The lock-out time can be adjusted by parameters.
The automatic switch only evaluates detections when the brightness value is under the adjusted dimmed lighting level which has a default value of 15 Lux. There is also the possibility to set the device brightness independent.
Additionally, a cyclical transmission during the detection can be activated.
By a special object the so-called disable object, the automatic switch is inactive. That means it can not detect any movement as long as the disable object is active. The telegram at start and end of blocking can be adjusted by parameters.

Objects

Number of addresses (dynamic):	5	
Number of assignments (dynamic):	5	
Communication objects:	2	

Object	Name	Function	Type	Flag
0	Switch	Switch	1 Bit	C, W, T
1	Disable	Disable	1 Bit	C, W

Description of application
2. Master unit A 00201 / extension unit A 00301

With the combination of these applications it is possible to have one or several extension units (satellites) to one master unit.
Additionally, to the features of the application single unit there is one more object, the so-called movement object.
That is the object used for the communication between the master and the extension unit.
Every extension unit receives the real switch telegram of the master unit by the object switch (status). That is necessary for the extension to know the real switch status of the master.

Note: In the project design you have to take care that the switch objects of the devices (master/extensions) and the movement objects are connected together.
After commissioning or after bus voltage recovery the device is blocked for about 80 sec. During that time no movements can be delected.

Objects

Number of addresses (dynamic):	6	
Number of assignments (dynamic):	6	
Communication objects:	3	

Object	Name	Function	Type	Flag
0	Switch	Switch	1 Bit	C, W, T
1	Disable	Disable	1 Bit	C, W
2	Movement	Event signal from extensions input	1 Bit	C, W, T
2	Movement	Event signal to master	1 Bit	C, W, T

1

12 m

10 m

1,10 m

2
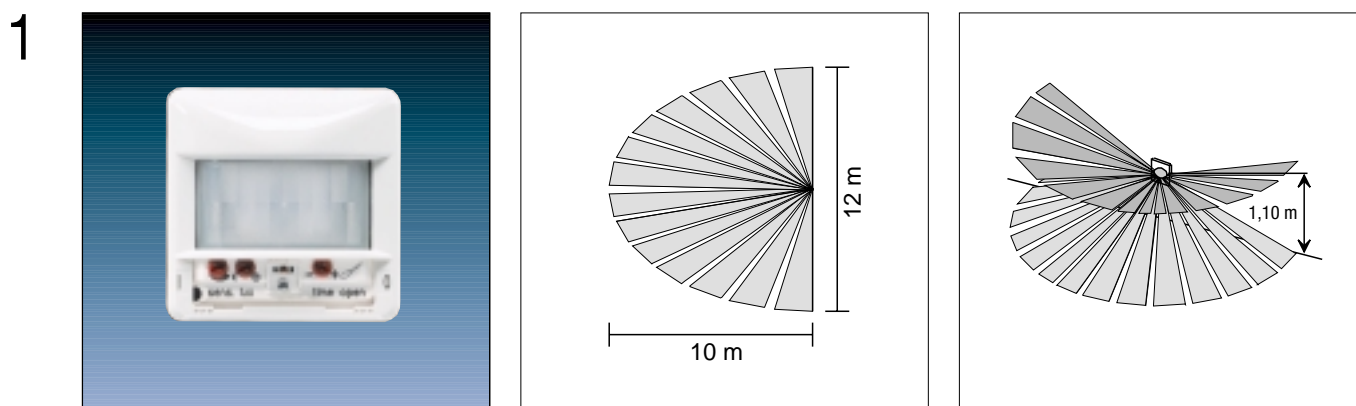
	Ref.-No.
KNX PIR automatic switch 180°	
1.1 m, universal	
ETS-product family:	Physical sensors
Product type:	Movement
ranges CD 500/CD plus	
ivory	**3180-1 A**
white	**CD 3180-1 A WW**
blue	**CD 3180-1 A BL**
brown	**CD 3180-1 A BR**
grey	**CD 3180-1 A GR**
light grey	**CD 3180-1 A LG**
red	**CD 3180-1 A RT**
black	**CD 3180-1 A SW**
ranges LS 990/LS plus/Stainless Steel/Aluminium/Anthracite/Gold/Chrome	
ivory	**LS 3180-1 A**
white	**LS 3180-1 A WW**
light grey	**LS 3180-1 A LG**
Metal versions	
stainless steel	**ES 3180-1 A**
aluminium	**AL 3180-1 A**
anthracite	**AL 3180-1 A AN**
gold coloured	**GO 3180-1 A**
chrome	**GCR 3180-1 A**
ranges AS 500/A 500/A plus	
ivory	**A 3180-1 A**
white	**A 3180-1 A WW**
aluminium	**A 3180-1 A AL**

3 The KNX automatic switch is plugged onto a flush mounted bus coupling unit. It reacts to changes in temperature like people moving into the detection area. This causes switching commands or value transmission to devices such as binary outputs to switch groups of lights or dimming actuators. It can also be used to release a light scene in combination with a light scene push-button.
It has three potentiometers for time, brightness and sensitivity adjustable from the front side. A slide switch (ON/AUTO/OFF) is also integrated. The automatic switch has two major modes. There is one for lighting purposes as already explained and one for monitoring purposes used for simple alarm detection or in connection with the Central Alarm Unit EAM 4000. By activating a specific object the device can be toggled between these modes.

1

12 m

10 m

2,20 m

2
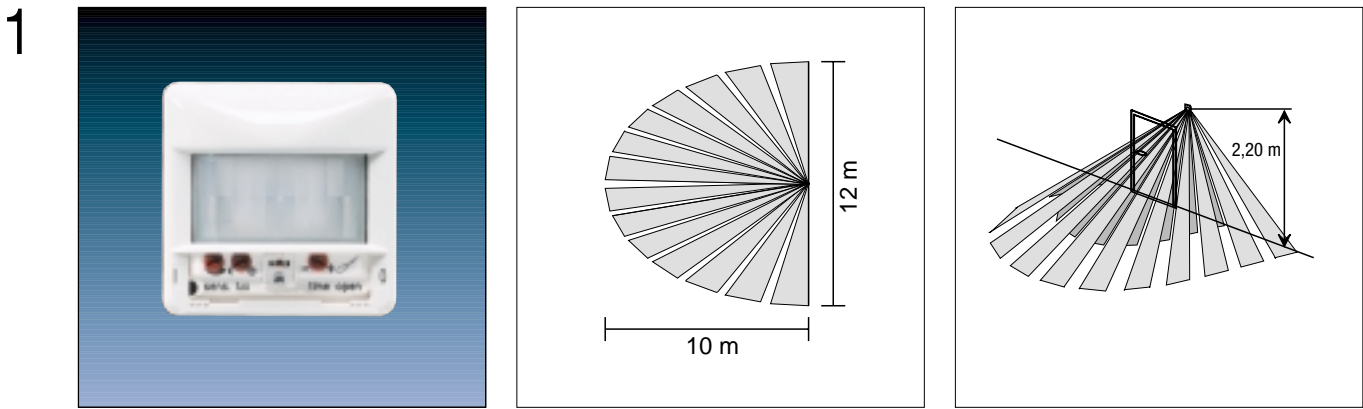
	Ref.-No.
KNX PIR automatic switch 180°	
2.2 m, universal	
ETS-product family:	Physical sensors
Product type:	Movement
ranges CD 500/CD plus	
ivory	**3280-1 A**
white	**CD 3280-1 A WW**
blue	**CD 3280-1 A BL**
brown	**CD 3280-1 A BR**
grey	**CD 3280-1 A GR**
light grey	**CD 3280-1 A LG**
red	**CD 3280-1 A RT**
black	**CD 3280-1 A SW**
ranges LS 990/LS plus/Stainless Steel/Aluminium/Anthracite/Gold/Chrome	
ivory	**LS 3280-1 A**
white	**LS 3280-1 A WW**
light grey	**LS 3280-1 A LG**
Metal versions	
stainless steel	**ES 3280-1 A**
aluminium	**AL 3280-1 A**
anthracite	**AL 3280-1 A AN**
gold coloured	**GO 3280-1 A**
chrome	**GCR 3280-1 A**
ranges AS 500/A 500/A plus	
ivory	**A 3280-1 A**
white	**A 3280-1 A WW**
aluminium	**A 3280-1 A AL**

3 The automatic switch has a detection angle of 180° and an area of 10 x 12 m. This angle can be restricted to 90° with a slip-on screen.
The device has to be mounted in a height of 2.2 m.
Additionally, the device has an integrated red LED used for testing mode or alarm indication when the cover was removed from the insert.
It can also be programmed to release an alarm indication if somebody manipulated the cover.

Software application:
PIR universal   A00802

4

Technical data:

Supply

Voltage:	24 V DC (+8 V / –3 V)	
Power consumption:	typical 150 mW	
Connection:	KNX connection block	
Input:	for mounting height 1,10 m	for mounting height 2,20 m
Opening angle	180°	180°
Range, frontal	10 m	10 m
Range, side	2 x 6 m	2 x 6 m
No. of lences/detection levels	18/2	18/2
Protection:	IP 20	
Behaviour at voltage drop:	no response	
	Active movements detected or running delays will be disregarded and not continued after bus voltage recovery.	
Behaviour at voltage recovery:	depending on the used mode	
	thermal movement detection immunity time: approx 80 s	
Operation temperature:	–5°C ... +45°C	
Storage temperature:	–25°C ... +75°C	
Mounting:	plug onto a flush-mounted bus coupler	

5

Objects

Number of addresses (dynamic):	28
Number of assignments (dynamic):	28
Communication objects:	max. 9 (dynamic)

Object	Name	Function	Type	Flag
0	Switching	Switching	1 Bit	W, C, T, (R)*
1	Valuator	Valuator	1 Byte	W, C, T, (R)*
1	Light scene	Light scene	1 Bit	W, C, T, (R)*
	Extension input	Extension input	1 Byte	
2	Disable	Disable	1 Bit	W, C, (R)*
3	Level of dimmed	Detection (not)		
	Lighting	Brightness depend.	1 Bit	W, C, T, (R)*
4	Event signal from	Movement	1 Bit	W, C, T, (R)*
	Extension input			
4	Event signal to master	Movement	1 Bit	W, C, T, (R)*
5	Event signal	Event signal	1 Bit	W, C, T, (R)*
6	Switch object	Switch object	1 Bit	C, T, (R)*
	Signal mode	Signal object		
7	Operation mode	Operation mode	1 Bit	W, C, T, (R)*
8	Alarm	Alarm	1 Bit	W, C, T, (R)*

Objects marked with *: object value can be read out (set R-flag).

Description of objects

Object 0 switching:
1 bit object for sending a switch telegram. Within the master/extension mode operation (switching) the level of dimmed lighting will be deactivated with a switch object = 1 and activated with a switch object = 0 during a detected movement. This ensures that a movement can also be detected when the lights are switched On.

Object 1 valuator:
1 byte object for sending a value telegram. Within the master/extension mode operation (valuator) the level of dimmed lighting will be deactivated with a value object = 1 ... 255 and activated with a value object = 0 during a detected movement. This ensures that a movement can also be detected when the lights are switched On.

Object 1 light scene extension:
1 byte object for sending a light scene extension telegram.

Object 2 disable:
1 bit object to switch the disable mode ON or OFF. The disable object has a higher priority than the internal slide switch.

Object 3 level of dimmed lighting:
1 bit object to switch between brightness dependent or independent movement detection.
Level of dimmed
lighting object value = 0:   level of dimmed lighting acc. to ETS-parameter "Level of dimmed lighting"
lighting object value = 1:   brightness independent movement detection

5 Description of objects

Object 4 movement (event signal to master, event signal from extension):
1 bit object for communication between master and extension. The movement object is only visible with application "master" and "extension input".

Object 5 event signal:
1 bit object for sending an event signal telegram in the monitoring mode.

Object 6 switch object / signal mode:
1 bit object for sending a switch telegram in the monitoring mode.

Object 7 operation mode:
1 bit object for switching between monitoring and the lighting mode within the parameterized operation modes:
– signal mode / switching + lighting mode
– signal mode / valuator + lighting mode
– signal mode / light scene retrieval + lighting mode
In case the T-flag is set in this object, an acknowledge telegram acc. to the actual object value can be sent.
This objects is only visible with a mixed operation (signal mode/lighting mode).

Object 8 alarm:
1 bit object for sending an alarm report in form of an ON or OFF telegram in case that the cover is removed.

Further functions

Walking test:
The walking test is used to adjust the sensivity of the movement detector when the device is put into operation. It is no operation mode, it should be inactive after starting the device.

The walking test function will be activated after removing and putting on again the cover or after a bus reset, if:
1. the ETS parameter "walking test activated" Yes/No is fixed to Yes and
2. the potentiometer for the level of dimmed lighting is turned to the max. and
3. the potentiometer for additional sending delay is turned to "–50 %" (zero position).

The walking test function will be deactivated after removing and putting on again the cover or after a bus reset, if:
1. the ETS parameter "walking test activated" Yes/No is fixed to No or
2. the potentiometer for the level of dimmed lighting is not turned to the max. or
3. the potentiometer for additional sending delay is not turned to "–50 %" (zero position).

Removal recognition – event signal after removal:
When the cover is removed from the BCU a report in form of an ON or OFF telegram can be released via the alarm object.
Alternatively, this function can be disabled by ETS parameter "alarm function disabled".

Signal operation:
In the signal operation mode, the movement detector reacts more insensitive to detected movements. The criterion for releasing an event signal telegram is the number X of movements within a fixed time period (monitoring time).
In this operation mode a configuration as master and extension input is not possible.
Every device works separately and sends, after detection and evaluation of the movement, a telegram via the event signal object to e.g. a display, signal panel, visualization etc.
The signal operation mode can be both, just single mode as well as mixed with lighting modes. In the mixed operation mode it can be switched between the modes via the operation mode object (object 7).

Master unit A 00201 / extension unit A 00301
The automatic switch can be used as a single unit, as a master or an extension.
Thus several automatic switch can be used in order to enlarge the detected area.
The automatic switch can be combined with several automatic switch standard (application extension unit) or with several universal presence detectors.
With the combination of these applications it is possible to have one or several extension units (satellites) to one master unit.
Additionally to the features of the application single unit there is one more object the so-called movement object.
That is the object used for the communication between the master and the extension unit.
Every extension unit receives the real switch telegram of the master unit by the object switch (status). That is necessary for the extension to know the real switch status of the master.

Note: In the project design you have to take care that the switch objects of the devices (master/extensions) and the movement objects are connected together.
After commissioning or after bus voltage recovery the device is blocked for about 80 sec. During that time no movements can be delected.

1

2

	Ref.-No.
KNX presence detector, standard	**3360**
ETS-product family:	Physical sensors
Product type:	Movement

3

The standard presence detector can be operated in two different modes:
– indoor presence: presences detector function mode
– indoor movement detection, ceiling mounted detection mode

In both modes the device offers two output channels which can be parameterized separately.
Changing between the operation modes requires re-programming via ETS. The standard presence detector can only be used as a stand-alone device and should be exclusively mounted to the room ceiling in order to monitor the area below.
The purpose of a presence detector is to switch On e.g. the light when a movement is detected. Depending of a preset brightness threshold, it switches OFF again if there is sufficient brightness without artificial light or in case nobody is present any longer.

4

Technical data:

Supply
Voltage:	24 V DC (+6 V / –4 V)
Power consumption:	typical 150 mW
Connection:	KNX connection block

Input
Opening angle:	360°
Nominal mounting height:	2.50 m
Nominal detection range	
at desk height:	approx. 5 m dia.
at floor level:	approx. 8 m dia.
No. of lences/detection levels:	80/6

Protection:	IP 20
Behaviour at voltage drop	no response
	Active movements detected or running delays will be disregarded and not continued after bus voltage recovery.
Behaviour at voltage recovery	depending on the used mode
	thermal movement detection immunity time: approx 40 s
Operation temp.:	–5°C ... +45°C
Storage temp.:	–25°C ... +70°C
Mounting:	plug onto flush-mounted bus coupler

Notes:
- The device shall not be mounted in the close vicinity of heat sources, e.g. lamps. Also the vicinity of fans, radiators, or ventilating ducts can cause unwanted triggering.
- Install the internal brightness sensor at the side opposite to the window to avoid unwanted influences of scattered light.

5

Description of software application:

- Free assignment of the switching, value transmitter and light mood extension functions of the two outputs.
- Presence detector or ceiling mounted detector application. Changing the mode requires reprogramming via ETS.
- Potentiometers for setting the twilight value and the additional time delay.
- Manual operation is possible via the trigger object.
- The lock-out time after releasing a telegram can be adjusted.
- The twilight value and the teach-in function can be parameterized for each output. If the twilight value potentiometer acts on both outputs, setting the twilight value for output 1 will be sufficient.
- Cyclical transmitting during detection is possible (base and factor)
- Telegrams at the beginning and at the end of detection selectable.
- Telegrams at the beginning and the end of blocking selectable.
- Additional time delay can be adjusted. The overall delay results from addition of the standard time delay (10 s) and the additional time delay.
- The behavior at bus voltage recovery can be parameterized for each output separately.
- Alarm message after unplugging the device from the BCU is possible (1 Bit/1 Byte).

Objects:

Number of addresses: 30
Number of assignments: 30
Communication objects: 8

Object	Name	Function	Type	Flag
Function: Switching**				
0	Output 1	Switching	1 Bit	C, W, T, (R)*
1	Output 2	Switching	1 Bit	C, W, T, (R)*
Function: Value transmitter**				
0	Output 1	Value	1 Byte	C, W, T, (R)*
1	Output 2	Value	1 Byte	C, W, T, (R)*
Function: Light scene extension**				
1	Output 1	Light scene extension	1 Byte	C, W, T, (R)*
2	Output 2	Light scene extension	1 Byte	C, W, T, (R)*
Function: Teach-in				
2	Output 1	Teach-in	1 Bit	C, T, (R)*
3	Output 2	Teach-in	1 Bit	C, T, (R)*
Function: Blocking				
4	Output 1	Blocking	1 Bit	C, T, (R)*
5	Output 2	Blocking	1 Bit	C, T, (R)*
Function: Trigger object				
6	Output 1 and 2	Trigger object	1 Bit	C, W, T, (R)*
1 Bit data format alarm function:				
7	Alarm	Switching	1 Bit	C, W, T, (R)*
1 Byte data format alarm function:				
7	Alarm	Value	1 Byte	C, W, T, (R)*

Objects marked with *:   Object value can be read out (set R-flag!)
Objects marked with **:   The functions 'no function', 'switching', 'value transmitter' and 'light mood extension' can be selected for both outputs. The names of the communication objects and the object table will change accordingly (dynamic object structure).

For further description please refer to the universal presence detector (3360-1)!

1

2

	Ref.-No.
KNX presence detector, universal	**3360-1**
ETS-product family:	Physical sensors
Product type:	Movement

3

The universal presence detector is used for the detection of presence (presence detector mode), for the detection of movements (ceiling-mounted detector mode) and for the supervision of signalling telegrams (signalling mode) in rooms.
In these three modes of operation, the device offers 4 output channels, two of which can be active in one mode of operation respectively and which can be independently parameterised. The modes of operation, presence detector, ceiling-mounted detector and signalling mode can be defined when the device is parameterised with the ETS software.

The detector is provided with an alarm function which is activated when the device is removed from the bus coupler.

The universal presence detector can be used as a stand-alone unit, as master (main unit) or slave unit (extension unit) and should be mounted exclusively under the room ceiling from where it monitors the area below.
The detector is equipped with a passive infrared sensor (PIR) and responds to thermal movements triggered by persons, animals or objects.

To extend the detection range, several presence detectors can be used in the same room by combining a device parameterised as master with several other devices parameterised as slaves.
It is also possible to connect the presence detector to a flush-mounted automatic switch "comfort", parameterised as a slave unit or with the flush-mounted automatic switch "standard" in an extension application.

The purpose of a presence detector is to switch on the light depending on brightness when a movement is detected, and to switch it off when it is no longer needed. This is the case when there is sufficient brightness without any additional artificial light, and when nobody is present anymore. This means that the presence of a person is detected depending on a preset brightness.

4

Technical data:

Supplying
Voltage:	24 V DC (+6 V / –4 V)
Power consumption:	typical 150 mW
Connection:	KNX connection block

Input
Opening angle:	360°
Nominal mounting height:	2.50 m
Nominal detection range	
at desk height:	approx. 5 m dia.
at floor level:	approx. 8 m dia.
No. of lences/detection levels:	80/6

Protection:	IP 20
Behaviour at voltage drop	no response
	Active movements detected or running delays will be disregarded and not continued after bus voltage recovery.
Behaviour at voltage recovery	depending on the used mode
	thermal movement detection immunity time: approx 40 s
Operation temperature:	–5°C ... +45°C
Storage temperature:	–25°C ... +70°C
Mounting:	plug onto flush-mounted bus coupler

Notes:
- The device shall not be mounted in the close vicinity of heat sources, e.g. lamps. Also the vicinity of fans, radiators, or ventilating ducts can cause unwanted triggering.
- Install the internal brightness sensor at the side opposite to the window to avoid unwanted influences of scattered light.

5

Description of software application:

- Toggling between two independent operation modes with two outputs each possible.
- For each operation mode it is possible to adjust the device as a presence detector, a ceiling mounted detector or to an event signal mode. For switching over of the different operation modes during active operation, the device offers an operation mode object.
- The free assignment of the functions "switching", "dimming value transmitter", "light scene extension" and "report" (only within operation mode "event signal mode") to the four outputs is possible.
  Additionally for output 1: "temperature value transmitter" or "brightness value transmitter".
- Application modes: single unit, master or slave. Different combinations can be realized (e.g.: Presence detector universal as master with presence detector standard or automatic switch (standard/universal) as slave).
- The integrated potentiometers for the twilight value and the additional time delay act on one parameterized output.
- Within the application mode as a master, the evaluation of the twilight value can be carried out in the master and the slave or in the master only: Removal alarm after with drawal of the device from the flush-mounted bus coupler possible (1 bit/1 byte).
- Twilight value and teach-in function can be parameterized for each output.

Objects:

Number of addresses:	20
Number of assignments:	21
Communication objects:	12

Object	Name	Function	Type	Flag
Function: Switching*				
0 – 3	Output 1 – 4	Switching	1 Bit	C, W, (T**), (R)*
Function: Dimming value transmitter*				
0 – 3	Output 1 – 4	Value	1 Byte	C, W, (T**), (R)*
Function: Light scene extension*				
0 – 3	Output 1 – 4	Light scene extension	1 Byte	C, W, (T**), (R)*
Function: Signaling*				
0 – 3	Output 1 – 4	Signaling	1 Bit	C, W, T, (R)*
Function: Temperature value transmitter (only for output 1)**				
0	Output	Temperature value	2 Byte	C, (W, T)**. (R)*
Function: Brightness value transmitter (only for output 1)**				
0	Output 1	Brightness value	2 Byte	C, W, (T**). (R)*

5

Description of software application:

Object	Name	Function	Type	Flag
General				
4	Movement	Communication with main/extension unit	1 Bit	C, W, T, (R)*
5	Mode	Mode of operation change-over	1 Bit	C, W, T, (R)*
6	Inhibit	Inhibit object 1	1 Bit	C, W, (R)*
7	Inhibit	Inhibit object 2	1 Bit	C, W, (R)*
8	Teach-In	Teach-in object 1	1 Bit	C, W, (R)*
9	Teach-In	Teach-in object 2	1 Bit	C, W, (R)*
10	Twilight level	Brightness-(in)dependent	1 Bit	C, W, (T**), (R)*
Alarm function				
11	Alarm	Switching	1 Bit	C, W, T, (R)*
12	Alarm	Value	1 Byte	C, W, T, (R)*

   * : For the objects marked (R), the object status can be read out (set R-Flag).

  ** : These flags are set or removed dependent on the type of application.

 *** : The "no function", "switching", "dimming value transmitter", "light scene extension" and "signaling" (only in signaling mode) functions can be selected per output. The names of the communication objects and the object table (dynamic object structure) change accordingly.

**** : "Temperature value transmitter" and "Brightness value transmitter" can only be selected for output 1. The names of the communication objects and the object table (dynamic object structure) change accordingly.

• Modes of Operation

Ceiling-mounted detector mode

In the ceiling-mounted detector mode, the device detects movements and will transmit the message parameterised at the beginning of detection if the brightness value measured is below the twilight value set. If the message was transmitted at the beginning of detection, the device will work independently of the ambient brightness. If no more movements are detected, the device will transmit the parameterised message at the end of detection after the preset overall transmit delay (standard transmit delay (10 s) + additional transmit delay) has elapsed.

Independent of a movement detection, the light can also be switched on or off if the ceiling-mounted detector is disabled, upon bus voltage recovery, or by the trigger object (refer to the description of the trigger function).
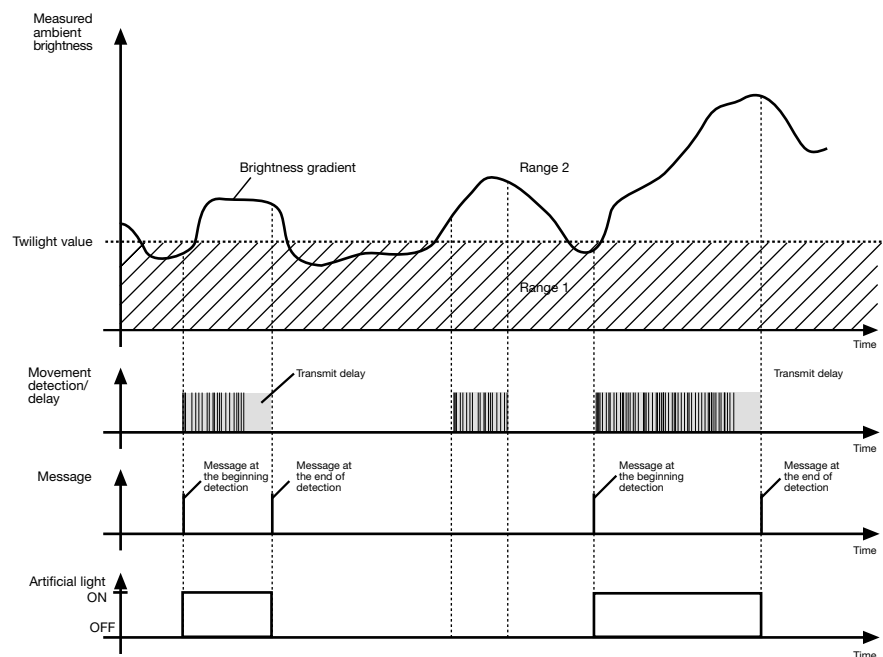
The brightness limit between range 1 and range 2 is determined by the twilight value which can be parameterised. If the ambient brightness measured falls below this value and a movement is detected, the ceiling-mounted detector will switch on the artificial light. Range 2 characterises the brightness in the room at which the room is sufficiently illuminated and, therefore, no artificial light needs to be switched on. If the ambient brightness is within this range and the device detects no movement, no artificial light will be switched on.

The "sensitivity" parameter determines the intensity of the movement impulses to detect a movement. Thus, to avoid erroneous switching, for example, it is possible to reduce the sensitivity of the PIR sensors.

If the twilight value has been parameterised to "brightness-independent", the artificial light will always be switched on without any monitoring of the ambient brightness once a movement is detected.

5 Presence detector mode

In the presence detector mode, the device detects the presence of a person and will transmit the message parameterised at the beginning of detection if the brightness value measured is below the twilight value set.
If no more presence is detected now and the preset overall transmit delay (standard transmit delay (10 s) + additional transmit delay) has elapsed, or if the preset twilight value has been exceeded, for example, by double the value for at least 10 minutes (depending on the software), the presence detector will transmit the parameterised message at the end of detection.

The differences in the functionality compared with the ceiling-mounted detector mode are in the processing of:

a) the movement signal:
   Contrary to the ceiling-mounted detector function, only a succession of movement impulses leads to presence detection.

b) the brightness signal:
   The adjustable brightness range to be evaluated as twilight value is wider than for the ceiling-mounted detector mode.
   Only after double the value of the preset twilight value (switch-off brightness) is exceeded, the configured message will be transmitted at the end of the detection event after at least 10 minutes, even though the presence of a person is detected.
   This switch-off brightness can be altered in the parameters through a correction value.

c) the combination in the evaluation of the movement and brightness impulses:
   The light will be switched on when it is needed, i.e. after the presence of a person has been detected and a brightness value below the preset twilight value has been measured.
   The light will be switched off when it is no longer needed, i.e. nobody is present any longer, or the brightness is sufficient without additional illumination.

Independent of a movement detection, the light can also be switched on or off if the presence detector is disabled, upon bus voltage recovery, or by the trigger object (refer to the description of the triggering function).
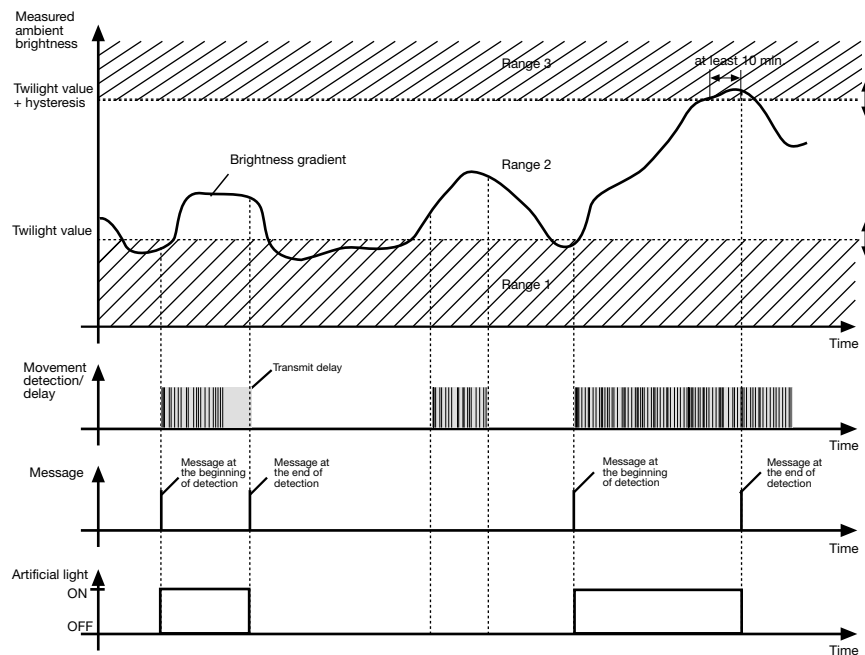
The brightness limit between range 1 and range 2 is determined by the twilight value which can be parameterised. If the ambient brightness measured falls below this value and the presence of a person is detected, the presence detector will switch on the artificial light.
Range 2 characterises the brightness in the room the presence detector is to adjust. If the ambient brightness is within this range and the device detects a new movement, no artificial light will be switched on. The border between ranges 2 and 3 is determined by the twilight value plus the hysteresis (refer to the "Hysteresis and correction value" description further below). If the ambient brightness measured exceeds this brightness threshold permanently, the artificial light will be switched off after 10 minutes at the earliest. The time until the switch-off moment can be longer than 10 minutes if the ambient brightness does not permanently exceed the threshold between ranges 2 and 3, i.e. if the brightness sometimes decreases or sometimes increases, respectively. This switch-off time serves to "debounce" short-time light reflections and prevents erroneous switching of the light.
If the twilight value has been parameterised to "brightness-independent", the artificial light will always be switched on without any monitoring of the ambient brightness once the presence of a person is detected.

5

Hysteresis and correction value:
The border between ranges 2 and 3 (switch-off threshold) can be parameterised and adapted to the ambient conditions. If the artificial light is found to switch off too early (too late) the switch-off threshold can be shifted up (down). Such shifting of the switch-off threshold is described by the correction value ("switch-off hysteresis correction").

In the standard case, the hysteresis is double (100 %) the parameterised twilight value. If the threshold is to be shifted down, a negative value must be selected. If the threshold is to be shifted up, parameterise a positive value. The hysteresis must be specified as a percentage of the parameterised twilight value to have an additional reference. The following illustration shows various parameterisation examples.
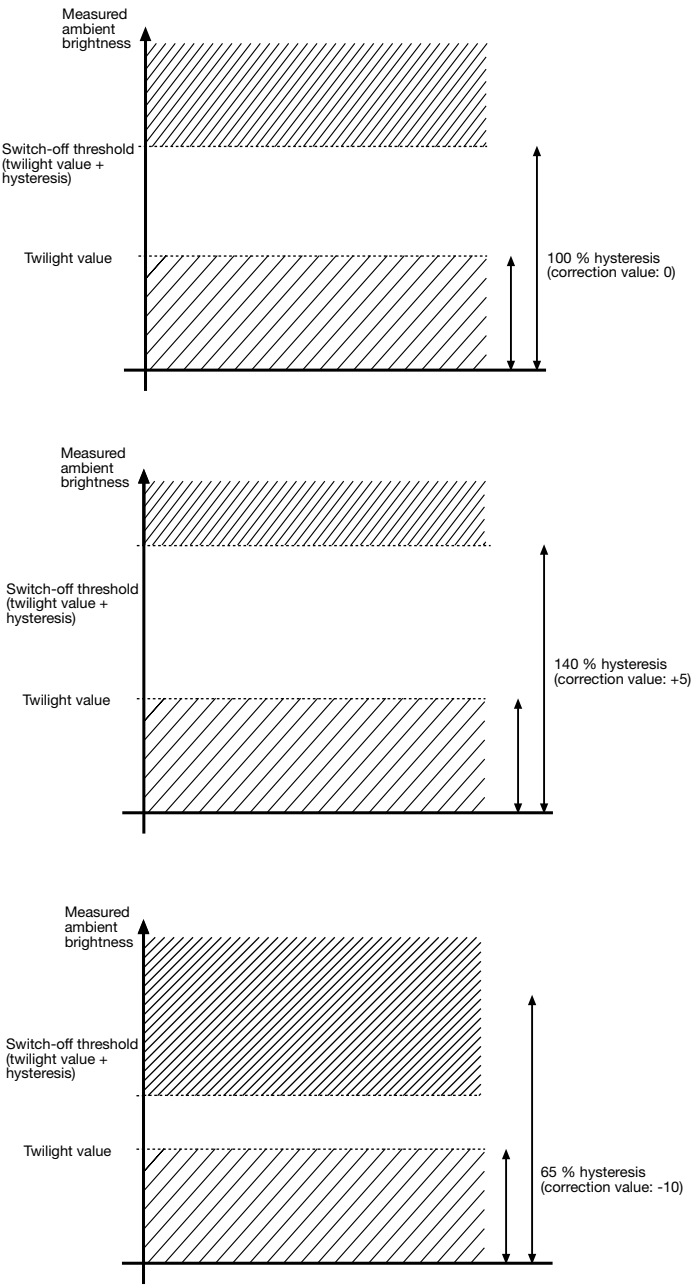
5

• Teach-in function

The teach-in function allows a direct local, object-controlled adaptation of the twilight value (switch-on threshold) to the ambient conditions. For this purpose, a separate teach-in object is available for each output.

In such case, the device accepts as the new twilight value the currently measured ambient brightness 3 s after an update to the teach-in object. The effect of the delay of these 3 s is that some actuators can be activated in parallel by the message for the triggering of the teach-in function to set a different illumination situation before the new twilight value is saved. So as not to influence the brightness value by any actions of the presence detector (e.g. on, off, value messages, cyclic transmitting, inhibit messages, etc.) within the delay of the 3 s, presence and movement evaluation or brightness control, respectively, will be disabled until the new twilight value is accepted.

The polarity of a teach-in message can be parameterised. Depending on the parameterisation, you can switch back to the originally parameterised twilight value by the reception of the opposite object value (teach-in function inactive). In this case, you will lose the twilight value taught in before. However, if the teach-in mode has been parameterised to "1"- and "0"-active, you cannot switch back to the twilight value originally programmed by the ETS while the device is in operation. In such case, you can only restore the original value by re-programming.
Several successively received updates to the teach-in object (teach-in function active) each time cause a new twilight value saving process.
The twilight value taught in by the teach-in function will be kept permanently saved in the EEPROM of the bus coupler until a new teach-in message is received so that a bus voltage failure will not lead to the loss of the value taught in.

If a new twilight value has been set for a channel by the teach-in function, this value cannot be altered by the twilight value potentiometer.
The inhibit function has no influence on the teach-in function.

1

2160 REG

LA 90

2

Ref.-No.

KNX brightness sensor with 3 barriers

brightness sensor	**2160 REG**
ETS-product family:	Physical sensors
Product type:	Brightness
Series embodiment (SE)-device (2 units)	

3

This 3 barrier brightness sensor controls switching and dimming actuators depending on the ambient brightness.
The level of brightness is recorded by a light sensor which is fitted externally and connected via a cable with the brightness sensor.
The device is very suitable for applications where a comfortable brightness-dependent lighting control has to be implemented.
Up to four different brightness areas can be surveyed with the device.
The device offers two applications:
– brightness sensor with 3 barriers
– brightness sensor with 4 scenes

4

Technical data

Supply
Voltage: 24 V DC (+6 V / –4 V)
Power consumption: max. 150 mW
Connection: KNX connection block
Input
Number: 1 light sensor
Connection: external, lenght max. 100 m
Protection: IP 20 (control unit), IP 54 (light sensor)
Operation temperature: –5°C ... +45°C (control unit)
Storage temperature: –40°C ... +70°C (light sensor)
Mounting: onto DIN rail 35 x 7,5

5

Description of application   **1. Brightness sensor with 3 barriers**

With this application the brightness sensor takes over the function of a 3-barrier limit value switch with a range of adjustment from 1 to 10 000 Lux. Each limit value can be adjusted separately. The transmission behaviour of each channel can be parameterized when it is below or above a barrier. Via a 1 Byte object any combination of channels can be deactivated or activated temporarily.

Objects

Number of addresses: 5
Number of assignments: 5
Communication objects: 4

Object	Name	Function	Type	Flag
0	Channel 1	Switching at barrier ch. 1	1 Bit	R, T
1	Channel 2	Switching at barrier ch. 2	1 Bit	R, T
2	Channel 3	Switching at barrier ch. 3	1 Bit	R, T
3	Stop	Reception message stop	1 Byte	W, T

Table for object 3 stop (blocking):

value of the blocking object (type 1 Byte)		transmitting behaviour of the channels A = active G = blocked (i.e. any transmitting on the corresponding channel object is supressed)		
decimal	binary	channel 1 (object 0)	channel 2 (object 1)	channel 3 (object 2)
0	00000000			
1	00000001	A	A	A
2	00000010	G	A	A
3	00000011	A	G	A
4	00000100	G	G	A
5	00000101	A	A	G
6	00000110	G	A	G
7	00000111	A	G	G
255	11111111	G	G	G
	Bit 3 to 7 have no function	G	G	G

Description of application   **2. Brightness sensor with 4 scenes**

With this application the device takes over the function of a brightness controlled scene component with a range of adjustment from 100 to 20 000 Lux. Four brightness areas can be defined by three different switching levels.
Thereby a light scene, consisting of three switching and a value object, is assigned to each brightness area.
If the measured brightness value for an adjustable delay time is in an area, the parameterised switching and value messages are transmitted on the bus. Additionally, each scene object can be force-controlled over a so-called blocking object.
If a value is transmitted to this object, objects 0 to 3 send their actual values. The behaviour of blocking can be parameterised.
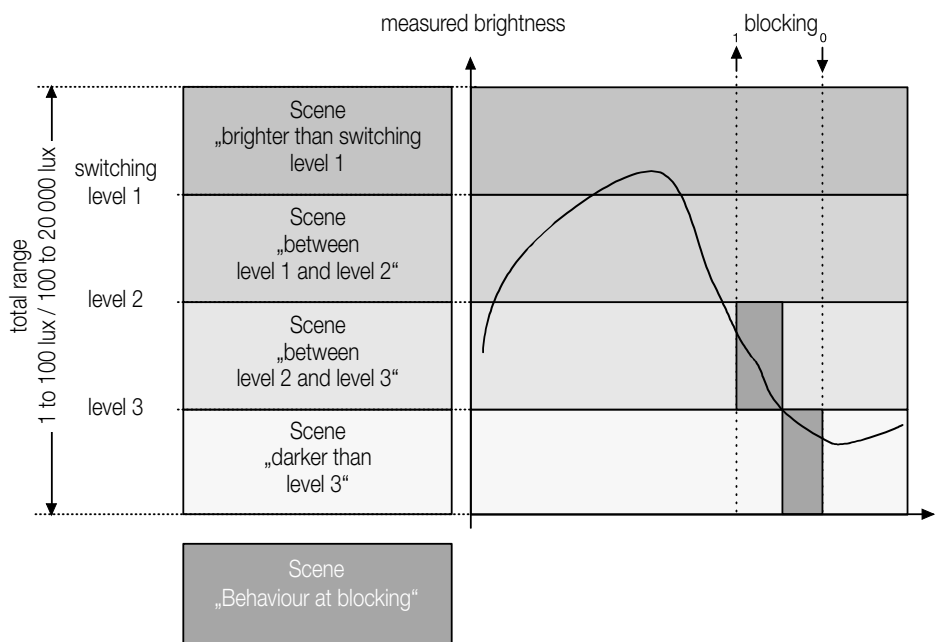
5 Objects

Number of addresses: 5
Number of assignments: 5
Communication objects: 5

Object	Name	Function	Type	Flag
0	Value object	Send telegram value	1 Byte	R, T
1	Switch object 1	Send telegram switch	1 Bit	R, T
2	Switch object 2	Send telegram switch	1 Bit	R, T
3	Switch object 3	Send telegram switch	1 Bit	R, T
4	Block	Reception teleg. block	1 Byte	W, T

Table for object 4 blocking:

value of the blocking object (object 4 / type 1 Byte)		transmitting behaviour of the channels A = active (0) G = blocked (i.e. transmitting object adopts the status which is adjusted on the parameter page "behaviour when blocking" after reception of the corresponding blocking bit) (1)			
decimal	binary	object 3	object 2	object 1	object 0
0	00000000	A	A	A	A
1	00000001	A	A	A	G
2	00000010	A	A	G	A
3	00000011	A	A	G	G
4	00000100	A	G	A	A
5	00000101	A	G	A	G
6	00000110	A	G	G	A
7	00000111	A	G	G	G
8	00001000	G	A	A	A
9	00001001	G	A	A	G
10	00001010	G	A	G	A
11	00001011	G	A	G	G
12	00001100	G	G	A	A
13	00001101	G	G	A	G
14	00001110	G	G	G	A
15	00001111	G	G	G	G
16 to 255	Bit 4 to 7 have no function	A	A	A	A

Physical sensors

Room temperature Controller

1

LS 2178 WW

2

	Ref.-No.
KNX room temperature controller	
with integrated BCU	
ETS-product family:	Heating, A/C, ventilation
Product type:	Regulator
ranges CD 500/CD plus	
ivory	**2178**
white	**CD 2178 WW**
blue	**CD 2178 BL**
brown	**CD 2178 BR**
grey	**CD 2178 GR**
light grey	**CD 2178 LG**
red	**CD 2178 RT**
black	**CD 2178 SW**
ranges LS 990/LS plus/Stainless Steel/Aluminium/Anthracite/Gold/Chrome	
ivory	**LS 2178**
white	**LS 2178 WW**
light grey	**LS 2178 LG**
Metal versions	
stainless steel	**ES 2178**
aluminium	**AL 2178**
anthracite	**AL 2178 AN**
gold	**GO 2178**
chrome coloured	**GCR 2178**
ranges AS 500/A 500/A plus	
ivory	**A 2178**
white	**A 2178 WW**
aluminium	**A 2178 AL**

3

The temperature controller with integrated BCU is used for a single room temperature control. Dependent on the operation mode and the actual temperature it controls a heating or cooling system by the KNX.

It is possible to choose between different control principles as a continuous PI control, switching PI control (pulse width modulation) and a switching two-step control.

The actual room temperature is measured by the integrated temperature sensor.

In addition to the basic system for heating or cooling, an additional heating or cooling system can be implemented whereby the control principles can be different. This is practicable when a room should be heated up faster due to cold temperatures (basic system: floor heating; additional system: electrical heating).

The temperature controller knows five operation modes which are comfort, stand-by, night, frost / heat protection and disabled controller.

1

LS 2178 TS WW

LS 2178 ORTS WW

2

	Ref.-No.
KNX room temperature controller	
with integrated BCU and push-button interface	
ETS-product family:	Heating, A/C, vent. or binary input, 4-gang
Product type:	Regulator
ranges CD 500/CD plus	
ivory	**2178 TS**
white	**CD 2178 TS WW**
blue	**CD 2178 TS BL**
brown	**CD 2178 TS BR**
grey	**CD 2178 TS GR**
light grey	**CD 2178 TS LG**
red	**CD 2178 TS RT**
black	**CD 2178 TS SW**
ranges LS 990/LS plus/Stainless Steel/Aluminium/Anthracite/Gold/Chrome	
ivory	**LS 2178 TS**
white	**LS 2178 TS WW**
light grey	**LS 2178 TS LG**
Metal versions	
stainless steel	**ES 2178 TS**
aluminium	**AL 2178 TS**
anthracite	**AL 2178 TS AN**
gold coloured	**GO 2178 TS**
chrome	**GCR 2178 TS**
ranges AS 500/A 500/A plus	
ivory	**A 2178 TS**
white	**A 2178 TS WW**
aluminium	**A 2178 TS AL**
KNX room autostat	
with integrated BCU and push-button interface	
(without any operational elements)	
ETS entry similar to 2178 TS	
all ranges as above	**.. 2178 ORTS ..**

3 The temperature controller with integrated BCU is used for a single room temperature control. Dependent on the operation mode and the actual temperature it controls a heating or cooling system by the KNX.
It is possible to choose between different control principles as a continuous PI control, switching PI control (pulse width modulation) and a switching two-step control.
The actual room temperature can be measured either by the integrated temperature sensor or by an external one which is connected to channel 4 of the integrated push-button interface. In addition to the basic system for heating or cooling, an additional heating or cooling system can be implemented whereby the control principles can be different. This is practicable when a room should be heated up faster due to cold temperatures (basic system: floor heating; additional system: electrical heating).
The temperature controller knows five operation modes which are comfort, stand-by, night, frost / heat protection and disabled regulator.
The integrated 4-gang push-button interface has similar features as the regular 2-/4-gang push-button interface
($\rightarrow$ please refer to ref.-no. 2076-2T / 4T). In addition, channel 4 can also be used to connect an external sensor, e.g. floor temperature sensor.
The connection of 230 V signals or other external voltages to the inputs is not allowed.

The temperature controller is also available in a version without any operational element as rotary knob, presence push-button or LED's.
This version is called autostat. The functions of the autostat are exactly the same, it is operated solely via bus telegrams. This version is recommended for e.g. for public buildings where you should avoid the manual operation of the sensor.

3
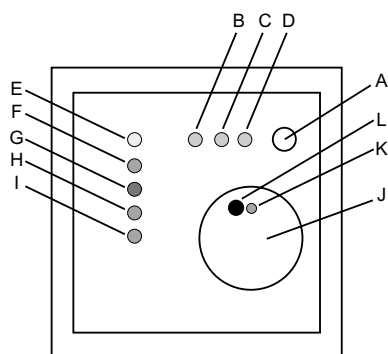
A: presence push-button
B: status LED green: comfort mode
C: status LED green: standby mode
D: status LED green: night mode
E: status LED yellow: energy request
F: status LED red: operation mode heating
G: status LED blue: operation mode cooling
H: status LED red: frost/heat protection
I: status LED red: dew point
J: rotary knob for set point adjustment
K: programming LED (beneath knob)
L: programming push-button (beneath knob)

Note:
If 1.5 mm² wires are used for the push-button interface, a deep wall box should be used !

4 **Technical data:**

KNX supply
Voltage: 21 – 32 V DC
Power consumption: typical 150 mW
Connection: bus terminal (KNX type 5.1)

Response to voltage failure
Bus voltage only: all object values are deleted
                                    – temperature sensor: no reaction
                                    – push-button interface: no reaction
Bus and mains:
Response to recovery
Bus voltage only: – temperature sensor: restart, transmission of values and status according to parameters
                                    – push-button interface: according to parameters

Inputs
Number: up to 4 (depending on parameterisation)
Line length: – binary inputs: max. 5 m
                                    – external sensor: 4 m pre-fabricated (e.g. ref.-no. FF 7.8) extendable to 50 m
Scanning voltage: continuous signal
Loop resistance: max. 2 kOhm for safe detection of "1" signal

Temperature sensor
Range of measurement: 0°C … +40°C
Resolution: 0.1 K
Air humidity: 0 … 95 %

Protection: IP 20
Ambient temperature: –5°C … +45°C
Storage/transport temperature: –25°C … +70°C (storage above +45°C results in shorter life time)

For further details of the push-button interface please refer to ref.-no. 2076-2 T / 4 T !

4

Connection proposal for push-button interface

Example 1: application with 4 binary inputs
(recommended wiring J-Y(St)Y 2 x 2 x 0.8 mm)
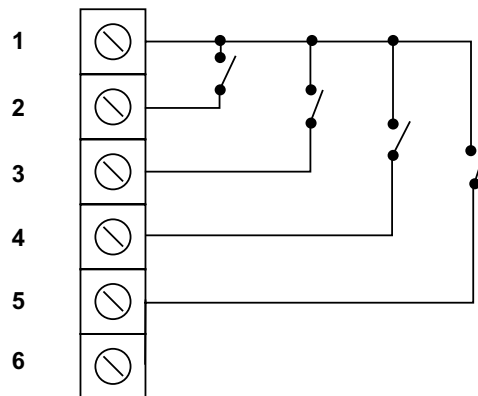
Example 2: application with 2 binary outputs (for LED´s), 1 binary input
(recommended wiring J-Y(St)Y 2 x 2 x 0.8 mm),
external temperature sensor (pre-fabricated wires,
extend with 1.5 mm^2 up to 50 m)

5
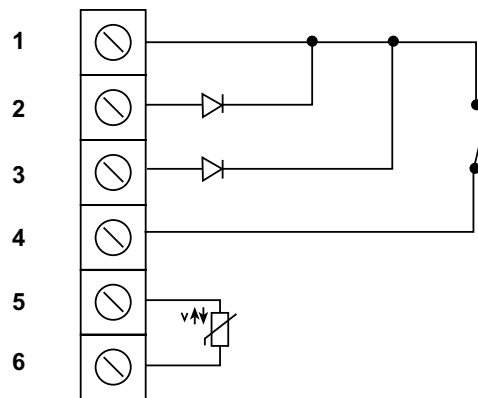
Scope of functions

A) Push-button interface

General
- Free assignment of the switching, dimming, blind/shutter, valuator functions to the 4 inputs.
- Blocking object to enable/disable individual inputs.
- Delay times upon bus voltage recovery and debouncing time centrally adjustable.
- Behaviour on bus voltage recovery adjustable.
- Limit value for telegrams adjustable in general, for all inputs.

Switching function
- Two independent switching objects are available for each input.
- Command upon rising and falling edges separately selectable (ON, OFF, TOGGLE, no response).
- Independent cyclic sending of the switching objects selectable as a function of the edge or of the object value, respectively.

Dimming function
- Single-level or two-level operation possible.
- Time between dimming and switching and dimming step width adjustable.
- Repetition of telegram and sending stop telegram possible.

Blind/shutter function
- Command upon the rising edge adjustable (no function, UP, DOWN, TOGGLE).
- Operating concept adjustable (short – long – short or long - short).
- Time between short-time mode and long-time mode adjustable (for short – long – short only).
- Louvres adjustment time (for louvers adjustment by one single push button action).

5

Transmitter and light scene extension function
- Edge (push-button as normally-open contact, push-button as normally-closed contact, switch) and a certain value can be parameterised.
- Value changing possible in case of push-button mode by pressing push-button for a longer time period.
- For light scene extension with memory function, saving of light scene is also possible without previously recalling it.

Temperature/brightness valuator functions
- Edge (push-button as normally-open contact, push-button as normally-closed contact, switch) and a certain value can be parameterised.
- Value changing possible in case of push-button mode by pressing push-button for a longer time period.

Outputs
- Independent switching of max. 2 outputs
- Optional output either of a 1 bit control output of the temperature controller or a separate output.

B) Room temperature controller

General
- 5 operation modes: comfort, standby, night, frost/heat protection and disable controller.
- Changeover between modes by either a 1 byte KONNEX object (recommended) or by separate 1 bit objects.

Heating/cooling
- Operation modes: Heating, cooloing, heating and cooling always with or without additional system
- PI controller (continuous or switched PWM) or 2step controller adjustable.
- Continuous (1 byte) or switched (1 bit) control output.
- Controller parameter for both principles adjustable.

Set points
- To each operation mode a temperature set point can be assigned.
- The set points for the additional system are derived by a defined step to the basic system.
- Set point adjustment possible either by rotary knob or ETS objects.

Functionality
- Automatic or object dependent changeover between heating and cooling.
- The operation of the controller can be disabled by an object.
- Complete (1 byte) or partial (1 bit) status information can be transmitted onto the bus.

Room temperature measurement
- Temperature measurement either by internal or external sensor.
- Evaluation of external temperature input to the internal value adjustable.
- The actual and set point temperature can be transmitted to be bus (also cyclical) after an adjustable deviation.
- Temperature alarm with upper and lower limit value possible via two separate objects.

Control value output
- Separate or common control value output via one or two objects (with heating and cooling mode).
- Control value output can be normal or inverted.
- Automatic sending of the control value output and the cyclic time are adjustable.

For further details of the functions/objects and the corresponding description, please refer to the complete product documentation which is available on our webpage!

1

2
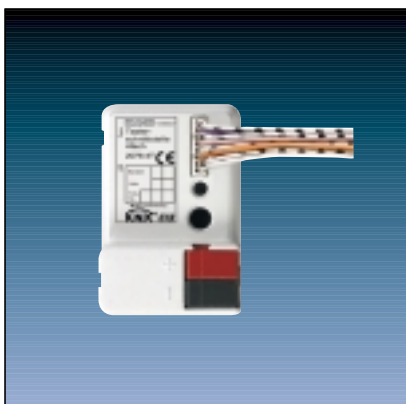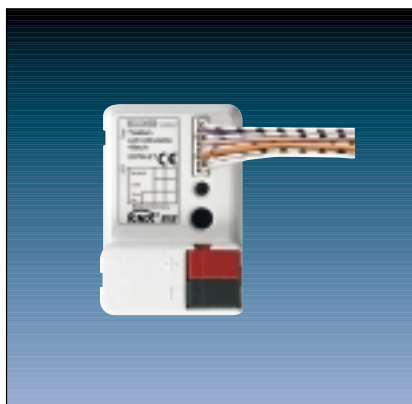
	Ref.-No.
KNX push-button interface,	
2-gang	**2076-2 T**
4-gang	**2076-4 T**
ETS-product family:	Input
Product type:	Binary input

3

The 2-channel (4-channel) push-button interface has 2 (4) independent channels which – depending on parameterization – can be used as inputs or alternatively as outputs. The push-button interface can therefore be used to poll its inputs for the switching state of up to 2 potential-free push-buttons/switches with a common reference potential and send the corresponding telegrams to the KNX. These may be telegrams for switching or dimming, shutter/blind control or value transmitter applications (dimming value transmitter, light-scene extension, temperature or brightness value transmitter). Moreover, 2 switching event counters or 1 pulse counter (only channel 1) are available.

Channels 1 and 2 can be used alternatively as independent outputs for controlling up to two LED's. To increase the output current (cf. Technical Data), the channels can also be connected in parallel if they are parameterised alike. The outputs are short-circuit-proof and protected against overloading and false polarity.

Connection 230 V signals or other external voltages to the inputs is not permitted.

4

Technical data

KNX supply
Voltage: 21 – 32 V DC SELV
Power consumption: typ. 150 mW
Connection: bus connection and branching terminal

Response to voltage failure
Bus voltage only: no response (outputs switching off)
Response to return of voltage
Bus voltage only: the response of the inputs and the outputs can be parameterised

Protection: IP 20
Safety class: III
Mark of approval: KNX
Ambient temperature: –5°C ... +45°C
Storage/transport temperature: –25°C ... +70°C (storage above +45°C results in shorter lifetime)
Mounting position: any
Minimum spacings: none
Fastening: e.g. placing into deep flush-mounting box
(Ø 60 mm x 60 mm)

4   Technical data

Inputs

Number:	up to 2 (depending on parameterization: channel 1 to 2), 2076-2 T
	up to 4 (depending on parameterization: channel 1 to 4), 2076-4 T
Line length:	25 cm prefabricated, extendable to 5 m max.
Scanning voltage:	continuous signal
Loop resistance:	max. 2 kOhm for safe detection of a "1" signal (rising edge)

Outputs

Number:	up to 2 (depending on parameterization: channel 1 to 2)
Line length:	25 cm prefabricated, extendable to 5 m max.
Output current:	max. 0.8 mA per output channel
	(at 1.5 V, typ. for red low-current LED)
Output voltage:	typ. 1.5 V (e.g. red-low current LED)
	(5 V with outputs open circuit)

Outputs:

- Independent switching of max. 2 outputs
- Outputs parameterizable as n.o. contact (ON: output supplies current / OFF: output supplies no current) or as n.c. contact (ON: outputs supplies no current / OFF: output supplies current)
- Preferred state on return of bus voltage presettable
- For each output additional feedback and additional function possible:
- Presettable additional functions: – logic-operation function with 3 logic parameters
  - disabling function with presettable disabling behaviour of the relays
  - priority-position function to fix the priority of arriving switching telegrams
- Feedback object invertible
- Delay on return of bus voltage centrally presettable
- Turn-on delay and/or turn-off delay or timer function separately presettable for each output
- Output signal as flashing signal (flashing frequency parameterizable in 3 steps)

Note: For parallel connection of the outputs, the maximum total output current increases to 1.6 mA. In the event of parallel connection, outputs 1 and 2 must be parameterised exactly alike (none of the output signals flashing). The outputs are short-circuit-proof, protected against overloading and false polarity.

Important: – Connect only potential-free switches or push-buttons to the inputs.
                – To obtain sufficient signalling brightness, it is recommended to connect "**low-current** LED" to the outputs.

For detailed information please refer to the binary input REG devices shown on the following pages.

1

2
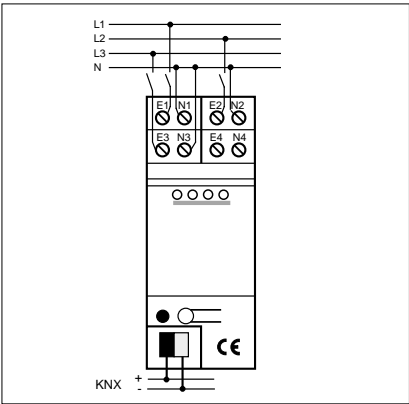
	Ref.-No.
KNX universal binary input, 4-gang	**2114 REG**
ETS-product family:	Input
Product type:	4-gang binary input
Series embodiment (SE-) device (2 units)	

1

2
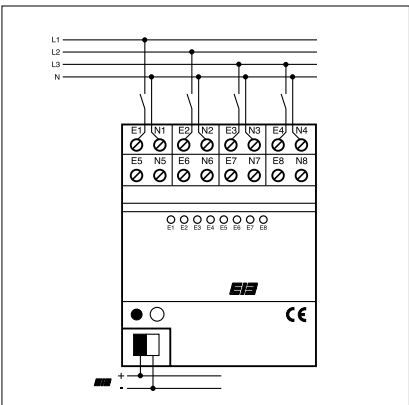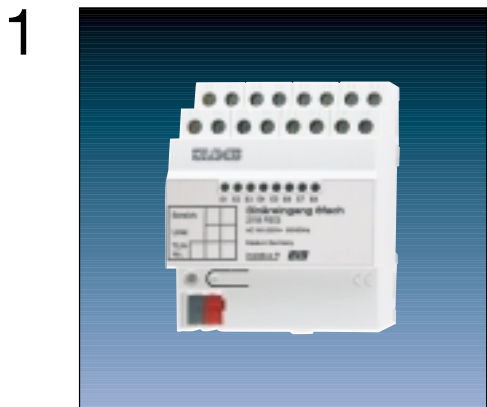
	Ref.-No.
KNX universal binary input, 8-gang	**2118 REG**
ETS-product family:	Input
Product type:	8-gang binary input
Series embodiment (SE-) device (4 units)	

3 With its 4 (8) independent inputs, this binary input can collect 230 V signals and send messages to the KNX, depending on the parameter setting. These can, for example, be messages for switching, dimming (single-level or two-level operation) or for blind/shutter control. Also, it is possible to program certain functions such as dimming value transmitter, light scene extension as well as temperature or brightness transmitter, respectively. Various functions can be assigned to the 4 (8) inputs.

In addition, inputs 1 and 2 can be parameterised with pulse or switching counter functions.

Finally, the binary input offers a blocking function to enable or disable certain inputs.

4 Technical data

Supply	
Voltage:	24 V DC (+6 V / -4 V)
Power consumption:	
2114 REG:	150 mW
2118 REG:	max. 240 mW
Connection:	KNX connection block
Input	
Number	
2114 REG:	4
2118 REG:	8
Signal voltage	110 V … 230 V AC ± 10 %; 50/60 Hz
Signal current	approx. 7 mA at 230 V AC per input (max. glow discharge lamp current < 2 mA for reliable "0" recognition)
Signal length for pulse	Tmin. = 200 ms at a mark-to-space ratio of 1:1
"0"-signal	0 … 70 V AC
"1"-signal	> 90 V AC
Input line length	100 m max. (unshielded)
Connection:	clamp bar
Behaviour at voltage drop	
only bus voltage	no reaction
only mains	a falling edge is detected; this response depends on the parameters
bus and mains	no reaction
Behaviour at voltage recovery	
only bus voltage	dependent on parameters
only mains	a rising edge is detected; this response depends on the parameters
bus and mains	dependent on parameters
Protection:	IP 20
Operation temperature:	–5°C ... +45°C
Storage temperature:	–25°C ... +70°C
Mounting:	on DIN rail 35 x 7.5

Notes:
• Different lines can be connected to the device.

1

2

	Ref.-No.
KNX universal binary input, 6-gang	**2126 REG**
ETS-product family:	Input
Product type:	6-gang binary input
Series embodiment (SE-) device (2 units)	

3

With its six independent inputs, this binary input can collect 24 V signals and send messages to the KNX, depending on the parameter setting. These can, for example, be messages for switching, dimming (single-level or two-level operation) or for blind/shutter control. Also, it is possible to program certain functions such as dimming value transmitter, light scene extension as well as temperature or brightness transmitter, respectively. Various functions can be assigned to the six inputs.

In addition, inputs 1 and 2 can be parameterised with pulse or switching counter functions.

Finally, the binary input offers a blocking function to enable or disable certain inputs.

4

Technical data

Supply
Voltage: 24 V DC (+6 V / -4 V)
Power consumption: max. 225 mW
Connection: KNX connection block
Input
Number 6
Signal voltage 8 V … 42 V AC/DC; 50/60 Hz
Signal current approx. 4 mA at 24 V AC/DC per input
Signal length for pulse Tmin. = 200 ms at a mark-to-space ratio of 1:1
"0"-signal 0 … 1.8 V AC   42 V … 1.8 V DC
"1"-signal > 8 V AC/DC
Input line length 100 m max. (unshielded)

Connection: clamp bar
Behaviour at voltage drop
  only bus voltage no reaction
  only mains –
  bus and mains no reaction
Behaviour at voltage recovery
  only bus voltage dependent on parameters
  only mains –
  bus and mains dependent on parameters
Protection: IP 20
Operation temperature: –5°C ... +45°C
Storage temperature: –25°C ... +70°C
Mounting: on DIN rail 35 x 7.5

Note:
• 24 V and 230 V potentials are to be led in separate cables.

5

Description of universal software application:

General
- Free assignment of the switching, dimming, blind/shutter, valuator functions to the inputs.
- Free assignment of the pulse counter and switching counter functions to inputs 1 and 2.
  For the pulse counter function parameterised for input 1 (2), input 3 (4) will be reserved for the sync signal and, therefore, cannot be used for any other functions.
- Signal indication is possible through four yellow status LED's. The status LED will light up when a signal is being applied and cannot be parameterised.
- Blocking object to enable / disable individual inputs.
- Delay times upon bus voltage recovery and debouncing time centrally adjustable.
- Behaviour on bus voltage recovery adjustable.
- Limit value for telegrams adjustable in general, for all inputs.

Switching function
- Two independent switching objects are available for each input and can be valuated individually.
- Command upon rising and falling edges separately selectable (ON, OFF, TOGGLE, no response).
- Independent cyclic sending of the switching objects selectable as a function of the edge or of the object value, respectively.

Dimming function
- Single-level or two-level operation possible.
- Time between dimming and switching and dimming step width adjustable.
- Repetition of telegram and sending stop telegram possible.

Blind/shutter function
- Command upon the rising edge (no function, UP, DOWN, TOGGLE) adjustable.
- Operating concept parameterisable (short – long – short or long - short).
- Time between short-time mode and long-time mode adjustable (for short – long – short only).
- Louvres adjustment time (for louvers adjustment by one single push button action).

Transmitter and light scene extension function
- Edge (push button as normally-open contact, push button as normally-closed contact, switch) and a certain value can be parameterised.
- Value changing possible in case of push button mode by pressing push button for a longer time period.
- For light scene extension with memory function, saving of light scene is also possible without previously recalling it.

Temperature / brightness valuator functions
- Edge (push-button as normally-open contact, push-button as normally-closed contact, switch) and a certain value can be parameterised.
- Value changing possible in case of push-button mode by pressing push-button for a longer time period.

Pulse counter function
- Pulse counting edge and meter reading interval time can be parameterised.
- Sync signal edge for counter reset and corresponding switch telegram (including edge evaluation) adjustable.

Switching counter function
- Edge for counting of the input signals and maximum meter reading are adjustable.
- Step width for meter reading output and command (no telegram, ON, OFF, TOGGLE) upon reaching max. meter reading can be parameterised.

5

Objects for 2114 REG:

Number of addresses: 26
Number of assignments: 27
Communication objects: 12

Object	Name	Function	Type	Flag
Function: Switching (for all inputs)				
0 – 3	Input 1 – 4	Switching	1 Bit	C, W, T, (R)
Function: Dimming (for all inputs)				
0 – 3	Input 1 – 4	Switching	1 Bit	C, W, T, (R)
8 – 11	Input 1 – 4	Dimming	4 Bit	C, T, (R)
Function: Blind/shutter control (for all inputs)				
0 – 3	Input 1 – 4	Short time operation	1 Bit	C, T, (R)
8 – 11	Input 1 – 4	Long time operation	1 Bit	C, T, (R)
Function: Dimming value transmitter (for all inputs)				
0 – 3	Input 1 – 4	Value	1 Byte	C, T, (R)
Function: Light scene extension (for all inputs)				
0 – 3	Input 1 – 4	Light scene extension	1 Byte	C, T, (R)
Function: Temperature value transmitter (for all inputs)				
8 – 11	Input 1 – 4	Temperature value	2 Byte	C, T, (R)
Function: value transmitter (for all inputs)				
8 – 11	Input 1 – 4	Brightness value	2 Byte	C, T, (R)
Function: Impulse counter (for inputs 1 and 2 only)				
2	Input 3	Synch signal counter 1	1 Bit	C, W, T, (R)
3	Input 4	Synch signal counter 2	1 Bit	C, W, T, (R)
8	Input 1	Meter reading counter 1	2 Byte	C, T, (R)
9	Input 2	Meter reading counter 2	2 Byte	C, T, (R)
Function: Switching counter (for inputs 1 and 2 only)				
0	Input 1	Switching counter	1 Bit	C, W, T, (R)
1	Input 2	Switching counter	1 Bit	C, W, T, (R)
8	Input 1	Switching counter	2 Byte	C, T, (R)
9	Input 2	Switching counter	2 Byte	C, T, (R)
Function: Blocking (for all inputs)				
16 – 19 (*)	Input 1 – 4	Blocking	1 Bit	C, T, (R)

Objects marked with (R): Object value can be read out (set R-flag!)
Objects marked with (*): If the inputs have been parameterised to "no function", "impulse counter" or "switching counter", the blocking function is not active.

5

Objects for 2118 REG:

Number of addresses: 26
Number of assignments: 27
Communication objects: 24

Object	Name	Function	Type	Flag
Function: Switching (for all inputs)				
0 – 7	Input 1 – 8	Switching	1 Bit	C, W, T, (R)
Function: Dimming (for all inputs)				
0 – 7	Input 1 – 8	Switching	1 Bit	C, W, T, (R)
8 – 15	Input 1 – 8	Dimming	4 Bit	C, T, (R)
Function: Blind/shutter control (for all inputs)				
0 – 7	Input 1 – 8	Short time operation	1 Bit	C, T, (R)
8 – 15	Input 1 – 8	Long time operation	1 Bit	C, T, (R)
Function: Dimming value transmitter (for all inputs)				
0 – 7	Input 1 – 8	Value	1 Byte	C, T, (R)
Function: Light scene extension (for all inputs)				
0 – 7	Input 1 – 8	Light scene extension	1 Byte	C, T, (R)
Function: Temperature value transmitter (for all inputs)				
8 – 15	Input 1 – 8	Temperature value	2 Byte	C, T, (R)
Function: value transmitter (for all inputs)				
8 – 15	Input 1 – 8	Brightness value	2 Byte	C, T, (R)
Function: Impulse counter (for inputs 1 and 2 only)				
2	Input 3	Synch signal counter 1	1 Bit	C, W, T, (R)
3	Input 4	Synch signal counter 2	1 Bit	C, W, T, (R)
8	Input 1	Meter reading counter 1	2 Byte	C, T, (R)
9	Input 2	Meter reading counter 2	2 Byte	C, T, (R)
Function: Switching counter (for inputs 1 and 2 only)				
0	Input 1	Switching counter	1 Bit	C, W, T, (R)
1	Input 2	Switching counter	1 Bit	C, W, T, (R)
8	Input 1	Switching counter	2 Byte	C, T, (R)
9	Input 2	Switching counter	2 Byte	C, T, (R)
Function: Blocking (for all inputs)				
16 – 23 (*)	Input 1 – 8	Blocking	1 Bit	C, T, (R)

Objects marked with (R): Object value can be read out (set R-flag!)
Objects marked with (*): If the inputs have been parameterised to "no function", "impulse counter" or "switching counter", the blocking function is not active.

5

Objects for 2126 REG:

Number of addresses: 26
Number of assignments: 27
Communication objects: 18

Object	Name	Function	Type	Flag
Function: Switching (for all inputs)				
0 – 5	Input 1 – 6	Switching	1 Bit	C, W, T, (R)
Function: Dimming (for all inputs)				
0 – 5	Input 1 – 6	Switching	1 Bit	C, W, T, (R)
8 – 13	Input 1 – 6	Dimming	4 Bit	C, T, (R)
Function: Blind/shutter control (for all inputs)				
0 – 5	Input 1 – 6	Short time operation	1 Bit	C, T, (R)
8 – 13	Input 1 – 6	Long time operation	1 Bit	C, T, (R)
Function: Dimming value transmitter (for all inputs)				
0 – 5	Input 1 – 6	Value	1 Byte	C, T, (R)
Function: Light scene extension (for all inputs)				
0 – 5	Input 1 – 6	Light scene extension	1 Byte	C, T, (R)
Function: Temperature value transmitter (for all inputs)				
8 – 13	Input 1 – 6	Temperature value	2 Byte	C, T, (R)
Function: value transmitter (for all inputs)				
8 – 13	Input 1 – 6	Brightness value	2 Byte	C, T, (R)
Function: Impulse counter (for inputs 1 and 2 only)				
2	Input 3	Synch signal counter 1	1 Bit	C, W, T, (R)
3	Input 4	Synch signal counter 2	1 Bit	C, W, T, (R)
8	Input 1	Meter reading counter 1	2 Byte	C, T, (R)
9	Input 2	Meter reading counter 2	2 Byte	C, T, (R)
Function: Switching counter (for inputs 1 and 2 only)				
0	Input 1	Switching counter	1 Bit	C, W, T, (R)
1	Input 2	Switching counter	1 Bit	C, W, T, (R)
8	Input 1	Switching counter	2 Byte	C, T, (R)
9	Input 2	Switching counter	2 Byte	C, T, (R)
Function: Blocking (for all inputs)				
16 – 21 (*)	Input 1 – 6	Blocking	1 Bit	C, T, (R)

Objects marked with (R): Object value can be read out (set R-flag!)
Objects marked with (*): If the inputs have been parameterised to "no function", "impulse counter" or "switching counter", the blocking function is not active.

5 Notes to software application:

• Impulse counter

The pulse counters can only be parameterised to input 1 or 2. In this case, inputs 3 (for pulse counter 1) or 4 (for pulse counter 2) are the sync signal inputs and cannot be assigned to any other function. Pulse counters 1 and 2 run independently of each other and have a resolution of 16 bit so that counts between 0 and 65535 are possible. You can set the R-flag to read out the current count at object 8 or 9.

The counting pulse is applied to input 1 or 2. After the interval time specified as parameter has elapsed, the count will be taken over and sent as object value of the 2 byte "count" object (object 8 or 9). Then the 2 byte pulse counter will be internally reset during the next time interval. Only upon the appearance of a new edge at the input, or after the newly started interval time has elapsed, the current count can be read out from the count objects (set R-flag).

In addition, the count and the interval time can be reset by a sync signal applied to input 3 or 4, respectively. Moreover, switch telegrams (no telegram, ON, OFF, TOGGLE) can be sent in dependence of the sync signal edge. The output value can be assigned to the edge. The edge assignment for resetting the count can be parameterised independently of the output value.

For pulse counting, the mark-to-space time of a signal applied to input 1 or 2 must not fall below 100 ms.
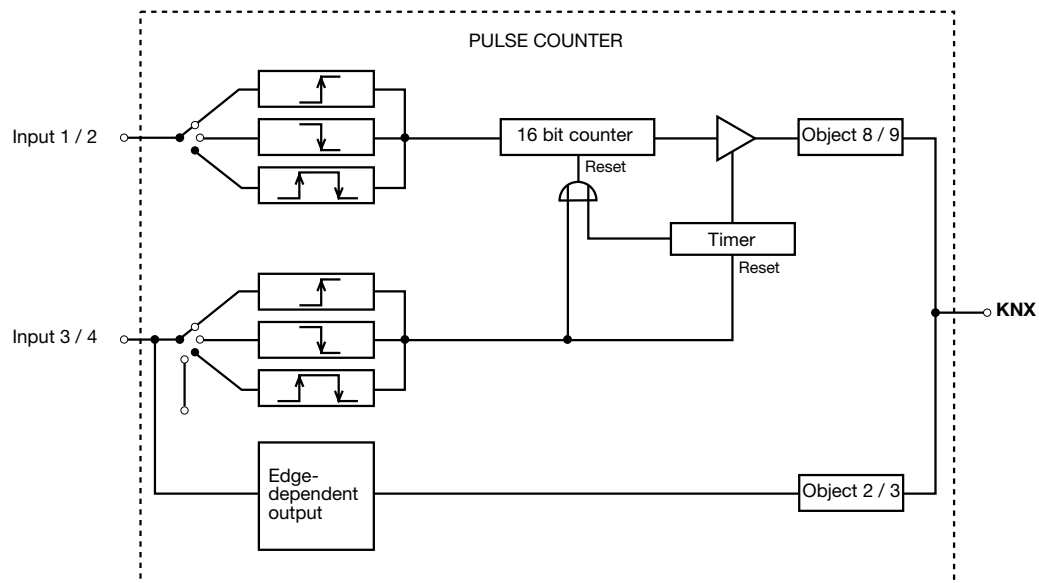
• Switching counter

The switching counters can only be parameterised to input 1 or 2. Switching counters 1 and 2 run independently of each other and have a resolution of 16 bit so that counts between 1 and 65535 are possible. You can set the R-flag to read out the current count at object 8 or 9.

The counting pulse is applied to input 1 or 2. After the count has reached the parameterised set value, it will be taken over into 2 byte object 8 or 9 and transmitted. Simultannously, it is possible to output a signal value (1 bit object "0" or "1") which can be parameterised. After the transmission, the 16 bit counter will be automatically and internally reset. Only upon the appearance of a new edge at the input, the current count can be read out from the count objects (set R-flag).

Moreover, the count will be sent in cycles after a pre-defined number of counting pulses (1 … 255), which is used to get an automatic update on any display for instance.

For switch counting, the mark-to-space time of a signal applied to input 1 or 2 must not fall below 100 ms.

5
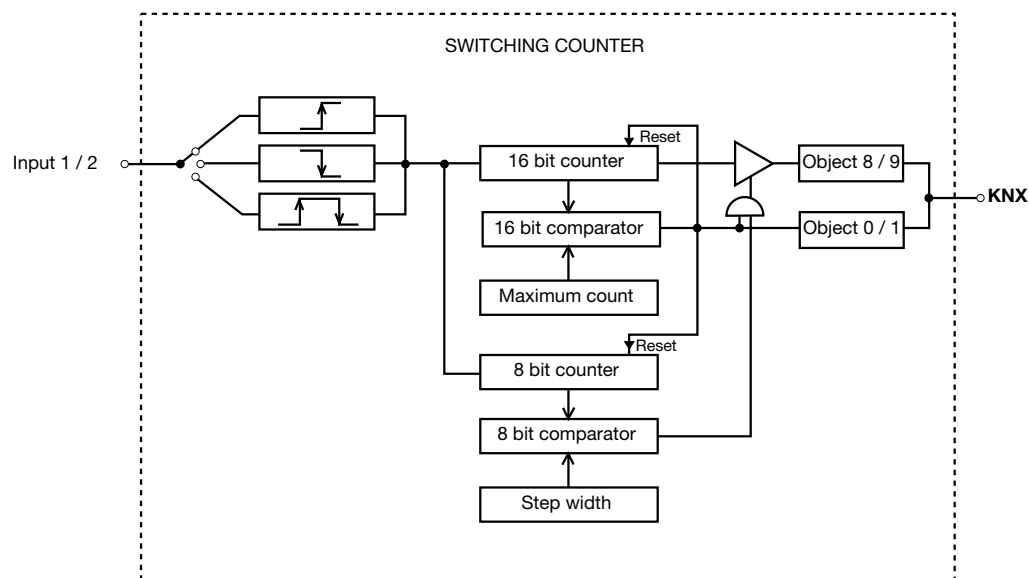
Notes to software application:

• **Bus voltage recovery**

You can specify for each input what response is to be made upon bus voltage recovery. If a delay time after bus voltage recovery has been parameterised, this time has to be elapsed until the response will be made. Within the delay, any edges or signals applied to the inputs will be ignored. The delay time should be parameterised for all inputs.

You can parameterise the limit number of telegrams. In such case, no telegram will be sent within the first 17 s after bus voltage recovery. Please note that any possibly parameterised delay after bus voltage recovery may also be active during this time.

Any edge or signal applied to the inputs upon bus voltage recovery will be ignored.

• **Blocking function**

At the beginning or at the end of the blocking, an independent response can be made to each input. In this case, you can set the parameter to "no response". Only in such case, any dimming or blind/shutter control or value changing events running until the action is completed during an active blocking. In any other cases, the parameterised command will be sent immediately at the start of blocking. Moreover, any edges or signals at the corresponding inputs will not be accepted during an active blocking.

Updates on blocking objects (disable or enable) each time cause the corresponding parameterised command to be sent "at start or end of the blocking".

During an active blocking, there will be no cyclic sending through the disabled input.

If cyclic sending was taking place prior to an activation of the blocking function, no more cyclic sending will be performed at the end of the blocking, provided that "no telegram" has been parameterised. In this case, the cyclic transmission of the object value will only be effected again after an update on the switching object. In any other cases, the object value will be sent in cycles again after the end of blocking.

Analog Input

4-gang

1

2

	Ref.-No.
KNX analog input	**2214 REGA**
ETS-product family:	Input
Product type:	4-gang analog input
Series embodiment (SE)-device (4 units)	

3

The analog input processes measured-value data supplied by analog sensors. Four analog transducers in any combination can be connected to the input. The analog input evaluates voltage and current signals.

Voltage signals:	0 ... 1 V DC	0 ... 10 V DC
Current signals:	0 ... 20 mA DC	4 ... 20 mA DC

The 4 ... 20 mA current inputs can be monitored for open-circuit conditions.

The following sensors from the JUNG range can be connected to the analog input:
Brightness (WS 10 H), Twilight (WS 10 D), Temperature (WS 10 T), Wind (WS 10 W) and Rain (WS 10 R).
An optional analog input extension module, ref.-no. 2214 REGAM, connected by a 6-pole system connector adds four more analog sensor inputs to the device. A 6-pole connector can be used for future extensions.

The measured values are encoded by the analog input in the form of value telegrams (DPT 9.0xx, 2 byte or DPT 5.001, 1 byte) so that other bus subscribers (e.g. visualization software, Info Display) can display these measured values, generate messages or intervene in automatic control processes.

Each measured value has two presettable limit values. As soon as a measured value rises above or drops below these limits, the analog input can transmitt the corresponding messages. The limit values can also be modified in operation by other devices as, for instance, a push-button sensor serving as a value transmitter.

The analog input needs 24 V AC for operation. This voltage can be supplied, for instance, by the power supply unit (WSSV 10). This power supply unit can at the same time also supply the power for wind sensor heating or the power for a connected analog input extension module.

The terminals U_S and GND supply 24 V DC (max. 100 mA altogether) to external analog sensors. In the event of short-circuits or overload between U_S and GND, the power is shut off.

3

Layout:

(C)
(A)
(B)
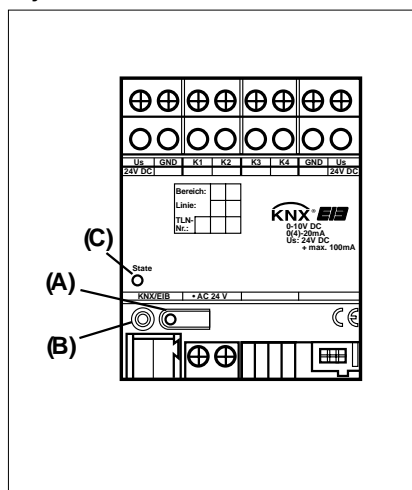
Dimensions:

Width: 72 mm (4 units)
Height: 90 mm
Depth: 58 mm

Controls:

A: Programming button
B: Programming LED
C: Status LED, three-colour
(red, orange, green)

Status LED functions:

LED off	no power supply
LED orange/on	modul scan by analog input
LED orange/flashing fast	parameterization of analog extension module
LED red/flashing slowly	fault: low voltage at module connection / U_S short-circuited
LED red/flashing fast	fault: no project, parameterization error
LED green/flashing slowly	module scan terminated, projecting OK
	parameter download into modules
LED green/flashing fast	parameter download to modules
LED green/on	initialization process terminated, everything OK

slow flashing:	approx. 1 Hz
fast flashing:	approx. 2 Hz

4

Technical data

KNX Supply
Voltage: 21 – 32 V DC (SELV)
Power consumption: typically 150 mW
Connection: Bus terminal (KNX Typ 5.1)
External supply, voltage: 24 V AC ± 10 %
Current consumption: 250 mA max.
Power consumption: max. 4 VA
Connection: Screw terminals: 0.5 mm² to 4 mm², single-wire
0.34 mm² to 4 mm², fine-wire (without ferrule)
0.14 mm² to 2.5 mm², fine wire (incl. ferrule)

Response to voltage failure
Bus voltage only: No communication with KNX.
Operating voltage only: No communication with KNX, no feeding of the measuring sensors.
Bus and mains/operating voltage: No communication with KNX, no feeding of the measuring sensors.
Response to recovery
Bus voltage only: No communication with KNX, no feeding of the measuring sensors.
Operating voltage only: No communication with KNX.
Bus and mains/operating voltage: Communication with KNX according to initialization parameters.
Module connection
Numbers: 1
Connection: 6-pole system connector for analog input extension module
Analog inputs
Number: 4
Signal voltage/current: 0 ... 1 V DC, 0 ... 10 V DC, 0 ... 20 mA DC or 4 ... 20 mA DC,
depending on parameterization
Input resistance: Voltage measurement: approx. 18 kΩ
Current measurement: approx. 100 Ω
Connection: Screw terminals: 0.5 mm² to 4 mm², single-wire
0.34 mm² to 4 mm², fine-wire (without ferrule)
0.14 mm² to 2.5 mm², fine-wire (incl. ferrule)

Measuring sensor power supply outputs
Number: 2
Rated voltage: 24 V DC ±10 %
Rated current: 100 mA DC (total)
Connection: Screw terminals: 0.5 mm² to 4 mm², single-wire
0.34 mm² to 4 mm², fine-wire (without ferrule)
0.14 mm² to 2.5 mm², fine-wire (incl. ferrule)

Protection: IP 20
Safety class: III
Mark of approval: KNX/VDE
Ambient temperature: −5°C ... +45°C
Storage/transport temperature: −25°C ... +70°C (storage above +45°C reduces the lifetime)
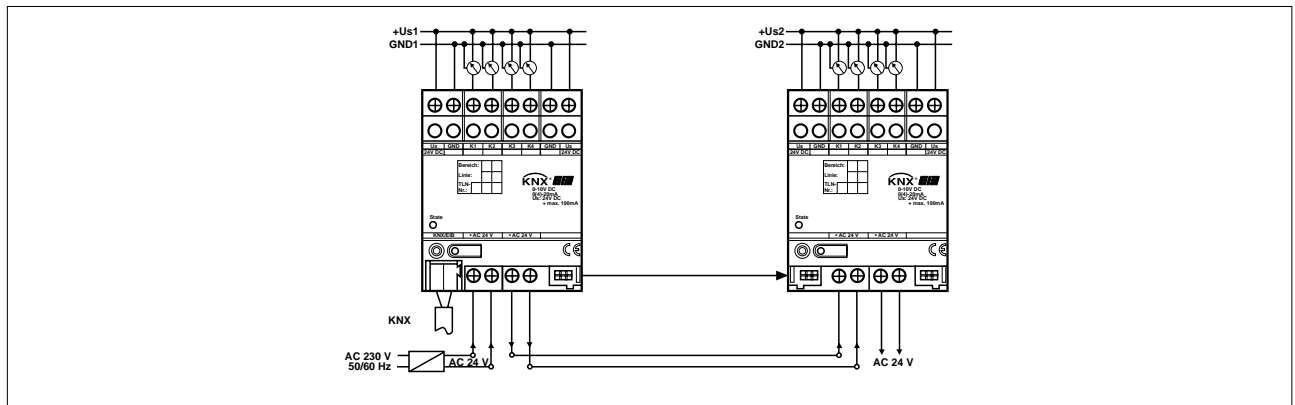**Mounting position:** any
Minimum distances: none
Fastening: on DIN rail 35 x 7.5

4

Wiring diagram for connection of an analog input module

Remarks on the hardware

Please observe the following basic rules when installing the analog input station:

- Any sensors connected can be power-supplied via terminals $+U_s$ and GND (refer to the wiring diagram). These terminals are provided in duplicate and are internally connected with each other. The total current consumption of all sensors power-supplied this way must not exceed 100 mA.
- In the event of a short-circuit between $+U_s$ and GND, the voltage will be switched off. After the elimination of the fault, the voltage will reappear automatically.
- Sensors connected can also be power-supplied externally (SELV), e.g. if their current consumption exceeds 100 mA. In this case, such sensors must be connected between terminals K1 ... K4 and GND.
- The $+U_s$ and GND terminals must not be connected with the corresponding inputs of a different device. The power supply of any sensors used through an analog input module connected is not permitted (hazard of destruction).

Please observe the following basic rules when installing the analog input extension module:

- The analog input extension module is connected to the analog input only with the 6-pole system connector (supplied with the analog input extension module). Only one analog input extension module can be connected to the device.
- The analog input and the analog input extension module can be connected to the same 24 V AC power supply. The connecting terminals are double terminals for easy wiring. Corresponding terminals are marked with dots.
- The $+U_s$ and GND terminals of the analog input extension module must not be connected to the corresponding terminals of another device, e.g. of the analog input, to prevent problems caused by ground loops.
- Sensors connected to the inputs of the analog input extension module must not get their power supply from the analog input.
  Sensors connected to the inputs of the analog input must not get their power supply from the analog input extension module.
- If defective, an analog input extension module can be replaced by one of the same type while the system is in operation (disconnect voltage supply from module!). After the replacement, the analog input makes a reset after abt. 25 s. This action re-initializes all inputs and outputs of the analog input / analog sensor interface and of the module connected and resets them to their original state.
- Removal or addition of modules without adapting the project and subsequent downloading into the analog input is not permitted as this will result in system malfunctioning.
- After first activation, the analog input performs a module scan (status LED: "Orange / On"). As a new decive is not projected from the start, the status LED thereafter switches to "Red / Flashing fast".
- A connected analog input extension module signals its ready-for-operation status by switching its status LED to "Flashing fast".
- After loading a project into the analog input, the status LED switches to "Green / On"; and the module switches its status LED off.

4

Scope of functions:

- Up to four analog sensors with output signals of 0 ... 1 V DC, 0 ... 10 V DC, 0 ... 20 mA DC, 4 ... 20 mA DC can be connected directly to the analog input.
- The connecting lines of the sensors with 4 ... 20 mA outputs can be monitored for open-circuit conditions.
- An analog input extension module permits the connection of up to four more analog sensors.
- The values measured by the analog sensors can be transmitted in the form of 16-bit or 8-bit values.
- The measuring values can be transmitted after value changes and/or cyclically.
- For analog sensors, two limit values with definable hysteresis characteristics can be used.
- The limit values can be modified with external devices as 8-bit values or as 16-bit values.

Analog Input
Weather Station

1

2

	Ref.-No.
KNX weather station	**2224 REG W**
ETS-product family:	Input
Product type:	4-gang analog input
Series embodiment (SE)-device (4 units)	

3

The weather station serves to collect and forward weather data and events. A digital combination sensor (to measure the wind intensity, brightness and twilight as well as rain; with or without DCF77 receiver), and up to four analog measuring sensors can be connected to the weather station. An optional analog input extension module, allows the extension of the range of analog measuring sensors to be connected by another four.

The following measuring sensors, for which preset parameters are available in the device software, can be connected to the analog inputs: Brightness (WS 10 H), Twilight (WS 10 D), Temperature (WS 10 T), Wind (WS 10 W) and Rain (WS 10 R).
Alternatively, other measuring sensors supplying voltage or current signals (0 ... 1 V DC, 0 ... 10 V DC, 0 ... 20 mA DC, 4 ... 20 mA DC) can be used, too. For sensors which supply 4 ... 20 mA signals, the device software parameters offer the option to select wire breakage or open-circuit monitoring.
The values measured are translated by the weather station into value telegrams (DPT 9.0xx, 2-byte or DPT 5.001, 1-byte type). Thus, other bus devices (e.g. visualization software, info display) can display such measured values, generate messages or control weather-dependent processes.

For each measured value, two adjustable limits are available. Once a measured value exceeds or falls below such limits, the weather station can issue corresponding messages. At the same time, such limits can be gated. Cascading several weather stations can even help to implement complex functions. The weather station needs an operating voltage supply of 24 V AC. The latter can, for example, be provided by a power supply module (WSSV 10). At the same time such power supply module can also heat wind sensors or feed an analog input module connected. Terminals $+U_s$ and GND serve to supply external analog sensors with 24 V DC (100 mA max. in total). In the event of a short-circuit between $+U_s$ and GND, the voltage will be switched off.

3

Layout:
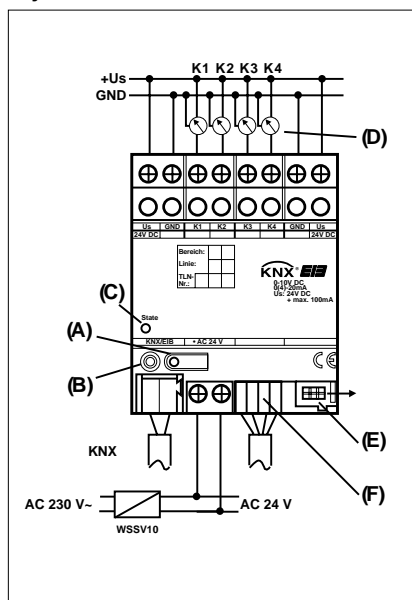
Dimensions:

Width: 72 mm (4 units)
Height: 90 mm
Depth: 58 mm

Controls:

A: Programming key
B: Programming LED
C: Status LED, three-colour
   (red, orange, green)
D: Measuring sensors
E: Module connector, 6-pole
F: Combi sensor connector, 4-pole

Status LED functions:

LED off	no power supply
LED orange/on	modul scan by weather station
LED orange/flashing slowly	combi sensor module scan (waiting for assignment)
LED orange/flasing fast	DIN rail extension module (REG) parameterization
LED red/flashing slowly	fault: undervoltage at module connection / U_S short-circuited
LED red/flashing fast	fault: no project, parameterization error
LED green/flashing slowly	module scan complete, projecting OK
	parameter download into modules
LED green/flashing fast	parameter download to modules
LED green/on	initialization process terminated, everything OK

slow flashing:	approx. 1 Hz
fast flashing:	approx. 2 Hz

4

Technical data

KNX Supply

Voltage:	21 – 32 V DC (SELV)
Power consumption:	typically 150 mW
Connection:	Bus terminal (KNX Typ 5.1)
External supply, voltage:	24 V AC ± 10 %
Current consumption:	250 mA max.
Power consumption:	max. 4 VA
Connection:	Screw terminals:	0.5 mm² to 4 mm², single-wire
		0.34 mm² to 4 mm², fine-wire (without ferrule)
		0.14 mm² to 2.5 mm², fine-wire (incl. ferrule)
		Stud torque max. 0.8 nM

Response to voltage failure

Bus voltage only:	No communication with KNX.
Operating voltage only:	No communication with KNX, no feeding of the measuring sensors.
Bus and mains/operating voltage:	No communication with KNX, no feeding of the measuring sensors.

Response to recovery

Bus voltage only:	No communication with KNX, no feeding of the measuring sensors.
Operating voltage only:	No communication with KNX.
Bus and mains/operating voltage:	Communication with KNX according to initialization parameters.

Module connection

Number:	2
Connection:	6-pole system connector for analog input extension module
	4-pole system connector for combi sensor

Analog inputs

Number:	4
Signal voltage/current:	0 ... 1 V DC, 0 ... 10 V DC, 0 ... 20 mA DC or 4 ... 20 mA DC,
	depending on parameterization
Input resistance:	Voltage measurement:	approx. 18 kΩ
	Current measurement:	approx. 100 Ω
Connection:	Screw terminals:	0.5 mm² to 4 mm², single-wire
		0.34 mm² to 4 mm², fine-wire (without ferrule)
		0.14 mm² to 2.5 mm², fine-wire (incl. ferrule)

Protection:	IP 20
Safety class:	III
Mark of approval:	KNX/VDE
Ambient temperature:	–5°C ... +45°C
Storage/transport temperature:	–25°C ... +70°C (storage above +45°C reduces the lifetime)
Mounting position:	any
Minimum distances:	none
Fastening:	on DIN rail 35 x 7.5

4 Technical data

Measuring sensor power supply outputs

Number:	2
Rated voltage:	24 V DC ±10 %
Rated current:	100 mA DC (total)
Connection:	Screw terminals: 0.5 mm² to 4 mm², single-wire
	0.34 mm² to 4 mm², fine-wire (without ferrule)
	0.14 mm² to 2.5 mm², fine-wire (incl. ferrule)

Wiring diagram with extension module and combi sensor
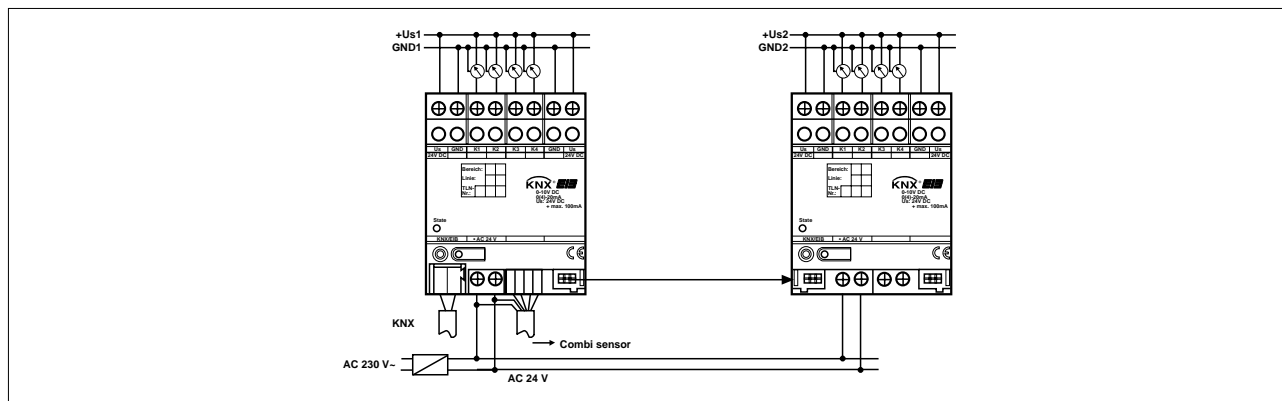
Remarks on the Hardware

Please observe the following basic rules when installing the weather station:

- Any sensors connected can be power-supplied via terminals $+U_s$ and GND (refer to the wiring diagram). These terminals are provided in duplicate and are internally connected with each other. The total current consumption of all sensors power-supplied this way must not exceed 100 mA.
- In the event of a short-circuit between $+U_s$ and GND, the voltage will be switched off. After the elimination of the fault, the voltage will reappear automatically.
- Sensors connected can also be power-supplied externally (SELV), e.g. if their current consumption exceeds 100 mA. In this case, such sensors must be connected between terminals K1 ... K4 and GND.
- The pillar terminal block for the connection of the combination sensor must be plugged on before the mains voltage is switched on and during operation to prevent the digital input from unintentional contact with live wiring. The device as well as any sensors or analog input extension modules connected can be destroyed thereby.
- The $+U_s$ and GND terminals must not be connected with the corresponding inputs of a different device. The power supply of any sensors used through an analog input extension module connected is not permitted (hazard of destruction).

Please observe the following basic rules when installing the combi sensor:

- The sensor comes with a stainless steel bracket for installation on a tubular pole (35 ... 50 mm dia.).
  Depending on the wind intensity, very high forces can occur on such pole.
- If external lightning protection is provided the pole must not be higher than the lightning rod.
- The combi sensor should not be affected from any direction by obstacles or shadows. For this reason, a sufficient distance from walls or roof superstructures such as exhaust blowers should be kept.
- To enable the brightness and the twilight sensors to clearly detect the solar altitude align the combi sensor so that its precipitation window faces north.
- Removing or adding modules without adapting their configuration and subsequent downloading into the weather station is not allowed as this will result in system malfunctioning.
- After the first start, the weather station will run a module scan (status LED: "orange/ON"). Since a new device does not include any configuration by default the status LED will then change to "red/quickly blinking".
- The combi sensor connected indicates its readiness for operation by two short tones which will recur every 5 s.
- In this state, the combi sensor can be logged in and the antenna aligned (refer to the combi sensor operating instructions).
- A defective combi sensor can be replaced in operation by another one of the same type. In such case, the new combi sensor must logged in once again and to aligned. After logging in the new combi sensor, the weather station will reset after about 25 s. This will re-initialize all inputs and outputs of the weather station and of the modules connected and reset them to their original state.

4

Remarks on the hardware
Please observe the following basic rules when installing the analog input extension module:
- One analog input extension module at maximum can be connected to the weather station.
- Always use the 6-pole system connector (comes with the analog input extension module) to connect the analog input extension module to the weather station.
- A defective analog input extension module can be replaced in operation by another one of the same type (disconnect the module from the voltage supply). After replacement, the weather station will reset after about 25 s. This will re-initialize all inputs and outputs of the weather station and of the modules connected and reset them to their original state.
- Removing or adding any modules without adapting their configuration and subsequent downloading into the weather station is not allowed as this will result in system malfunctioning.
- After the first start, the weather station will run a module scan (status LED: "orange/ON"). Since a new device does not include any configuration by default the status LED will then change to "red/quickly blinking".
- An analog extension input module indicates its readiness for operation by changing its status LED to "quickly blinking".
- After loading a project into the weather station, the status LED will change to "green/ON", with the module turning off its status LED.

5

Scope of functions:

- The weather station can be combined with a digital combi sensor to detect brightness (in triple form), twilight, wind speed and precipitation (rain) as well as for DCF77 reception.
- The connection to the combi sensor and the wind measured values of the combi sensor can be monitored.
- In conjunction with DCF77 reception, automatic shading of up to four façades with slat readjustment in dependence on the sun position can be implemented.
- Up to four analog sensors providing output signals of 0 ... 1 V DC, 0 ... 10 V DC, 0 ... 20 mA DC, 4 ... 20 mA DC can be directly connected to the weather station.
- The connections to sensors with 4 ... 20 mA outputs can be monitored for wire breakage (open circuit).
- With the aid of an analog input extension module, up to four additional analog sensors can be connected.
- For selected weather sensors (wind, brightness, twilight, precipitation (rain), temperature, air humidity, atmospheric pressure) pre-configured software settings are available.
- The measured values of the weather sensors (with the exception of the precipitation sensor) can be output in 16-bit form. Output can take place when values change or in cycles.
- The measured values of the analog sensors can be output in 16-bit or in 8-bit form. Output can take place when values change or in cycles.
- The precipitation (rain) sensor outputs are 1-bit values.
- For each of the analog sensors and for the weather sensors (with the exception of the precipitation sensor), two limit values with definable hystereses are available.
- These limit values can be externally preset as 8-bit or 16-bit values.
- Up to 16 blocking modules facilitate the filtering of 1-bit, 8-bit or 16-bit values.
- Up to 20 logic gates with up to eight inputs each can be used.
- AND, OR and exclusive OR can be selected as logic functions.
- The inputs and outputs of the logic gates can be inverted.

Automatic shading
Shading control with automatic readjustment of the shutter/blind slats offers the optimized utilization of the natural daylight, avoiding extreme dazzling at the same time.
The automatic shading control function is based on the calculated position of the sun which, for the human observer, moves from east over south to west during the course of the day. In this connection, the path of the sun is very flat in winter and very steep in summer.
Also, information on the building is required.
The shutter/blind actuators must facilitate slat positioning through a 1-byte communication object.

Calculating the sun position
The weather station calculates the position of the sun from the geographical position of the building as well as from the current time and the current date.
The geographical position can be entered within the framework of the configuration work. For this purpose, either the exact coordinates of the building are available, or a neighbouring town or city can be selected from the list. To get the correct time the weather station uses the DCF77 receiver of the combi sensor or the time from any timing device in the system, e.g. FP 701 CT etc. From these values, the weather station can calculate the correct sun position.

Steep path of the sun in summer
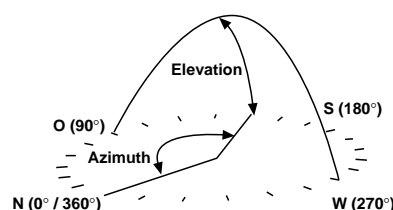
From the viewpoint of the observer, the sun's position is described by two angles. The azimuth defines the angle between the geographical north direction and a vertical circle through the centre of the sun. The elevation (sun height) defines the angle between the horizon and the sun's centre.

5 Building orientation

The automatic shading control starts at the moment when at least one of the three brightness sensors indicates that the luminance has exceeded the selectable threshold.

To enable the weather station to determine for which of the up to four facades of the building shading is necessary the orientation and the opening angle are still required for each facade.

Example:
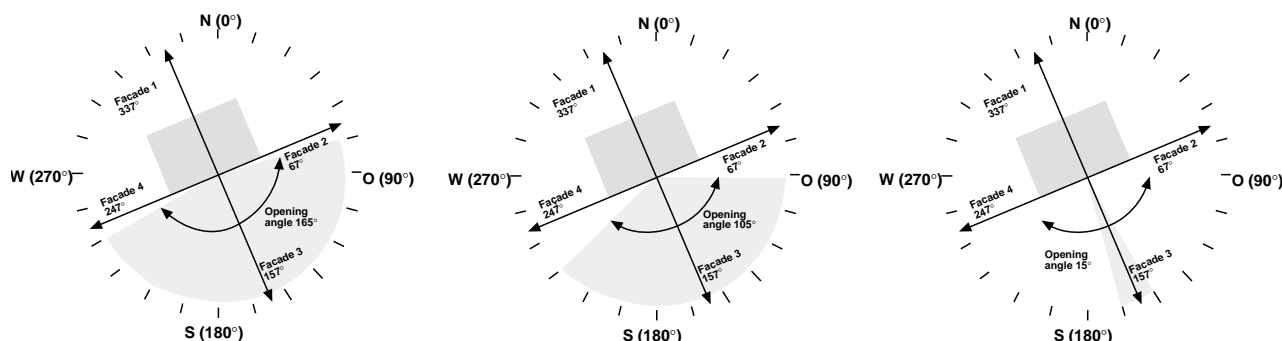
The orientation of the facade is determined by the direction of a vertical line projected onto each facade. Such orientation data can, for example, be obtained from the construction documents.

The opening angle determines in what range the sun azimuth must be so that disturbing dazzling can occur. Entering a value of 180° means, that as soon as the sun just begins to shine through the windows of this facade, the shutters/blinds of this facade will be moved down. If an opening angle of 1° has been entered, the azimuth must virtually be vertical to the facade. It is possible either to set a fixed opening angle, or to vary it in operation by an external value transmitter. In such case, the external opening angle will overwrite the parameterised value.

Shutter/blind control

The weather station will send a 1-bit telegram with the value of "1" for each facade if the brightness threshold has been exceeded and the sun azimuth is within the opening angle of the facade. This "Facade shading" communication object will be linked up with the "Long-time operation objects of the shutter/blind actuators for this facade.

Thus, the shutters/blinds of this facade can be moved down. To enable all shutter/blind drives to really reach their bottom end position the slats will be positioned only after some waiting time.

| Slats fully opened 0% / -90° | Slats being positioned irrespective of what of the sun position is. | Slats fully shut 100% / +90° |
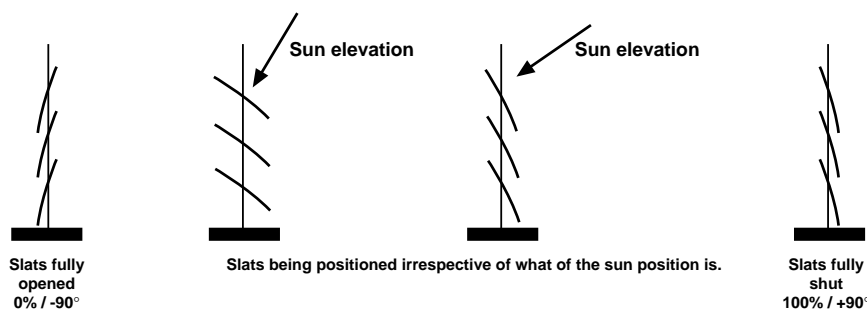
The positioning of the slats depends on the elevation of the sun. To obtain optimum protection from dazzling the slats must be adjusted vertically to the falling sunlight. For adaptation to different actuators, slat positioning can be effected either with percentage values or by angular data. In this connection, an offset can be selected for adaptation to different slat curtain materials.

As long as the sun radiation is above the parameterised "Basic brightness for shading" value, the slat positioning telegrams will be sent in cycles. For most of the shutters/blinds, slat readjustment is effected by short-time moving of the slat curtain. For this reason, the slat positioning cycle time should not be selected too short.

Analog Input
Extension Module

1
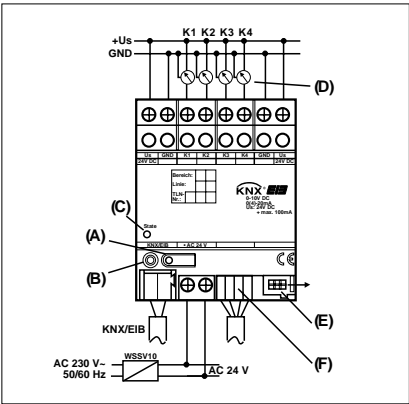
2

	Ref.-No.
Analog input extension module	**2214 REGAM**
(No KNX device)	
Series embodiment (SE)-device (4 units)	

3

The analog input extension module exceeds a KNX Weather station 2224 REG W or a KNX by four additional sensor inputs.
The evaluation of the measured data and the limiting values will be handled by the connected KNX device.

The analog input extension module evaluates voltage and current signals.

Voltage signals:	0 ... 1 V DC	0 ... 10 V DC
Current signals:	0 ... 20 mA DC	4 ... 20 mA DC

The analog input extension module needs an external 24 V power supply, WSSV 10.

4

Technical data

Connection to KNX device:	6-pole system plug
Sensor input:	4 x analog
Signal voltage/current:	0 ... 1 V DC, 0 ... 10 V DC, 0 ... 20 mA DC or 4 ... 20 mA DC
Input resistance:	Voltage measurement: approx. 18 kΩ
	Current measurement: approx. 100 Ω
Supply of external sensors:	24 V DC, max. 100 mA
Protection:	IP 20
Safety class:	III
Supply voltage:	24 V AC ± 10 %
Current consumption:	max. 170 mA
Power consumption at system plug:	typ. 150 mW
Ambient temperature:	–5°C ... +45°C
Storage/transport temperature:	–25°C ... +70°C (storage above +45°C reduces the lifetime)
Connection:	Screw terminals: 0.5 mm² to 4 mm², single-wire
	0.34 mm² to 4 mm², fine-wire (without ferrule)
	0.14 mm² to 2.5 mm², fine-wire (incl. ferrule)

1

2
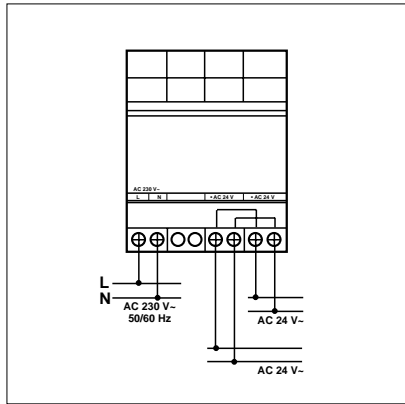
	Ref.-No.
Power supply	**WSSV 10**
(No KNX device)	
Series embodiment (SE)-device (4 units)	

3

The power supply AC 24 V serves for the supply of KNX devices as e.g. Weather station 2224 REG W, Analog input 2214 REG A or analog input extension module 2214 REG AM.
Above that, also the sensors as e.g. WS 10 W, WS 10 R or the Combi sensor WS 10 KS and their internal heating can be supplied as far as the max. output current of the power supply is not exceeded.

The power supply is protected against overload and short-circuits by a thermo-switch.
Automatic restart after cool down or elimination of the short circuit.

4

Technical data

Net voltage:	230 V AC ± 10 %, 50/60 Hz
Output voltage:	24 V AC ± 10 %, 50/60 Hz
Output current:	max. 1 A
Power-on time:	100 %
Short-circuit protection:	Thermo switch
Ambient temperature:	–5°C ... +40°C, ice free
Storage/transport temperature:	–25°C ... +70°C
Protection:	IP 20
Connection:	Screw terminals: 0.34 mm² to 4 mm², fine-wire (without ferrule)
	0.14 mm² to 2.5 mm², fine-wire (incl. ferrule)

Combi sensor

1

A: Wind wheel
B1 ... B3:   Brightness sensors
                    west, east, south
C: Dawn sensor
D: Rain sensor
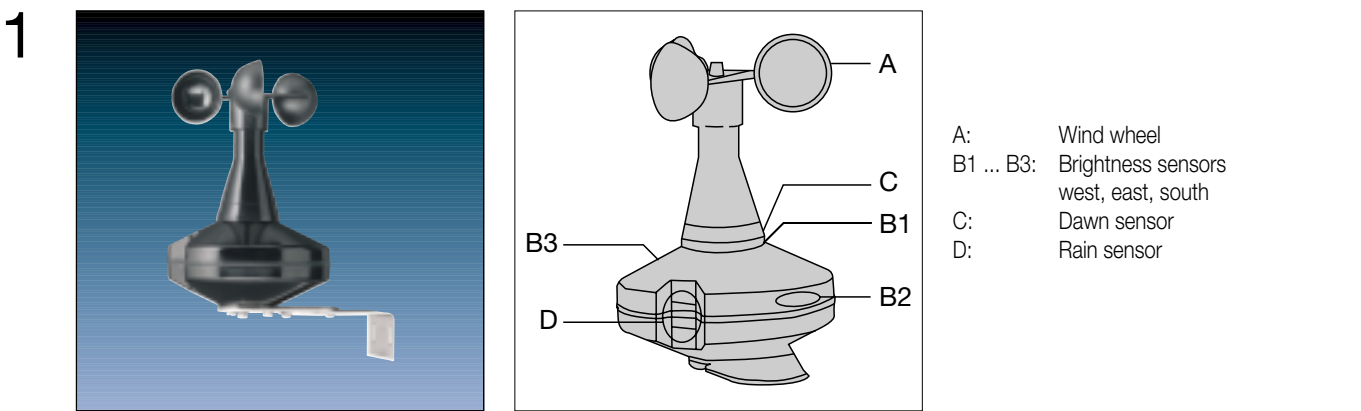
2

	Ref.-No.
Combi sensor	**WS 10 KS**
– with DCF77 receiver	**WS 10 KSDCF**
(No KNX device)	

3

The combi sensor serves for the measurement of the wind speed, brightness dawn and rain.
The brightness can be measured for three directions, south, east and west, separately.
The combi sensor will be connected directly to the weather station (2224 REG W) which evaluates the measured data and transmits these as switching or value telegrams to the bus.

The combi sensor WS 10 KSDCF includes an additional DCF77 receiver for the official German time signal.
The combi sensor needs an external 24 V AC supply, e.g. power supply WSSV 10.

4   **Technical data**

Supply:	24 V AC ± 15 %, 50/60 Hz
Max. current consumption:	600 mA
Power consumption:	max. 14.4 W (sensors and heating)
Ambient temperature:	–5°C ... +45°C
Connection cable:	LiYCY, 6 x 0.25 mm, 10 m, max. 50 m
Ambient temperature:	–40°C ... +60°C, ice free
Storage/transport temperature:	–40°C ... +60°C
Protection:	IP 55, in standard purpose acc. to DIN EN 60592
Safety class:	III
Dimensions:	130 x 200 mm (without mounting bracket)
Fastening:	mounting bracket for wall or mast

Sensor signals	
Wind speed:	1 ... 40 m/s
Accuracy:	≤ 0.5 m/s, –20°C ... +60°C
Rain:	Yes / No
Sensitivity:	fine drizzle
Switch On delay:	approx. 3 rain particles
Switch Off delay:	approx. 2 minutes

Brightness	
Range:	0 ... 110 KLux
Spectral range:	700 ... 1050 nm
Resolution:	10 bit
Direction:	east, south, west

Dawn	
Range:	0 ... 674 Lux
Resolution:	10 bit

1

Connections:

brown	operating volt. + 24 V
white	correspond. ground
green	output 0 V / 10 V
yellow	correspond. ground
pink	heating 24 V
grey	heating 24 V

2

	Ref.-No.
Wind sensor	**WS 10 W**
(No KNX device)	

3

The wind sensor converts the wind speed into electrical signals. These signals are generated by a Reed contact which closes under the influence of magnets.
The generated impulses are transformed into an output voltage proportional to the wind speed.
A PTC-heating element takes care for a trouble free winter operation (only in combination with heating transformer WSSV 10).

4

Technical data

Range:	0,7 ... 40 m/s
Electrical output:	0 ... 10 V at 40 m/s
Supply voltage:	18 ... 32 V DC
Current consumption:	6 ... 12 mA
Contact type:	Reed contact
Heating:	PTC-element (800 C)
Operating voltage heating:	24 V AC/DC
Lead wire:	3 m (LIYY 6 x 0.25 mm^2)

Analog Sensors for Weather Station

1
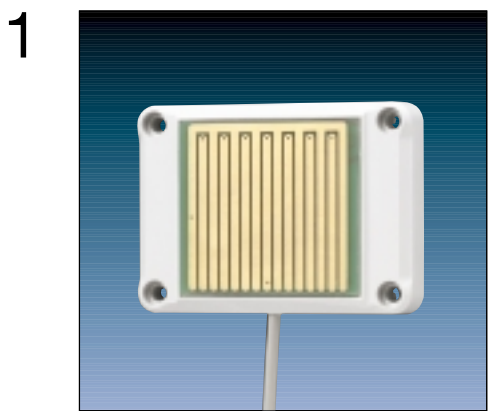
Connections:

brown	operating volt. + 24 V
white	correspond. ground
green	output 0 V / 10 V
yellow	heating 24 V
grey	heating 24 V

2

	Ref.-No.
Rain sensor	**WS 10 R**
(No KNX device)	

3

The rain sensor is used for the measuring and evaluation of the rainfall.
With a meander shaped sensor the conductance of the rain water is evaluated.
A micro processor controls the heating (only in combination with heating transformer WSSV 10) and offers an output signal of 0 V or 10 V.

4

Technical data

Range of the electrical output:	0 V dry / 10 V rain (min. 1 kΩ load)
Lead wire:	3 m (LIYY 5 x 0.25 mm^2)

Plasting housing with sealed electronics

1

Connections:
1   operating volt. + 24 V
2   correspond. ground
3   output 0 ... 10 V

2   Ref.-No.

Brightness sensor   **WS 10 H**
(No KNX device)

3   The brightness sensor is used for the measuring and evaluation of the brightness.
      The brightness measured by a photodiode is transmitted to an analog output signal of 0 V – 10 V by the electronics.

4   **Technical data**

Range: 0 ... 60.000 Lux, linear
Electrical output: 0 V ... 10 V, short-circuit / proof
Protection: IP 65

Plasting housing
with PG7 thread + screw and pressure respectively moisture compensation (recommended cable 3 x 0.25 mm^2)

1

Connections:
1   operating volt. + 24 V
2   correspond. ground
3   output 0 ... 10 V

2   Ref.-No.

Dawn sensor   **WS 10 D**
(No KNX device)

3   The dawn sensor is used for the measuring and evaluation of the brightness (dawn/dusk).
      The brightness measured by a photodiode is transmitted to an analog output signal of 0 V – 10 V by the electronics.

4   **Technical data**

Range: 0 ... 255 Lux, linear
Electrical output: 0 V ... 10 V, short-circuit / proof
Protection: IP 65

Plasting housing
with PG7 thread + screw and pressure respectively moisture compensation (recommended cable 3 x 0,25 mm^2)

1

Connections:
1   operating volt. + 24 V
2   correspond. ground
3   output 0 ... 10 V

2

	Ref.-No.
Temperature sensor	**WS 10 T**
(No KNX device)	

3
The temperature sensor is used for the measuring and evaluation of the temperature.
The temperature measured by a temperature sensor is transmitted to an analog output signal of 0 V – 10 V by the electronics.

4
Technical data

Range: –30 °C ... +70 °C, linear
Electrical output: 0 V ... 10 V, short-circuit / proof
Protection: IP 65

Plasting housing
with PG7 thread + screw and pressure respectively moisture compensation (recommended cable 3 x 0.25 mm^2)

Analog output
4-gang

1

2

	Ref.-No.
KNX analog output	**2204.01 REGA**
ETS-product family:	Output
Product type:	4-gang analog output
Series embodiment (SE)-device (4 units)	

3

The analog output converts measuring data received via KNX telegrams (DPT-ID 9.0xx and 5.010) into analog output signals.
The analog output signals enable heating, ventilation and air conditioning units to adapt their output values to information received from the bus and thus to take part in control processes.

Voltage signals:	0 ... 1 V DC	0 ... 10 V DC
Current signals:	0 ... 20 mA DC	4 ... 20 mA DC

The analog output offers four analog outputs which can be software-parameterised for one of the ranges mentioned above.
Outputs not used can be deactivated.
The output variables can be force-controlled from a coordinating control system.
With an analog output extension module, the number of analog outputs can be increased from 4 to 8.

In conjunction with the "dimming" function of a sensor, both, the analog output and also the analog output extension module can be used as an active control unit for dimming applications.
The analog output needs 24 V AC for operation. The necessary power can be supplied by the power supply unit (WSSV 10). This power supply unit is capable of supplying power at the same time to a connected analog output extension module.

3

Layout:

(A)

(B)

(C)

(D)

(E)

(F)
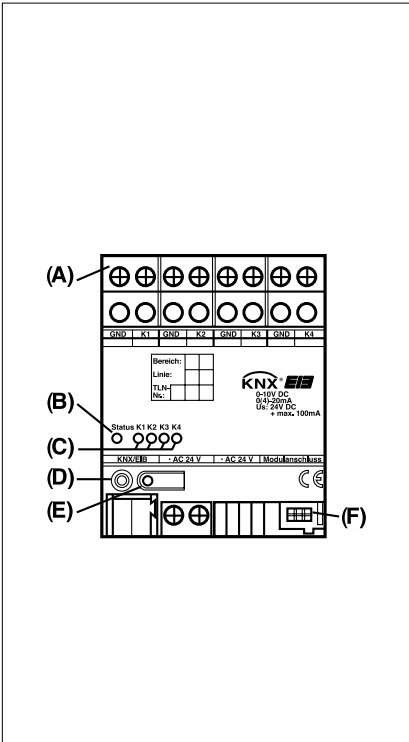
Dimensions:

Width:	4 mod, 72 mm
Height:	90 mm
Depth:	58 mm

Controls:

A: Analog outputs 1 ... 4
B: Status LED of device, three-colour
   (red, orange, green)
C: Status LED's of the four outputs
   mono, yellow
D: Programming LED
E: Programming button
F: System connector, 6-pole,
   for analog output extension module

Status LED (B) indication for analog actuator:

LED off	no power supply
LED orange/on	modul scan by analog actuator
LED orange/flashing fast	module scan of analog output extension module
LED red/flashing slowly	fault: undervoltage at module connection / U_S short-circuited
LED red/flashing fast	fault: no project, parameterization error
LED green/flashing slowly	module scan complete, projecting OK
	parameter download into modules
LED green/flashing fast	parameter download to modules
LED green/on	initialization process terminated, everything OK

slow flashing:	approx. 1 Hz
fast flashing:	approx. 2 Hz

Status LED (C) indication for the 4 analog outputs:

LED off	output signal is zero
LED on	output signal is greater than zero

4

Technical data

KNX Supply

Voltage:	21 – 32 V DC (SELV)
Power consumption:	typically 150 mW
Connection:	Bus terminal (KNX Typ 5.1)
External supply, voltage:	24 V AC ± 10 %
Connection:	Screw terminals:

	0.5 mm² to 4 mm², single-wire
	0.34 mm² to 4 mm², fine-wire (without ferrule)
	0.14 mm² to 2.5 mm², fine-wire (incl. ferrule)
	Stud torque max. 0.8 nM

Response to voltage failure

Bus voltage only:	parameterizable: last value maintained; fixed value (in %)
Mains voltage only:	outputs down to 0 V or to 0 mA
Bus and mains voltage:	outputs down to 0 V or to 0 mA

Response to recovery

Bus voltage only:	parameterizable: no reaction; state of initialization; last value before failure
Mains voltage only:	parameterizable status request of group addresses, determination and setting of the parameterizable output states with bus voltage applied
Bus and mains/operating voltage:	parameterizable status inquiry of group addresses, determination and setting of the parameterizable output states with bus voltage applied

Protection:	IP 20
Safety class:	III
Mark of approval:	KNX/VDE
Ambient temperature:	–5°C ... +45°C
Storage/transport temperature:	–25°C ... +70°C (storage above +45°C reduces the lifetime)
Mounting position:	any
Minimum distances:	none
Fastening:	on DIN rail 35 x 7.5

4 Technical data

Module connection
Number: 1
Connection: 6-pole system connector for extension module

Analog outputs
Number: 4
Type of signal: 0 ... 1 V DC, 0 ... 10 V DC, 0 ... 20 mA DC or 4 ... 20 mA DC,
depending on parameterization

Output signal load: voltage signal: ≥ 1 kΩ
current signal: ≤ 500 Ω

Output current: voltage signal: max. 10 mA per channel
current signal: ma.x 20 mA pe channel

Connection: Screw terminals: 0.5 mm^2 to 4 mm^2, single-wire
0.34 mm^2 to 4 mm^2, fine-wire (without ferrule)
0.14 mm^2 to 2.5 mm^2, fine-wire (incl. ferrule)

Connection of an extension module
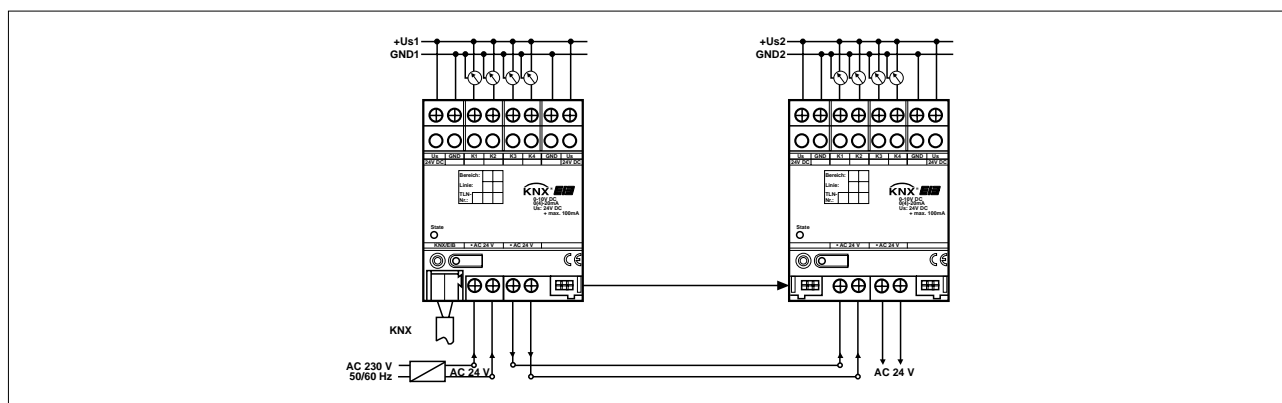
Remarks on the Hardware

• The GND terminals must not be connected to the corresponding terminals of another device.

• The outputs of the analog output and of the analog output extension module must not be connected to the 1 ... 10 V interface of electronic ballasts or electronic transformers.

• All connected components must ensure safe separation from other voltages.

Please observe the following basic rules when installing the analog output extension module:

• An analog output extension module is connected to the analog output only with the 6-pole system connector (supplied with the analog output extension module).

• One extension module only can be connected to the device.

• An analog output extension module can be replaced (e.g. in case of defect) while the system is in operation (disconnect the voltage supply from the module). After the replacement, the analog output makes a reset after abt. 25 s. This action re-initializes all outputs and resets them to their original state.

• Removal or addition of modules without adapting the project and subsequent downloading into the analog output is not permitted as this will result in system malfunctioning.

• The GND terminals of the analog output extension module must not be connected to the corresponding terminals of another device, e.g. the analog output.

• After initial start-up, the analog output performs a module scan (status LED: "orange/on").

• Since a new device contains generally no project, the status LED switches thereafter to "red/flashing fast".

5

Application

Objects

Number of addresses:	200
Number of assignments:	200
Communication objects:	58

Object	Function	Name	Type	DP-Type	Flag
0 ... 3	Input value output 1 ... 4	Analog output	9.0xx	2 Bytes	C, W, T[1]
0 ... 3	Input value output 1 ... 4	Analog output	5.001	1 Byte	C, W, T[1]
4 ... 7	Status output 1 ... 4	Analog output	9.0xx	2 Bytes	C, R, T[1]
4 ... 7	Status output 1 ... 4	Analog output	5.001	1 Byte	C, R, T[1]
8 ... 15	Forced control 1 / 2 output 1 ... 4	Analog output	1.001	1 Bit	C, W, T[2]
16 ... 19	Switching output 1 ... 4	Analog output	1.001	1 Bit	C, W, T[2]
20 ... 23	Dimming output 1 ... 4	Analog output	3.007	4 Bits	C, W, T
24 ... 27	Alarm output 1 ... 4	Analog output	1.001	1 Bit	C, R, T
29 ... 32	Input value output 5 ... 8	Extension module	9.0xx	2 Bytes	C, W, T
29 ... 32	Input value output 5 ... 8	Extension module	5.001	1 Byte	C, W, T[4]
33 ... 36	Status output 5 ... 8	Extension module	9.0xx	2 Bytes	C, R, T[4]
33 ... 36	Status output 5 ... 8	Extension module	5.001	1 Byte	C, R, T[4]
37 ... 44	Forced control 1 / 2 Output 5 ... 8	Extension module	1.001	1 Bit	C, W, T[3] [4]
45 ... 48	Switching output 5 ... 8	Extension module	1.001	1 Bit	C, W, T[4]
49 ... 52	Dimming output 5 ... 8	Extension module	3.007	4 Bits	C, W, T[4]
53 ... 56	Alarm output 5 ... 8	Extension module	1.001	1 Bit	C, R, T[4]
57	Alarm	Extension module	1.001	1 Bit	C, R, T[4]

[1] The type of the "Input value ..." and "Status ..." objects depends on the setting of the "Input format" parameter.

[2] The "Switching" and "Dimming" objects of an output are visible only if the "Input format" parameter is set to "8 bits".

[3] The "Forced control" objects of an output are visible only if the "Forced control object" parameter is set to "Forced control active with ...".

[4] Objects 29 .... 57 are visible only if the "Extension module present" parameter is set to "Yes".

Scope of functions:

For each channel separately programmable:
- Type of signal output (0 ... 10 V, 0 ... 1 V, 0 ... 20 mA, 4 ... 20 mA)
- Format of input value (8-bit or 16-bit) presettable
- Dimming actuator operation (with 8-bit input objects)
- Output value after initialization
- Up to two forced-control modes
- Cyclical monitoring of input values
- Response in the event of exceeding of monitoring time presettable
- Response to bus voltage failure presettable
- Response on return of bus voltage presettable

Analog output
Extension Module

1
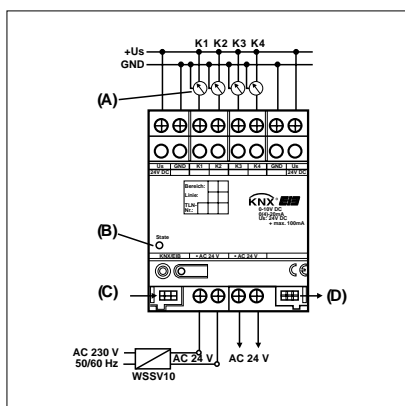
2

	Ref.-No.
Analog output module	**2204.01 REG AM**
(No KNX device)	
Series embodiment (SE)-device (4 units)	

3

The analog output extension module exceeds a KNX Analog output, 2204.01 REGA by four additional sensor outputs.
The analog output extension module offers four analog outputs which can be software parameterised for one of the following ranges.
Outputs not used can be deactivated.

Voltage signals:	0 ... 1 V DC	0 ... 10 V DC
Current signals:	0 ... 20 mA DC	4 ... 20 mA DC

The analog output extension module needs an external 24 V power supply, WSSV 10.

4

Technical data

Supply voltage:	24 V AC ± 10 %	
Current consumption:	max. 170 mA	
Power consumption at system plug:	typ. 150 mW	
Connection:	Screw terminals:	0.5 mm^2 to 4 mm^2, single-wire
		0.34 mm^2 to 4 mm^2, fine-wire (without ferrule)
		0.14 mm^2 to 2.5 mm^2, fine-wire (incl. ferrule)
Connection to KNX device:	6-pole system plug	
Sensor input:	4 x analog	
Output signal load:	voltage signal:	≥ 1 kΩ
	current signal:	≤ 100 Ω
Output current:	voltage signal:	max. 10 mA per channel
	current signal:	max. 20 mA per channel
Connection:	Screw terminals:	0.5 mm^2 to 4 mm^2, single-wire
		0.34 mm^2 to 4 mm^2, fine-wire (without ferrule)
		0.14 mm^2 to 2.5 mm^2, fine-wire (incl. ferrule)
Protection:	IP 20	
Safety class:	III	
Ambient temperature:	–5°C ... +45°C	
Storage/transport temperature:	–25°C ... +70°C (storage above +45°C reduces the lifetime)	

Time Switch

2 channel

1

2

	Ref.-No.
KNX time switch, 2 channel	**2152 REG**
ETS-product family:	Time switch
Product type:	Timer
Series embodiment (SE)-device (2 units)	

3 The 2 channel time switch can be used as a daily or as a weekly time switch. On each channel, switching, priority, brightness values or value messages (commands) can be transmitted at determined times.

The time switch offers: 36 captive switching times which are programmable by free block formation on one, several or all weekdays.

In addition the device is already programmed ex factory with valid Middle-European switching for automatic summer/winter time switching and actual time.

If another or no switching is required, this can be programmed as described in the operating instruction.

4 **Technical data:**

Supply

Voltage:	24 V DC (+6 V / –4 V)
Power consumption:	< 2 mA
Connection:	KNX connection bus
Power reserve:	6 years at +20°C
Programmable:	every minute
Memory locations:	36
Sommer/winter:	adjustment automatically
Protection:	IP 20
Operation temperature:	–5°C ... +45°C
Mounting:	on DIN rail 35 x 7.5

5

Description of application   **2 scenes with switching, value, priority**

On each of the 2 channels you can choose between the following telegram types:
– switching telegram (1 Bit)
– priority telegram (2 Bit)
– brightness value or value telegram (8 Bit)
Cyclic transmitting can be selected for each channel, this is controlled by a common timer. In addition the possibility exists of suppressing the time switch program of the clock by control of a blocking object via the bus.
The characteristic of the blocking object and its influence on the transmission behaviour of the individual channel objects can be adjusted by parameters.
This could be an ideal application for private homes or smaller KNX projects.
During a switching time, up to four telegrams (commands) can be transmitted via bus on one channel (end of a working day: switch off main lighting, drive shutter down, lower ambient temperature, lock external doors).
These additional objects can be a 1 or 2 Bit or a 1 Byte type.

Objects

Number of addresses: 11
Number of assignments: 11
Communication objects: 9

Object	Name	Function	Type	Flag
Scene – objects channel 1, operation mode: switching				
0	Channel 1 – object 1	Send switching telegram	1 Bit	C, R, T
1	Channel 1 – object 2	Send switching telegram	1 Bit	C, R, T
2	Channel 1 – object 3	Send switching telegram	1 Bit	C, R, T
3	Channel 1 – object 4	Send switching telegram	1 Bit	C, R, T
Scene – objects channel 2, operation mode: switching				
4	Channel 2 – object 1	Send switching telegram	1 Bit	C, R, T
5	Channel 2 – object 2	Send switching telegram	1 Bit	C, R, T
6	Channel 2 – object 3	Send switching telegram	1 Bit	C, R, T
7	Channel 2 – object 4	Send switching telegram	1 Bit	C, R, T
Scene – objects channel 1, operation mode: value transmitter				
0	Channel 1 – object 1	Send value telegram	1 Byte	C, R, T
1	Channel 1 – object 2	Send value telegram	1 Byte	C, R, T
2	Channel 1 – object 3	Send value telegram	1 Byte	C, R, T
3	Channel 1 – object 4	Send value telegram	1 Byte	C, R, T
Scene – objects channel 2, operation mode: value transmitter				
4	Channel 2 – object 1	Send value telegram	1 Byte	C, R, T
5	Channel 2 – object 2	Send value telegram	1 Byte	C, R, T
6	Channel 2 – object 3	Send value telegram	1 Byte	C, R, T
7	Channel 2 – object 4	Send value telegram	1 Byte	C, R, T
Scene – objects channel 1, operation mode: priority				
0	Channel 1 – object 1	Send priority telegram	2 Bit	C, R, T
1	Channel 1 – object 2	Send priority telegram	2 Bit	C, R, T
2	Channel 1 – object 3	Send priority telegram	2 Bit	C, R, T
3	Channel 1 – object 4	Send priority telegram	2 Bit	C, R, T
Scene – objects channel 2, operation mode: priority				
4	Channel 1 – object 1	Send priority telegram	2 Bit	C, R, T
5	Channel 1 – object 2	Send priority telegram	2 Bit	C, R, T
6	Channel 1 – object 3	Send priority telegram	2 Bit	C, R, T
7	Channel 1 – object 4	Send priority telegram	2 Bit	C, R, T
Blocking function				
8	Blocking	Receive blocking telegram	1 Bit	C, W, T

Time Switch

4 channel

1

2

	Ref.-No.
KNX time switch, 4 channel	**2154 REG**
ETS-product family:	Time switch
Product type:	Timer
Series embodiment (SE)-device (6 units)	

3

The 4 channel time switch controls connected bus participants via group addresses. It transmits either 1, 2 or 8 Bit telegrams, including the time. With the time program and the corresponding application, the time can be transmitted and received via the bus.

As an option, the programming can be done on a PC by using the special software OBELISK. The prepared file can be written onto the memory card and also be printed out.

The time switch has the following features:
– BCU integrated into the unit
– 324 switching times for free assignments
– permanent switching times by means of EEPROM
– day/week/year program
– random program
– pulse program
– switching times: ON or OFF delay
– 1 x function for all date-related switching times
– 10 priority programs consisting of 10 individual weekly programs per channel
– automatic setting of public holydays without fixed date (ie. Easter)
– approx. 1.5 years battery reserve by means of exchangeable environmentally friendly lithium cell
– it can be programmed up to the year 2063 in advance
– data transmission and data backup possible with memory card
– possible functions: switching, dimming transmitting time, receiving time
– option: radio controlled, hence automatic synchronisation of summer/winter time by means of the DCF 77 signal
– power supply for DCF receiver is integrated
– PC programming recommended by using the special software set OBELISK

4

Technical data:

Supply
Voltage:	24 V DC (+6 V / –4 V)
Power consumption:	max. 150 mW
with DCF:	230 V for integrated power supply
Connection:	KNX connection block
Power reserve:	1.5 years, CR2450 3 V/560 mA
Programmable:	every second
Memory locations:	324
Special programs:	9 week-programs
Antenna:	for DCF 77 signal
Protection:	IP 20
Operation temperature:	–5°C ... +45°C
Mounting:	on DIN rail 35 x 7,5
Max. distance of DCF:	200 m

5

Description of some features

Priority Program
The programming of a priority consists of:
1. input of switching times,
2. determination of a beginning and final date.
If the period of several priority programs overlaps, then always the program with the highest index is active.
For example the week program P2 overrides the week program P1.

Random Program
The random program causes random ON and OFF switching in the period from 10 to 120 minutes between one or more switching pairs (switch ON and OFF time). For each channel the random program can be switched on manually via keyboard.

Function "1 x"
The function "1 x" can be used for date-specific switching times and for priority periods. After the execution of the date-specific switching time, the switching time is deleted automatically at midnight in the clock. Likewise a priority period which was occupied with the function "1 x" was deleted after the operating time. However, the switching times in the clock, corresponding to the priority period, are preserved.
Thus the function "1 x" can be used meaningfully with the programming of the time switch program for holidays and holiday programs as well as movable holiday programs.

The time synchronisation
The time synchronisation of the time switch can be made by the DCF 77-radio signal (antenna and power supply are necessary), by means of the bus via reception of a date and time message or automatically quartz-controlled.

Programming of the switching time programs
Complete switching time programming can be made directly on the device by means of key input or by the PC using the special programming set OBELISK. The OBELISK memory chip is not part of delivery!

The software OBELISK permits e.g.:
– to program switching times into a EEPROM memory module
– to select switching times from the EEPROM memory module
– to archive switching times on fixed disk in the PC
– to print out switching times in a table
– to copy sections from an available switching time program and to insert them into a new or already available program
– to define a new rule for the summer/winter time (if no DCF antenna is attached)

5

Description of application   **1. Scene with switching, value priority**

On each of the 4 channels you can choose between the following telegram types:
– switching telegram (1 Bit)
– priority telegram (2 Bit)
– brightness value or value telegram (8 Bit)
Cyclic transmitting can be selected for each channel, this is controlled by a common timer.
By choice, a switching, priority or value telegram (command) can be sent on each of the channels 1 to 3.
Additionally a scene with up to 4 types of telegram (command) can be implemented on the 4th channel.
During a switching time, up to four telegrams (commands) can be transmitted via bus on channel 4 (end of a working day: switch off main lighting, drive shutter down, lower ambient temperature, lock external doors).
These additional objects can be a 1 or 2 Bit or a 1 Byte type.
In addition the possibility exists of suppressing the time switch progam of the clock by control of a blocking object via the bus.

Objects

Number of addresses: 10
Number of assignments: 10
Communication objects: 8

Object	Name	Function	Type	Flag
0	Channel 1	Send telegram switch	1 Bit	R, T
1	Channel 2	Send telegram switch	1 Bit	R, T
2	Channel 3	Send telegram switch	1 Bit	R, T
3	Channel 4	Send telegram switch	1 Bit	R, T
7	Block	Reception telegram block	1 Bit	W, T

max. extension with four switch messages (commands) on channel 4:

Object	Name	Function	Type	Flag
0	Channel 1	Send telegram switch	1 Bit	R, T
1	Channel 2	Send telegram switch	1 Bit	R, T
2	Channel 3	Send telegram switch	1 Bit	R, T
3	Channel 4 object 1	Send telegram switch	1 Bit	R, T
4	Channel 4 object 2	Send telegram switch	1 Bit	R, T
5	Channel 4 object 3	Send telegram switch	1 Bit	R, T
6	Channel 4 object 4	Send telegram switch	1 Bit	R, T
7	Block	Reception telegram block	1 Bit	W, T

Description of application   **2. Switching, value, send time and date**

On each of the 4 channels you can choose between the following telegram types:
– switching telegram (1 Bit)
– priority telegram (2 Bit)
– brightness value or value telegram (8 Bit)
Cyclic transmitting can be selected for each channel, this is controlled by a common timer.
By choice, a switching, priority or value telegram (command) can be sent on each of the channels 1 to 3.
Date and time-of-day can be transmitted each minute, each hour, each day or only on request.
Date and time-of-day are always transmitted together.

Objects

Number of addresses: 8
Number of assignments: 8
Communication objects: 7

Object	Name	Function	Type	Flag
0	Channel 1	Send telegram switch	1 Bit	R, T
1	Channel 2	Send telegram switch	1 Bit	R, T
2	Channel 3	Send telegram switch	1 Bit	R, T
3	Channel 4	Send telegram switch	1 Bit	R, T
4	Time	Send time	3 Byte	R, T
5	Date	Send date	3 Byte	R, T
6	Time demand	Ask for time + date	1 Bit	W, T

5

Description of application   **3. Switching, value, temperature, receive time and date**

On each of the 4 channels you can choose between the following telegram types:
– switching telegram (1 Bit)
– priority telegram (2 Bit)
– brightness value or value telegram (8 Bit)
– temperature telegram (16 Bit)
– any telegram in the EIS 5 format (16 Bit)
Cyclic transmitting can be selected for each channel, this is controlled by a common timer.
By choice, a switching, priority or value telegram (command) can be sent on each of the channels 1 to 3.
Furthermore the time switch can receive time and date telegrams for temporal synchronisation.
The adjustment of any message in the EIS 5 form requires appropriate mathematical knowledge.

Objects

Number of addresses: 8
Number of assignments: 8
Communication objects: 6

Object	Name	Function	Type	Flag
0	Channel 1	Switch	1 Bit	R, T
1	Channel 2	Switch	1 Bit	R, T
2	Channel 3	Switch	1 Bit	R, T
3	Channel 4	Switch	1 Bit	R, T
4	Time	Set time	3 Byte	W, T
5	Date	Set date	3 Byte	W, T

Time Switch
16 channel

1

2

	Ref.-No.
KNX year time switch, 16 channel	**2156 REG**
ETS-product family:	Time switch
Product type:	Timer
Series embodiment (SE)-device (6 units)	

3 Depending on the time of day, the programmed switching times and the parameterization of the application program, the 16-channel year time switch transmits telegrams to the KNX for up to 16 independent channels. These can be switching, value transmission, forced control or HVAC operating mode switch-over telegrams in accordance with KNX.
Moreover, up to 8 scenes with 6 scene objects each and 4 disable objects can be implemented.

Master/Slave time synchronization / DCF77 synchronization
Depending on parameterization, the time can be transmitted to or received from the bus and therefore be synchronized.
As an alternative, the time can be synchronized by means of a DCF77 antenna.

Display
The display shows the channel status, operating mode, date, day of the week and time of day.

Time switch keypad
The keypad permits entering the date, the time of day and the switching programs as well as the direct selection of individual channels.

Obelisk PC programming tool, Obelisk memory chip
The Obelisk programming tool permits easy compilation of switching event times on a PC and interchange between time switch and PC by means of a data interface. The storage device in this case is the Obelisk memory chip.

Scope of functions for programming of switching times
• Day programs/week programs and year programs
• Random switching programs
• Pulse function
• Weekday and channel groups facility
• "1 x" function (switching command is executed only once)
• Public holiday program (annual adaptation of movable holidays)
• Automatic summer/winter time change-over adaptable for international purposes
• Astro program
• Manual permanently ON/permanently OFF switching (via timer switch)
• Priority assignment
• Switching time simulation (only via Obelisk programming software)

4   Technical data

KNX Supply

Voltage:	21 – 32 V DC (SELV)
Power consumption:	< 150 mW
Connection:	KNX connecting and branch terminal
External supply:	only required in case of DCF77 antenna connection
Voltage:	230 V ± 10 %
Power consumption:	< 150 mW
Connection:	Screw terminals

Type of protection:	IP 20
Safety class:	II
Mark of approval:	KNX
Ambient temperature:	–5°C ... +45°C
Storage/transport temperature:	–25°C ... +70°C (storage above +45°C reduces the lifetime)
Mounting position:	any
Minimum distances:	none
Fastening:	Snap-fastening on DIN rail (data rail not required)
Memory locations:	500 (free grouping)
Shortest switching interval:	1 second/minute
Shortest pulse:	1 second
Switching accuracy:	precise to the second
Accuracy:	± 1 s/day at 20°C or radio time signal precision (with DCF77)
Running reserve:	Lithium cell approx. 1.5 years (20°C), CR2450, 3 V/560 mA

DCF77 antenna

Type of protection:	IP 54
Ambient temperature:	–20°C ... +70°C
Mounting position:	orientation as shown in wiring diagram
Receiving range:	1000 km from Frankfurt a.M., Germany
Connection:	max. 1.5 mm^2
Max. distance of antenna:	200 m
Max. loading:	10 devices
Fastening:	Holes in enclosure for fastening screws
	Fastening with brackets supplied with the device

Response at mains failure

Bus voltage only:	software-dependent (see software information)
Mains voltage only:	DCF77 reception not possible, if so equipped
Bus and mains voltage:	–
Response on return of supply	
Bus voltage only:	software-dependent (see software information)
Mains voltage only:	DCF77 reception not possible, if so equipped
Bus and mains voltage:	–

Battery
In the event of bus failure, the battery is activated automatically to supply the time switch (not the BCU). In this case, the application module is fully operational (display dark). The switching time programs remain stored in the internal EEPROM.
Current is drawn from the battery only in the event of bus failure (running reserve = approx. 1.5 years).
The battery has a lifetime of approx. 10 years. Observe the polarity when inserting the battery.

DCF77
The internal power supply unit for the DCF77 antenna is connected to the L and N terminals.
Connection to the mains is not required if the device is operated without DCF77.
The KNX bus (the battery in case of bus failure) supplies the operating voltage for the timer clock (incl. date and time-of day). Make sure to connect first the mains and then the bus voltage.
The antenna signal consists of safety extra-low voltage (SELV) with a level of 9 V.
The LED antenna flashes once every second to indicate that the antenna is properly aligned.

• Commissioning of a single time switch
  In the event of only one time switch being in operation, the polarity of the antenna line is irrelevant.

• Commissioning of several time switches (with common antenna)
  1. If several time switches are operated together, the polarity of the antenna cable must be the same for all devices:
    – Connect the antenna cable to all year time switches.
    – Connect the mains voltage only to one time switch.
    – The false-polarity LED indicates an incorrect connection of the antenna cable to a time switch.
  2. Connect the mains voltage to all other time switches.

4   **Obelisk memory chip**

For the transfer of data, only the Obelisk memory card 64K (supplied with the 16-channel year time switch) can be used.
Data transfer with the Obelisk memory card (2154 EEPROM) for the old KNX 4-channel year time switch REG is not possible!

Requirements: Programming software Obelisk **2.1** + Obelisk interface box **V2.0** + Obelisk memory card 64K.

The "Obelisk" memory chip has the following functions:

1. Keypad lock
   The access to the time switch by means of the built-in keypad can be disabled and re-enabled with the help of the Obelisk memory chip.
   The activation and deactivation procedure is described in the operating instructions.
   Exception:
   Re-initialization with the reset key is possible. If the automatic re-synchronization is interrupted, the date can be changed manually.
   During the next synchronization cycle, the device will, however, be automatically reset to the actual time.
   The keypad lock remains active after an operating voltage failure.
2. Storage device
   The memory chip is the storage device for switching programs.

---

5   **Scope of functions:**

- Transmission of telegrams on 16 channels depending on time switch programming with the following functions: switching, value transmitter
  (1 byte), forced control or HVAC operating mode switch-over (KNX).
- Use of 8 scenes with 6 output objects each (accessible via each channel) with the following functions: switching value transmitter (1 byte),
  forced control or HVAC operating mode switch-over (KNX) or temperature value transmitter.
- Cyclical transmission parameterizable for each channel object.
- Up to 4 disable objects for disabling of parameterizable channels.
- Use as time and date transmitter (Master) with transfer of the information to the bus after optional addition of the DCF77 receiver.
  Alternative use as time and date receiver (Slave) with reception of the information from the bus. In the master mode, a time request via a trigger
  object is possible.
- Cyclical transmission of time and date information to the bus in the master mode.

1

2154 PC   2154 EEPROM   2154 DCF
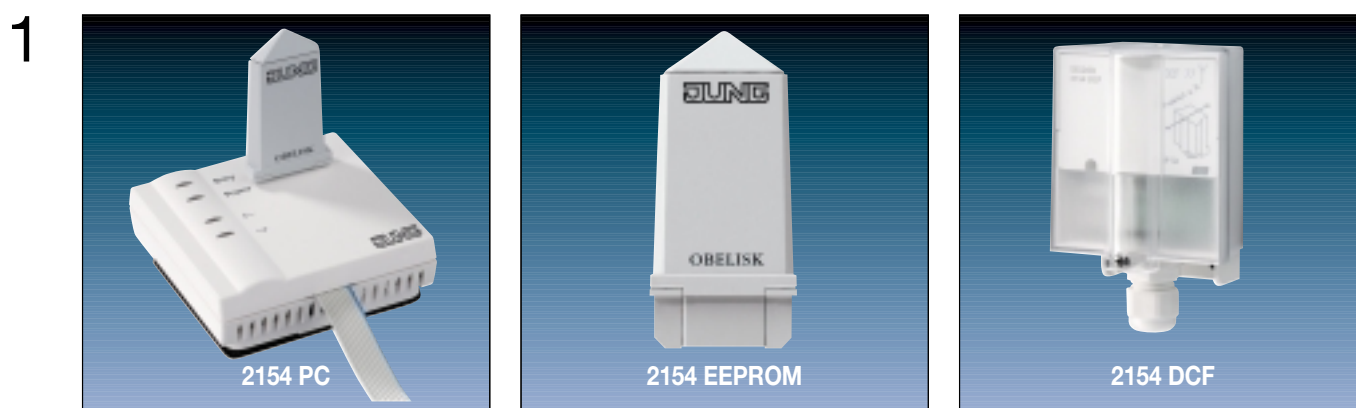
2

	Ref.-No.
Software set	
for OBELISK memory card	**2154 PC**

3

The programming set consists out of an OBELISK memory card for the data transmission between PC and time switch, a programming adapter and the software.
The memory card can be used as data backup or for the transmission of the program from time switch to time switch.

2

	Ref.-No.
OBELISK memory card	**2154 EEPROM**

3

Memory card with EEPROM used for data transmission between PC and 4 channel time switch 2154 REG.

2

	Ref.-No.
DCF receiver	**2154 DCF**
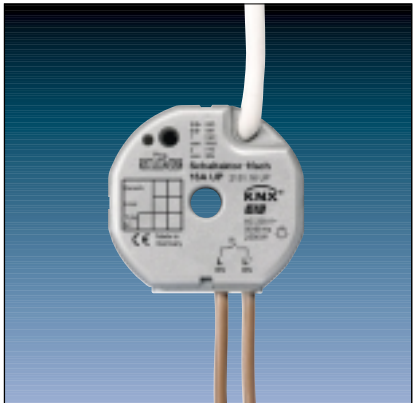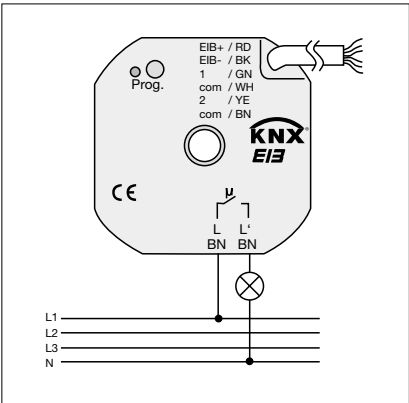
3

Receiver module for the DCF77 radio signal.
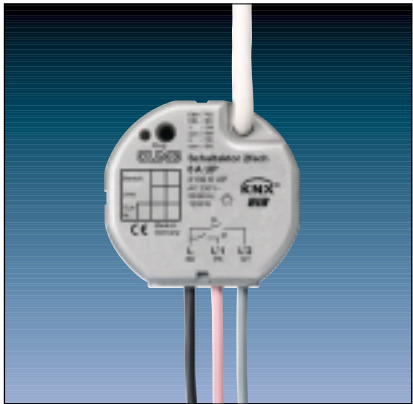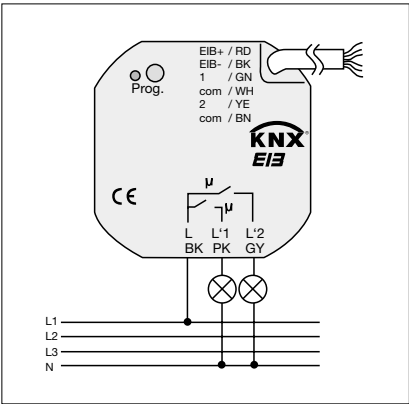
4   **Technical data**

Protection:	IP 54
Connection:	3 x 1.5 mm^2, max. 200 m
Distance:	1000 km Frankfurt a.M. (Germany)

Actuators

Switching – Flush mounted

2

	Ref.-No.
KNX switch actuator, flush mounted	
1-gang	**2131.16 UP**
2-gang	**2132.6 UP**
ETS-product family:	Output
Product type:	1(2)-gang binary output

3 The switching actuator receives telegrams from sensors via the KNX and switches an electrical load with its relay-output.
The device is equipped with two extension inputs which – depending on parameterization – can act directly on the switching output (local control / only input 1, input 2 without function) or alternatively as binary inputs on the KNX. The connected potential-free switch or push-button contacts are sensed against a common reference potential at the switching actuator. As a binary input, the device can transmit telegrams for switching or dimming, for shutter/blind control or for value transmitter applications (dimming value transmitter, light-scene extension).
Connecting 230 V signals or other external voltages to the extension inputs is not permitted.
The switching actuator is supplied from the KNX and needs no additional external power supply.

4 Technical data

KNX supply

Cable type:	YY 6 x 6.0 mm; red: bus (+) / black: bus (–)
Voltage:	21 – 32 V DC SELV
Power consumption:	typically 150 mW
Connection:	approx. 33 cm ready-made; connecting terminal (0.6 – 0.8 mm)

Input

Number:	2 (depending on parameterization either as extension inputs for push-button local control of the actuator or as independent binary inputs acting on the bus)	
Cable type:	YY 6 x 0.6 mm	
	green:	extension input 1
	white:	reference potential (com)
	yellow:	extension input 2
	brown:	reference potential (com)
Cable length:	approx. 33 cm ready-made, extendible to 5 m max.	
Scanning voltage:	approx. – 19 V DC referred to "com"; continuous signal	
Loop resistance:	max. 2 kOhm for safe "1" signal detection (rising edge)	

Output, for 2131.16 UP

Number:	1	
Cable type:	2 x H05 V-K 2.5 mm^2 with ferrules	
Cable length:	approx. 20 cm ready-made	
Switch type:	make-contact, potential-free (µ-contact) bistable	
Switching voltage:	230 V AC; 50/60 Hz	
Max. switching current:	16 A	
Max inrush current:	400 A, 20 ms	
Switching capacity:	Incandescent lamps	2.500 W (at 100.000 switching operations)
	HV halogen lamps	2.200 W (at 100.000 switching operations)
	LV halogen lamps	
	inductive transformers	1.000 VA
	electronic transformers	1.000 W
	capacitive loads	230 V AC, 10 A switching current, max. 105 µF

Output, for 2132.6 UP

Number:	2 (with common phase connection "L")	
Cable type:	3 x H05 V-K 2.5 mm^2 with ferrules	
Cable length:	approx. 20 cm ready-made	
Switch type:	make-contact, potential-free (µ-contact) bistable	
Switching voltage:	230 V AC; 50/60 Hz	
Max. switching current:	6 A for each output	
Max inrush current:	120 A, 20 ms	
Switching capacity:	Incandescent lamps	1.200 W (at 25.000 switching operations)
	HV halogen lamps	1.200 W (at 25.000 switching operations)
	LV halogen lamps	
	inductive transformers	500 VA
	electronic transformers	500 W
	capacitive loads	230 V AC, 6 A switching current, max. 14 µF

Protection:	IP 20
Safety class:	III
Mark of approval:	KNX
Ambient temperature:	–5°C ... +45°C
Storage/transport temperature:	–25°C ... +70°C (storage above +45°C results in shorter lifetime)
Mounting position:	any
Minimum spacings:	none
Fastening:	e.g. placing into deep flush-mounting box (Ø 60 mm x 60 mm)

4

Note:
- Never connect the mains voltage (230 V) or other external voltages to the extension inputs.
  Connecting an external voltage endangers the electrical safety of the entire KNX system (SELV / no electrical insulation).
  Persons may be put at risk and devices and installations may suffer irreparable damage.
- Make sure during the installation that there is always sufficient insulation between the mains voltage and the bus or the extensions.
  A minimum spacing of 4 mm must be ensured between the bus/extension wires and the mains wires.
- Non-used wires of the 6-wire connecting cable must be insulated with respect to one another and with respect to external voltages.
- To avoid EMC disturbances, the lines to the inputs should not be laid parallel to lines and cables carrying mains voltage.

Output:
- Output(s) parameterizable as n.o. contact (ON: contact closes / OFF: contact opens) or as n.c. contact (ON: contact opens / OFF: contact closes).
- Preferred state on return of bus voltage presettable.
- For the output additional feedback and additional function possible:
  Presettable additional functions: – logic-operation function with 3 logic parameters
                                     – disabling function with presettable disabling behaviour of the relays
                                     – priority-position function to fix the priority of arriving switching telegrams
- Feedback object invertible.
- Delay on return of bus voltage centrally presettable.
- Turn-on delay and/or turn-off delay or timer function separately presettable for each output.

5

Description of software application

Objects	2131.16 UP	2132.6 UP
Number of addresses:	26	26
Number of assignments:	27	27
Communication objects:	9	12

Objects for the binary inputs (extension inputs), if acting on the bus:

Object	Name	Function	Type	Flag
Function: "Switching" (for all 2 inputs[2])				
2 – 3	Input 1 – Input 2	Switching object X.1 (X = 1 to 2)	1 Bit	C, W, T, (R)[1]
10 – 11	Input 1 – Input 2	Switching object X.2 (X = 1 to 2)	1 Bit	C, W, T, (R)[1]
Function: "Dimming" (for all 2 inputs[2])				
2 – 3	Input 1 – Input 2	Switching	1 Bit	C, W, T, (R)[1]
10 – 11	Input 1 – Input 2	Dimming	4 Bit	C, T, (R)[1]
Function: "Shutter/blind" (for all 2 inputs[2])				
2 – 3	Input 1 – Input 2	Short operation	1 Bit	C, T, (R)[1]
10 – 11	Input 1 – Input 2	Long operation	1 Bit	C, T, (R)[1]
Function: "Value transmitter" (Function: Dimming value transmitter for all 2 inputs[2])				
2 – 3	Input 1 – Input 2	Value	1 Byte	C, T, (R)[1]
Function: "Value transmitter" (Function: Light-scene extension with/without storage function for all 2 inputs[2])				
2 – 3	Input 1 – Input 2	Light-scene extension	1 Byte	C, T, (R)[1]
Function: "Disable" (for all 2 inputs[3])				
2 – 3	Input 1 – Input 2	Disabling	1 Bit	C, W, (R)[1]

[1] : Objects marked (R) permit read-out of the object status (set R flag).

[2] : The "No function", "Switching", "Dimming", "Shutter/blind" and "Value transmitter" functions can be selected per input.
   The names of the communication objects and the object table (dynamic object structure) will change accordingly.

[3] : A disable function is not available if the inputs are parameterized for "No function".

5 Description of software application

Objects for the output of 2131.16 UP

Object	Name	Function	Type	Flag
0	Output 1	Switching	1 Bit	C, W, (R)[1]

Function: "Additional function for the output = "Logic-operation object""

Object	Name	Function	Type	Flag
8	Output 1	Logic function	1 Bit	C, W, (R)[1]

Function: "Additional function for the output = "Disabling object""

Object	Name	Function	Type	Flag
8	Output 1	Disabling	1 Bit	C, W, (R)[1]

Function: "Additional function for the output = "Priority-position object""

Object	Name	Function	Type	Flag
8	Output 1	Priority operation	1 Bit	C, W, (R)[1]

Function: "Acknowledge"

Object	Name	Function	Type	Flag
16	Output 1	Acknowledge	1 Bit	C, W, (R)[1]

Objects for the output of 2132.6 UP

Object	Name	Function	Type	Flag
0 – 1	Output 1 – 2	Switching	1 Bit	C, W, (R)[1]

Function: "Additional function for the output = "Logic-operation object""

Object	Name	Function	Type	Flag
8 – 9	Output 1 – 2	Logic function	1 Bit	C, W, (R)[1]

Function: "Additional function for the output = "Disabling object""

Object	Name	Function	Type	Flag
8 – 9	Output 1 – 2	Disabling	1 Bit	C, W, (R)[1]

Function: "Additional function for the output = "Priority-position object""

Object	Name	Function	Type	Flag
8 – 9	Output 1 – 2	Priority operation	1 Bit	C, W, (R)[1]

Function: "Acknowledge"

Object	Name	Function	Type	Flag
16 – 17	Output 1 – 2	Acknowledge	1 Bit	C, W, (R)[1]

[1] : Objects marked (R) permit read-out of the object status (set R flag).

Actuators
Switching 2-gang

1

2

	Ref.-No.
KNX switch actuator,	
2-gang, 16 A	**2132.16 REG** (will be replaced by 2302.16 RECHM)
ETS-product family:	Output
Product type:	2-gang binary output
Series embodiment (SE)-device (4 units)	

3

The switching actuator 2-gang receives telegrams and switches electrical loads by two floating contacts. The switch performance of the output is configured as a make-contact. Depending on the parameter, the actuator can be switched On/Off directly, with On/Off time delays or as a time switch. Additionally it offers the possibility of logical link and acknowledge operation.
The behaviour of a bus voltage drop/recovery can be parameterised.
The device provides 2 hardware slide switches to be actuated manually without any effect on the bus.

4

Technical data

Supply
Voltage:	24 V DC (+6 V / –4 V)
Power consumption:	max. 150 mW
Connection:	KNX connection block

Output
Number:	2	
Performance:	2 floating make-contacts	
Rated voltage:	230 V AC; 400 V AC	
Max. current:	16 A / AC-1; 10 A / AC-3 at 230 V AC	
	10 A / AC-1; 6 A / AC-3 at 400 V AC	
Capacity:	Incandescent :	2500 W
	Fluorescent, not comp. cos. φ = 0,5:	2500 W
	Fluorescent, parallel comp. cos. φ = 1:	1300 W / 140 µF
	Fluorescent, duo-circuit, cos. φ = 1:	2 x 2500 W
	HV- halogen:	2500 W
Connection:	screw terminals: 0,2 – 4 mm^2	
Protection:	IP 20	
Operation temperature:	–5°C ... +45°C	
Storage temperature:	–25°C ... +70°C	
Mounting:	on DIN rail 35 x 7.5	

Notes:
- Different lines can be connected to the device.
- A manual switching by the slide switches is not detected by the software! If a channel is blocked via bus, it can be switched by the slide switch.
- The two relay outputs do not switch simultanuously, there is always a small time delay between due to the power supply from the bus. This has to be considered with applications having a high switching frequency.

5 Description of software application

– Switching of 2 independent channels.
– Hand operation possible.
– Outputs can be adjusted as make or brake contacts.
– Preferred contact position in case of bus voltage drop or recovery adjustable.
– 3 objects per output: switching, acknowledge and additional function.
– Adjustable additional functions:
        Logical link with 3 logical parameter
        Disable function
        Forced position function
– Acknowledge object can be inverted.
– Switch ON and/or switch OFF time delay can be adjusted for each channel separately.

Objects

Number of addresses (dynamic):   32
Number of assignments (dynamic):   32
Communication objects: 6

Object	Name	Function	Type	Flag
0	Output 1	Switching	1 Bit	C,W
1	Output 2	Switching	1 Bit	C,W
Logical link function to the corresponding channel 1 – 2				
8	Output 1*	Logical link	1 Bit	C,W
9	Output 2*	Logical link	1 Bit	C,W
Disable link function to the corresponding channel 1 – 2				
8	Output 1*	Disable	1 Bit	C,W
9	Output 2*	Disable	1 Bit	C,W
Forced link function to the corresponding channel 1 – 2				
8	Output 1*	Forced position	2 Bit	C,W
9	Output 2*	Forced position	2 Bit	C,W
Acknowledge objects to the corresponding channel 1 – 2				
12	Output 1	Acknowledge	1 Bit	C,T
13	Output 2	Acknowledge	1 Bit	C,T

Objects marked with* can be assigned to any channel.

Notes to software application:

Forced position object

With the forced position object the switching channel can be forced separately via a 2 Bit telegram to a desired position, independent of its switching object. Here the parameter "relay-operation" is also effective.
The 2 Bit-telegram must be built up as follows:

Bit 1	Bit 0	Function	
0	X	Priority not active	→ 'switching' object
0	X	Priority not active	→ 'switching' object
1	0	Priority active	→ switch Off
1	1	Priority active	→ switch On

The first Bit (Bit 0) of the forced position object, sets the forced switching position. The second Bit (Bit 1) releases the forced position function. At active 'forced position' function (priority), the incoming telegrams will be evaluated internally. Afterwards, at inactive 'forced position' function (priority), the actual internal switching condition will adjust the switching object accordingly.

Acknowledge object

The acknowledge object will be updated e.g. at bus voltage recovery and can be read out by any display or visualization (set R-flag!).

Actuators
Switching 6-gang

1

2

	Ref.-No.
KNX switch actuator,	
6-gang, 6 A	**2136.6 REG**
ETS-product family:	Output
Product type:	6-gang binary output
Series embodiment (SE)-device (4 units)	

3

The 6-gang switch actuator receives telegrams and switches electrical loads by six floating contacts.

The switch performance of the output is configured as a make-contact.

Depending on the parameters the actuator can be switched on/off directly, with on/off time delays or with a time switch.

Additionally, there is the possibility of a logic link and acknowledge operation.

The behaviour of a bus voltage drop/recovery can be parameterised.

4 **Technical data**

Supply
Voltage:	24 V DC (+6 V / –4 V)
Power consumption:	150 mW
Connection:	KNX connection block

Output
Number:	6
Performance:	floating make-contacts
Rated voltage:	230 V AC
Max. current:	6 A (ohmic load)
Capacity:	1000 W incandescent lamp
	500 VA fluorescent lamp, uncompensated
	2 x 500 W fluorescent lamp, duo-circuit
	2 x 58 W (14 μF) fluorescent lamp, parallel comp.
Connection:	clamp bar
Protection:	IP 20
Insulation voltage:	referring to VDE 0660 T 102
Operation temperature:	–5°C ... +45°C
Mounting:	on DIN rail 35 x 7.5

Notes:
- The six relay outputs do not switch simultanuously, there is always a small time delay between due to the power supply from the bus. This has to be considered with applications having a high switching frequency.
- Different lines can be connected to the device.
- Do not connect 3 phase motors.

5   Description of application   Switching RM, VK, ZF 206101

Functions

– Switching of 6 independent channels.
– Outputs can be adjusted as make- or break-contact.
– Preferred position in case of bus voltage drop or recovery adjustable.
– 4 adjustable outputs with 3 objects per output: switching, acknowledge and additional function.
– 2 adjustable outputs with 2 objects per output: switching, acknowledge.
– Adjustable additional functions:
         Logical link with 3 logic parameter
         Disable function
         Forced position function
– Acknowledge object invertable.
– Switch ON and/or switch OFF time delay or time function can be adjusted for each channel separately.

Objects

Number of addresses (dynamic):   32
Number of assignments (dynamic):   32
Communication objects: 16

Object	Name	Function	Type	Flag
0	Output 1	Switch	1 Bit	C, W
1	Output 2	Switch	1 Bit	C, W
2	Output 3	Switch	1 Bit	C, W
3	Output 4	Switch	1 Bit	C, W
4	Output 5	Switch	1 Bit	C, W
5	Output 6	Switch	1 Bit	C, W
Logical link function to the selected channel 1 – 4:				
8	Output 1*	Logical link	1 Bit	C, W
9	Output 2*	Logical link	1 Bit	C, W
10	Output 3*	Logical link	1 Bit	C, W
11	Output 4*	Logical link	1 Bit	C, W
Disable function to the selected channel 1 – 4:				
8	Output 1*	Disable	1 Bit	C, W
9	Output 2*	Disable	1 Bit	C, W
10	Output 3*	Disable	1 Bit	C, W
11	Output 4*	Disable	1 Bit	C, W
Forced position function to the selected channel 1 – 4:				
8	Output 1*	Forced position	2 Bit	C, W
9	Output 2*	Forced position	2 Bit	C, W
10	Output 3*	Forced position	2 Bit	C, W
11	Output 4*	Forced position	2 Bit	C, W
Acknowledge function to the corresponding channel 1 – 6:				
12	Output 1	Acknowledge	1 Bit	C, T
13	Output 2	Acknowledge	1 Bit	C, T
14	Output 3	Acknowledge	1 Bit	C, T
15	Output 4	Acknowledge	1 Bit	C, T
16	Output 5	Acknowledge	1 Bit	C, T
17	Output 6	Acknowledge	1 Bit	C, T

Objects marked with* can be assigned to any channel.

5 | **Notes to software application:**

Forced position object

With the forced position object the switching channel can be forced separately via a 2 Bit telegram to a desired position, independent of its switching object. Here the parameter "relay-operation" is also effective.

The 2 Bit-telegram must be built up as follows:

Bit 1	Bit 0	Function	
0	X	Priority not active	→ 'switching' object
0	X	Priority not active	→ 'switching' object
1	0	Priority active	→ switch Off
1	1	Priority active	→ switch On

The first Bit (Bit 0) of the forced position object, sets the forced switching position. The second Bit (Bit 1) releases the forced position function. At active 'forced position' function (priority), the incoming telegrams will be evaluated internally. Afterwards, at inactive 'forced position' function (priority), the actual internal switching condition will adjust the switching object accordingly.

Acknowledge object

The acknowledge object will be updated e.g. at bus voltage recovery and can be read out by any display or visualization (set R-flag!).

1

2

	Ref.-No.
KNX switch actuator,	
4-gang, 16 A	**2304.16 REG HM**
8-gang, 16 A	**2308.16 REG HM**
ETS-product family:	Output
Product type:	4-/8-gang binary output
Series embodiment (SE)-device (4/8 units)	

3 The switching actuator receives telegrams from sensors or other controls via the KNX and switches electrical loads by its independent contacts.
Each switching output has a separate bistable relay, the switching state will be kept also at bus voltage drop.
By means of the slide switches on top of the device, the relays can be operated by hand in parallel to the KNX without bus voltage or programming.

The functional scope for each output channel include extensive time functions, logics, scenarios, inhabit-functions, elapsed hour counter, cyclical monitoring and extended acknowledge functions.The preferred switching status at bus voltage drop/recovery or after download can be adjusted for each channel separately.

For projecting and commissioning the use of ETS 3.0d is recommended. Only with this ETS version or later versions the full functionality will be available (vd4-file).
For ETS2 and older versions of ETS3 separate databases are available (vd2-file).

The switching actuators are supplied by the KNX and do not need any additional external supply.

4 **Technical data**

KNX Supply
Voltage:	21 – 32 V DC (SELV)
Power consumption:	typ. 150 mW
Connection:	Bus terminal (KNX Typ 5.1)
External supply:	–
Connection:	Screw terminals: 0.5 mm² to 4 mm², solid or finely stranded conductor without wire end sleeve
	0.5 mm² to 2.5 mm², finely stranded conductor with wire end sleeve
	Stud torque max. 0.8 Nm
Total power loss:	4-gang actuator: max. 4 W
	8-gang actuator: max. 8 W
Behavior at bus voltage drop:	Depending on parameter
Behavior at bus voltage recovery:	Depending on parameter

4 Technical data

Output
Number:	4 / 8
Type:	Potential free, μ-contact, bistable
Rated voltage:	230 V AC, 50/60 Hz
	400 V AC, 50/60 Hz
	24 V DC
Rated current AC:	16 A / AC-1; 10 A / AC-3 at 230 V AC
	10 A / AC-1; 6 A / AC-3 at 400 V AC
Rated current DC:	16 A / 24 V (ohmic)
Max. switch On current:	400 A, 150 μs
	200 A, 600 μs
Min. switch current:	100 mA (at 24 V)

Switching Capacities
Ohmic loads:	3600 W
Capacitive loads:	10 A, max. 140 μF

Lamps
Incandescent:	2500 W
HV-halogen:	2500 W
NV-halogen	
Conventional transformers:	1200 VA
Tronic transformers:	1500 W
Fluorescent T5 / T8	
not compensated:	2500 W
parallel compensated:	1300 W, 140 μF
duo-circuit:	2300 W, 140 μF
Compact fluorescent	
not compensated:	2500 W
parallel compensated:	1300 W, 140 μF
Mercury-arc lamp	
not compensated:	2000 W
parallel compensated:	2000 W, 140 μF
Ballasts:	The number of ballasts depends on the manufacturer and the type and the quality of the LV-net. The given figures are just examples. (Manufacturer: OSRAM)

Max. number per output:

T8 Lamps:	QTP 3 x 18 W, 4 x 18 W	17
	QTP 2 x 36 W	17
	QTP 1 x 58 W	17
	QTP 2 x 58 W	11
T5 Lamps:	QT-FH 1 x 28 W	17
	QT-FH 2 x 28 W	17
	QT-FH 2 x 54 W	11
	QT-FH 1 x 80 W	11

Protection:	IP 20
Safety class:	III
Mark of approval:	KNX/VDE
Ambient temperature:	–5°C ... +45°C
Storage/transport temperature:	–25°C ... +70°C (storage above +45°C results in shorter lifetime)
Mounting position:	any, recommended: output terminals on top
Minimum spacings:	none
Fastening:	on DIN rail 35 x 7.5

Notes:
- Different lines can be connected to the device.
- A manual switching by the slide switches is not detected by the software! If a channel is blocked via bus, it can be switched by the slide switch.
- By e.g. a central command or high frequent switching, the relay outputs react with a small time delay.
- Do not connect three phase motors.

5 Scope of functions

- Switching of independent channels.
- Hand operation of relays is independent from the bus.
- Outputs can be adjusted as make or brake contacts.
- Central switching function with collective acknowledge.
- Acknowledge switching (only bus operation): Active (at changing of the output status) or passive (object can be read out).
- Logic functions for each output.
- Inhibit function for each output, alternatively forced position function.
- Time functions (Switch-on- and Switch-off-delay, staircase-function also with advance warning).
- Light scenes possible, up to 8 internal scenes per output.
- Elapsed hour counter per output.
- Monitoring of inputs for cyclical updating with safety position.
- Preferred contact position in case of bus voltage drop or recovery and download for each output adjustable.

Description of software application

Objects

Number of addresses:	254
Number of assignments:	255
Communication objects:	4-gang: 50
	8-gang: 98

Superior channel objects:

Object	Function	Name	Type	DP-Type	Flag
Function: Central function					
⌷↵ 8	Central switching	All outputs	1 Bit	1.001	C, W, –, (R)[1]
Description:	1 Bit object for central switching of assigned outputs. The polarity can be defined.				
Function: Collective acknowledge					
⌷↵ 9	Collective acknowledge	All outputs	4 Byte	27.001	C, T, R[2]
Description:	4 Byte object for central acknowledge of the entire status of the actuator.				

Channel objects:

Object	Function	Name	Type	DP-Type	Flag
Function: Switching					
⌷↵ 10, 36, 62, 88, 114, 140, 166, 192[3]	Switching	Output 1 – 8[3]	1 Bit	1.001	C, W, –, (R)[1]
Description:	1 Bit object for controlling an output. ("1" = switch On / "0" = switch Off; please note the operation mode!)				
Function: Forced position					
⌷↵ 11, 37, 63, 89, 115, 141, 167, 193[3]	Forced position	Output 1 – 8[3]	2 Bit	2.001	C, W, –, (R)[1]
Description:	2 Bit object for a forced positioning of an output. The object status after bus voltage recovery can be defined by parameter.				
Function: Inhibit					
⌷↵ 12, 38, 64, 90, 116, 142, 168, 194[3]	Inhibit	Output 1 – 8[3]	1 Bit	1.003	C, W, –, (R)[1]
Description:	1 Bit object for inhibiting of an output. (The polarity can be defined.)				
Function: Logic link					
⌷↵ 13, 39, 65, 91, 117, 143, 169, 195[3]	Logic link	Output 1 – 8[3]	1 Bit	1.002	C, W, –, (R)[2]
Description:	1 Bit object for the input of a logic gate of an output. The object value after bus voltage recovery or after ETS-download can be pre-defined by parameter.				

[1] Each communication object can be read out. Set "R" flag.
[2] Depending on the parameter, acknowledge objects are either active (T-Flag set) or passive, can be read out (set R-Flag).
[3] Number of outputs or communication objects acc. to the chosen device (4-gang = 4 outputs or 8-gang = 8 outputs).

5

Description of software application

Object	Function	Name	Type	DP-Type	Flag

Function: Stair-case function

☐↵ 14, 40, 66,
    92, 118, 144,
    170, 196[3]   Stair-case function   Output 1 – 8[3]   1 Bit   1.010   C, W, –, (R)[1]
                    Start/Stop

Description: 1 Bit object for activation or deactivation of the stair-case time of the stair-case function of an output
               ("1" = switch On / "0" = switch Off).

Function: Stair-case function

☐↵ 15, 41, 67,
    93, 119, 145,
    171, 197[3]   Stair-case function, factor   Output 1 – 8[3]   1 Byte   5.010   C, W, –, (R)[1]
Description: 1 Byte object for the time-factor of the stair-case time (range: 0 ... 255).

Function: Scene function

☐↵ 16, 42, 68,
    94, 120, 146,
    172, 198[3]   Light scene extension   Output 1 – 8[3]   1 Byte   18.001   C, W, –, (R)[1]
Description: 1 Byte object for calling up or storing of a scenario.

Function: Acknowledge switching

☐↵ 18, 44, 70,
    96, 122, 148,
    174, 200[3]   Acknowledge switching   Output 1 – 8[3]   1 Bit   1.001   C, –, T, (R)[1]
Description: 1 Bit object for the acknowledge of an output status
               ("1" = switch On / "0" = switch Off; note operation mode!).

Function: Elapsed hour counter

☐↵ 19, 45, 71,
    97, 123, 149,
    175, 201[3]   Limiting value / Start value   Output 1 – 8[3]   2 Byte   7.007   C, W, –, (R)[1]
                    Elapsed hour counter[4]

Description: 2 Byte object for external setting of a limiting value / start value of the elapsed hour counter of an output (range: 0 ... 65535).

Function: Elapsed hour counter

☐↵ 20, 46, 72,
    98, 124, 150,
    176, 202[3]   Reset   Output 1 – 8[3]   1 Bit   1.015   C, W, –, (R)[1]
                    Elapsed hour counter

Description: 1 Bit object for resetting the elapsed hour counter of an output ("1" = reset, "0" = no reaction).

Function: Elapsed hour counter

☐↵ 21, 47, 73,
    99, 125, 151,
    177, 203[3]   Value elapsed hour counter   Output 1 – 8[3]   2 Byte   7.007   C, W, –, (R)[1]
Description: 2 Byte object for transmitting or read-out of the current meter reading of the elapsed hour cunter.
            The value of the communication object will not be lost at bus voltage drop and will be send to the bus at bus voltage
            recovery or ETS-download.

Function: Elapsed hour counter

☐↵ 22, 48, 74,
    100, 126, 152,
    178, 204[3]   Elapse elapsed hour counter   Output 1 – 8[3]   1 Bit   1.002   C, W, –, (R)[1]
Description: 1 Bit object for the message that the elapsed hour counter is elapsed (up counter = limiting value reached /
            down counter = value "0" reached). With a message the object value will be send actively to the bus. ("1" = message active /
            "0" = message inactive). The value of the communication object will not be lost at bus voltage drop and will be send to the bus
            at bus voltage recovery of ETS-download.

---

[1] Each communication object can be read out. Set "R" flag.

[2] Depending on the parameter, acknowledge objects are either active (T-Flag set) or passive, can be read out (set R-Flag).

[3] Number of outputs or communication objects acc. to the chosen device (4-gang = 4 outputs or 8-gang = 8 outputs).

[4] Limiting value object or start value object acc. to the chosen elapsed hour counter mode.

5 Description of software application

Superior channel functions

Delay after bus voltage recovery
In order to reduce the bus-traffic after bus-reset, connecting the devices to the bus or after ETS-download it is possible to delay all active sending acknowledges (ACK). A delay time can be adjusted.
The ACK to be delayed can be adjusted independently for each output and ACK-function.

Central function
All output channels can be linked by a 1-Bit central-communication object. The behaviour is assimilable with a central group address, linked to all switching objects.

Collective acknowledge
After central commands or bus voltage recovery the bus load is normally high as many devices send out an ACK about the status of its communication objects. This especially happens within visualisations. The collective ACK can be used to reduce the bus load.
In the collective ACK all switching status are combined in a 32 Bit communication object.

Byte 4	Byte 3	Byte 2	Byte 1
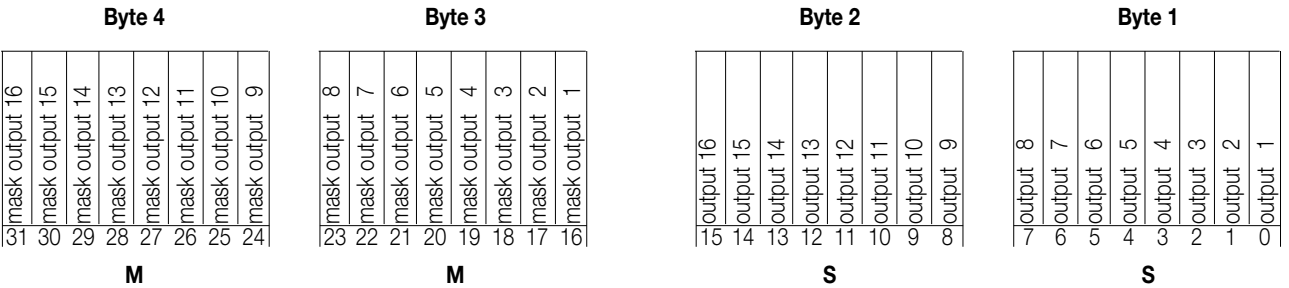
Structur of object Collective Acknowledge

The collective ACK can be used as an active object – will be send out with each change of a switching status – or as a passive status object – object value can be read out.

Actuators

Switching 4-gang/8-gang C-load

1

2

	Ref.-No.
KNX switch actuator, C-load	
4-gang, 16 A	**2304.16 REG CHM**
8-gang, 16 A	**2308.16 REG CHM**
ETS-product family:	Output
Product type:	4-/8-gang binary output
Series embodiment (SE)-device (4/8 units)	

3

The switching actuator receives telegrams from sensors or other controls via the KNX and switches electrical loads by its independent contacts.
Each switching output has a separate bistable relay, the switching state will be kept also at bus voltage drop.
By means of the slide switches on top of the device, the relays can be operated by hand in parallel to the KNX without bus voltage or programming.

The C-load actuators offer the same basic functionality as described before for the switching actuators 2304.16 REG HM and 2308.16 REG HM.

Additionally, the C-load actuators offer a current detection function.
The current measurement can be adjusted for each output separately and can either measure the current or monitor the current within adjustable limits.
The measured current can be transmitted to the bus via independent objects (Transmit at changing or cyclically). Alternatively, the connected load can be monitored within predefined limits (by teach-in or by parameter) with separate monitoring telegrams.

4

Technical data

KNX Supply

Voltage:	21 – 32 V DC (SELV)
Power consumption:	typically 150 mW
Connection:	Bus terminal (KNX Type 5.1)
External supply:	–
Protection:	IP 20
Safety class:	III
Mark of approval:	KNX/VDE
Ambient temperature:	–5°C ... +45°C
Storage/transport temperature:	–25°C ... +70°C (storage above +45°C results in shorter lifetime)
Mounting position:	any, recommended: output terminals on top
Minimum spacings:	none
Fastening:	on DIN rail 35 x 7.5

4 Technical data

Connection:	Screw terminals:	0.5 mm² to 4 mm², solid or finely stranded conductor without wire end sleeve
		0.5 mm² to 2.5 mm², finely stranded conductor with wire end sleeve
		Stud torque max. 0.8 Nm
Total power loss:		4-gang actuator: max. 4 W
		8-gang actuator: max. 8 W
Behavior at bus voltage drop:		Depending on parameter
Behavior at bus voltage recovery:		Depending on parameter

Output

Number:	4 / 8
Type:	Potential free, µ-contact, bistable
Rated voltage:	230 V AC, 50/60 Hz
	400 V AC, 50/60 Hz
	24 V DC
Rated current AC:	16 A / AC-1; 10 A / AC-3 at 230 V AC
	10 A / AC-1; 6 A / AC-3 at 400 V AC
Rated current DC:	16 A / 24 V (ohmic)
Max. switch On current:	600 A, 150 µs
	300 A, 600 µs
Min. switch current:	100 mA (at 24 V)

Current detection

Signal:	sinus (no detection at DC)
Signal frequency:	50/60 Hz
Range:	0.25 ... 16 A effective
Metering precision (metering tolerance):	at currents ≤ 1 A: ± 100 mA
	at currents > 1 A: ± 8 % of the actual current value
Measuring time per output:	min. 700 ms

Switching Capacities

HV-halogen:	3680 W
NV-halogen	
Conventional transformers:	2000 VA
Tronic transformers:	2500 W
Fluorescent T5 / T8	
not compensated:	3680 W
parallel compensated:	2500 W, 200 µF
duo-circuit:	3680 W, 200 µF
Compact fluorescent	
not compensated:	3680 W
parallel compensated:	2500 W, 200 µF
Mercury-arc lamp	
not compensated:	3680 W
parallel compensated:	3680 W, 200 µF
Ballasts:	The number of ballasts depends on the manufacturer and the type and the quality of the LV-net. The given figures are just examples. (Manufacturer: OSRAM)

Max. number per output:

T8 Lamps:	QTP 3 x 18 W, 4 x 18 W	25
	QTP 2 x 36 W	25
	QTP 1 x 58 W	25
	QTP 2 x 58 W	17
T5 Lamps:	QT-FH 1 x 28 W	25
	QT-FH 2 x 28 W	25
	QT-FH 2 x 54 W	17
	QT-FH 1 x 80 W	17

Notes:
- Different lines can be connected to the device.
- A manual switching by the slide switches is not detected by the software! If a channel is blocked via bus, it can be switched by the slide switch.
- By e.g. a central command or high frequent switching, the relay outputs react with a small time delay.
- Do not connect three phase motors.

Actuators
Switching/Blind Control

1
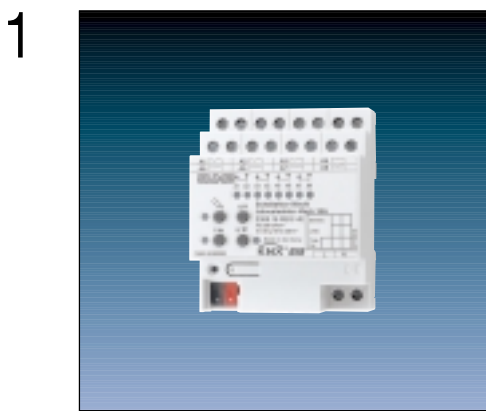
2

	Ref.-No.
KNX Switch/blinds actuator	
Switch 8-gang, Blinds 4-gang	**2308.16 REGHE**
Switch 16-gang, Blinds 8-gang	**2316.16 REGHE**
ETS-product family:	Output
Product type:	Binary output
Series embodiment (SE)-device (4/8 units)	

3

The switching actuator receives telegrams from sensors or other controls via the KNX and switches electrical loads by its independent contacts.
The relay outputs can be adjusted alternatively to switching or blinds operation by the software.
Also a mixed switching/blinds operation is possible.
Within the blinds operation, the actuator can operate blinds, shutters, awnings, ventilation flaps, curtains or other drives for 230V AC.
In the switching mode it operates e.g. lighting applications or also low voltages.
Each output has a line voltage supplied mono stabile relay. This way also preferred positions can be adjusted even at bus voltage drop.
By means of the 4 push-buttons on top of the device, the relays can be operated by hand in parallel to the KNX without bus voltage or programming.
Within the blinds operation mode, the functional scope includes separate adjustable driving times, advanced acknowledge functions, assignments to up to 5 safety functions, an extensive sun protection as well as scenarios and forced position functions.
Also a central control of all blinds outputs is possible.
Within the switching mode, the functional scope for each output channel includes extensive time functions, logics, scenarios or inhibit-functions and advanced acknowledge functions.
Also the central switching of all outputs is possible.
For projecting and commissioning the use of ETS 3.0d is recommended. Only with this ETS version or later versions the full functionality will be available (vd4-file).
For ETS2 and older versions of ETS3 separate databases are available (vd2-file).

4

Technical data

KNX Supply
Voltage:	21 – 32 V DC (SELV)
Power consumption:	typically 150 mW
Connection:	Bus terminal (KNX Type 5.1)

Protection:	IP 20
Safety class:	III
Mark of approval:	KNX/VDE
Ambient temperature:	–5°C ... +45°C
Storage/transport temperature:	–25°C ... +70°C (storage above +45°C results in shorter lifetime)
Mounting position:	any, recommended: output terminals on top
Minimum spacings:	none
Fastening:	on DIN rail 35 x 7.5

4 Technical data

External supply:	230 – 240 V AC ± 10 %, 50/60 Hz	
Connection:	Screw terminals:	0.5 mm^2 to 4 mm^2, solid or finely stranded conductor without wire end sleeve
		0.5 mm^2 to 2.5 mm^2, finely stranded conductor with wire end sleeve
Total power loss:	8/4-gang actuator: max. 3 W	
	16/8-gang actuator: max. 4.5 W	
Behavior at bus voltage drop/ recovery:	Depending on parameter	
Behavior at line voltage drop:	Outputs switch Off (Stop)	
Behavior at line voltage recovery:	Depending on parameter	

Output Switch/blind actuator 4/8-gang

Number:	4 / 8

Output Switch/blind actuator 8/16-gang

Number:	8 / 16
Type:	µ-contact, monostable (interlocked by software in blinds mode)
Rated voltage:	230 – 240V AC, ± 10 %, 50/60 Hz
Rated current AC:	16 A / AC-1, 10 A / AC 3, 16 AX
Max. switch On current:	800 A, 200 µs / 165 A, 20 ms
Min. switch current:	100 mA
Total current actuator:	4/8-gang: max. 80 A, 8/16-gang: max. 160 A
Total current neighbored channels:	max. 20 A

Switching Capacities

Ohmic loads:	3000 W
Capacitive loads:	16 A, max. 140 µF
Motor loads:	1380 VA

Lamps

Incandescent:	3000 W
HV- halogen:	2500 W
LV- halogen	
Conventional transformers:	1200 VA
Tronic transformer:	1500 W
Fluorescent T5 / T8	
not compensated	1000 W
parallel compensated	1160 W, 140 µF
duo-circuit	2300 W, 140 µF
Compact fluorescent	
not compensated:	2500 W
parallel compensated:	1160 W, 140 µF
Mercury-arc lamp	
not compensated:	1000 W
parallel compensated:	1160 W, 140 µF
Ballasts:	The number of ballasts depends on the manufacturer and the type and the quality of the LV-net. The given figures are just examples. (Manufacturer: OSRAM)

Max. number per output:

T8 Lamps:	QTP 2 x 58 W	11
T5 Lamps:	QT-FH 4 x 14 W	10
	QT-FQ 2 x 54 W	11

Notes:
• Different lines can be connected to the device.
• Do not connect three phase motors.

4 Operation

The actuator offers a manual operation for all outputs via 4 push buttons and 3 status LED on the top.
The following operation modes can be adjusted:
– bus operation : operation via push button sensors or other bus-devices
– temporary hand-operation: manual operation via push buttons on top, automatic return to bus-operation
– permanent hand-operation: manual operation via push buttons on top
The operation modes can be released or blocked by parameter.
During hand-operation is no bus-operation possible.
The hand-operation is only possible with line supply connected. At bus voltage recovery or line voltage drop the active hand operation will be stopped.
During bus-operation the hand-operation can be blocked by a telegram, the hand operation will be stopped.

Functional scope:

General
– The outputs can be used for switching or blinds – operation. In the blinds-operation two neighbored outputs will be combined to one blinds channel. A mixed operation is possible.
– The reaction at bus voltage drop and recovery and after ETS-download can be adjusted for each output.
– Active acknowledges can be globally delayed after bus voltage recovery.
– Hand-operation independent from the bus with LED status display.
– Each output has the full functionality. All channel orientated functions can be parameterized for each output separately.

Blinds-operation
– Control of blinds with louver, rolling shutter, awnings or ventilation flaps.
– Separate adjustable driving times – with driving time prolongation for drives in the upper endposition – for each channel.
– Adjustable time for louver adjustment.
– Blocking time at change of driving direction and the times for short and long operation (step, move) adjustable.
– Central control of all blinds channels via 1bit move telegram.
– Acknowledge of the blind and louver position (only during bus-operation).
– Assignment on up to 5 safety functions (3 wind, 1 rain, 1 frost alarm) with or without cyclical monitoring.
– An advanced sun-protection function with fixed or variable position for the blinds and the louver at the beginning or at the end of the function can be adjusted for each output.
– Forced position for each output (with ETS3.0d).
– Up top 8 internal scenarios per output (with ETS3.0d).

Switch-operation
– Switching of independent channels.
– Outputs can be adjusted as make or brake contacts.
– Central switching function with collective acknowledge.
– Acknowledge switching (only bus operation): Active (at changing of the output status) or passive (object can be read out).
– Logic functions for each output.
– Inhibit function for each output, alternatively forced position function.
– Time functions (Switch-on- and Switch-off-delay, staircase-function also with advance warning).
– Light scenes possible, up to 8 internal scenes per output.

5 Description of software application

Objects

Number of addresses: 254
Number of assignments: 255
Communication objects: 4/8 -gang: 74
8/16 -gang: 138

Superior channel objects:

Object	Function	Name	Type	DP-Type	Flag
Function: Hand-operation					
⊡⤶ 0	Inhibit	Hand-operation	1 Bit	1.003	C, W, –, (R)[1]
Description:	1 Bit object for inhibiting the hand-operation. The polarity can be defined.				
Function: Hand-operation					
⊡⤶ 1	Status	Hand-operation	1 Bit	1.002	C, T, R[1]
Description:	1 Bit object for transmitting the status of the hand-operation.				

[1] : Objects marked (R) permit read-out of the object status (set R flag).

5

Object	Function	Name	Type	DP-Type	Flag

Central function blinds (blinds-operation)

☐⌐ 2   Drive Central   All outputs   1 Bit   1.008   C, T, R[1]
Description: 1 Bit object for central drive (move) of all assigned outputs. The polarity can be defined.

Safety function (blinds-operation)

☐⌐ 3   Wind alarm[2]   Safety blinds   1 Bit   1.005   C, T, R[1]
Description: 1 Bit object for central activation/deactivation of wind alarm.[1]

Function: Safety function (blinds-operation)

☐⌐ 4   Wind alarm[2]   Safety blinds   1 Bit   1.005   C, T, R[1]
Description: 1 Bit object for central activation/deactivation of wind alarm.[2]

Function: Safety function (blinds-operation)

☐⌐ 5   Wind alarm 3   Safety blinds   1 Bit   1.005   C, T, R[1]
Description: 1 Bit object for central activation/deactivation of wind alarm.[3]

Function: Safety function (blinds-operation)

☐⌐ 6   Rain alarm   Safety blinds   1 Bit   1.005   C, T, R[1]
Description: 1 Bit object for central activation/deactivation of the rain alarm.

Function: Safety function (blinds-operation)

☐⌐ 7   Frost alarm   Safety blinds   1 Bit   1.005   C, T, R[1]
Description: 1 Bit object for central activation/deactivation of the frost alarm.

Function: Central function switching (switch-operation)

☐⌐ 8   Central switching   All outputs   1 Bit   1.001   C, T, R[1]
Description: 1 Bit object for central switching of all assigned outputs. The polarity can be defined.

Function: Collective acknowledge (switch-operation)

☐⌐ 9   Collective acknowledge   All outputs   4 Byte   27.001   C, T, R[1]
Description: 4 Byte object for central acknowledge of the entire status of the actuator

Channel objects, switch-operation:

Function: Switching

☐⌐ 10, 23 ...
205[3]   Switching   Output 1 –16[3]   1 Bit   1.001   C,W, –, (R)[1]
Description: 1 Bit object for controlling an output.
         ("1" = switch On / "0" = switch Off; please note the operation mode!).

Function: Forced position (only with ETS3.0d and upwards)

☐⌐ 11, 24 ...
206[3]   Forced position   Output 1 – 16[3]   2 Bit   2.001   C,W, –, (R)[1]
Description: 2 Bit object for a forced positioning of an output.
         The object status after bus voltage recovery can be defined by parameter.

Function: Inhibit

☐⌐ 12, 25 ...
207[3]   Inhibit   Output 1 – 16[3]   1 Bit   1.003   C,W, –, (R)[1]
Description: 1 Bit object for inhibiting of an output. (The polarity can be defined.)

Function: Logic link

☐⌐ 13, 26 ...
208[3]   Logic link   Output 1 – 16[3]   1 Bit   1.002   K, S, –, (R)[1]
Description: 1 Bit object for the input of a logic gate of an output.
         The object value after bus voltage recovery or after ETS-download can be pre-defined by parameter.

Function: Stair-case function

☐⌐ 14, 27 ...
209[3]   Stair-case function
       Start/Stop   Output 1 – 16[3]   1 Bit   1.010   K, S, –, (R)[1]
Description: 1 Bit object for activation or deactivation of the stair-case time of the stair-case function of an output
         ("1" = switch On / "0" = switch Off).

---

[1] : Objects marked (R) permit read-out of the object status (set R flag).

[2] : Depending on the parameter, acknowledge objects are either active (T-Flag set) or passive and can be read out (set R-Flag).

[3] : Number of outputs or communication objects acc. to the chosen device (4-gang = 4 outputs or 8-gang = 8 outputs).

5	Object	Function	Name	Type	DP-Type	Flag

Function: Scene function

☐◄ 16, 29 ...

| 211[3] | Light scene extension | Output 1 – 16[3] | 1 Byte | 18.001 | K, S, –, (R)[1] |

Description: 1 Byte object for calling up or storing of a scenario

Function: Acknowledge switching

☐◄ 18, 31 ...

| 213[3] | Acknowledge switching | Output 1 – 16[3] | 1 Bit | 1.001 | K, –, Ü, R[2] |

Description: 1 Bit object for the acknowledge of an output status
☐◄ ("1" = switched On / "0" = switched Off; note operation mode!)

Channel objects, blinds-operation:

Function: Long-operation

☐◄ 10, 36 ...

| 192[3] | Long-operation | Output 1/2 –15/16[3] | 1 Bit | 1.008 | C,W, –, (R)[1] |

Description: 1 Bit object for activation of the long-operation (move)

Function: Short-operation

☐◄ 11, 37...

| 193[3] | Short-operation | Output 1/2 –15/16[3] | 1 Bit | 1.007 | C,W, –, (R)[1] |

Description: 1 Bit object for activation of the short-operation (step)

Function: Forced position (only with ETS3.0d and upwards)

☐◄ 12, 38 ...

| 194[3] | Forced position | Output 1/2 –15/16[3] | 2 Bit | 2.001 | C,W, –, (R)[1] |

Description: 2 Bit object for a forced positioning of an output.
The object status after bus voltage recovery can be defined by parameter.

Function: Scene function

☐◄ 13, 39 ...

| 195[3] | Light scene extension | Output 1/2 –15/16[3] | 1 Byte | 18.001 | K, S, –, (R)[1] |

Description: 1 Byte object for calling up or storing of a scenario.

Function: Sun protection

☐◄ 18, 44 ...

| 200[3] | Sun/façade shading | Output 1/2 –15/16[3] | 1 Bit | 1.002 | C W –, (R)[1] |

Description: 1 Bit object for activating/deactivating of sun protection (The polarity can be defined.)

Function: Sun protection

☐◄ 19, 45 ...

| 201[3] | Position, Sun/facade shading | Output 1/2 –15/16[3] | 1 Byte | 5.001 | C W –, (R)[1] |

Description: 1 Byte object for a variable position (0 … 255) at active sun-protection.

Function: Sun protection

☐◄ 20, 46 ...

| 202[3] | Louvers position, Sun/facade shading | Output 1/2 –15/16[3] | 1 Byte | 5.001 | C W –, (R)[1] |

Description: 1 Byte object for a variable louver position (0 … 255) at active sun-protection.

Function: Sun protection

☐◄ 21, 47 ...

| 203[3] | Offset louvers position, Sun | Output 1/2 –15/16[3] | 1 Byte | 5.001 | C W –, (R)[1] |

Description: 1 Byte object for presetting a louver position angle (–100 % ... +100 %)
for a manual readjustment of the louver position at active sun-protection.

Function: Acknowledge position

☐◄ 24, 50 ...

| 206[3] | ACK position | Output 1/2 –15/16[3] | 1 Byte | 5.001 | C W –, (R)[1] |

Description: 1 Byte object for the ACK of the blinds, shutter or ventilation flap position (0 … 255).

[1] : Objects marked (R) permit read-out of the object status (set R flag).

[2] : Depending on the parameter, acknowledge objects are either active (T-Flag set) or passive and can be read out (set R-Flag).

[3] : Number of outputs or communication objects acc. to the chosen device (4-gang = 4 outputs or 8-gang = 8 outputs).

5

Object	Function	Name	Type	DP-Type	Flag

Function: Acknowledge position

☐↓ 25, 51 …

207[3] ACK louver position Output 1/2 –15/16[3] 1 Byte 5.001 C W –, (R)[1]

Description: 1 Byte object for the ACK louver position (0 … 255).

Function: Acknowledge position

☐↓ 26, 52 …

208[3] ACK invalid position Output 1/2 –15/16[3] 1 Bit 1.002 C W –, (R)[1]

Description: 1 Bit object for the ACK of an invalid position.

Function: Acknowledge moving

☐↓ 27 53 …

209[3] ACK moving Output 1/2 –15/16[3] 1 Bit 1.002 C W –, (R)[1]

Description: 1 Bit object for the ACK of an active movement.

Function: Positioning

☐↓ 28, 54 …

210[3] Positioning Output 1/2 –15/16[3] 1 Byte 5.001 C W –, (R)[1]

Description: 1 Byte object for setting a position (0 … 255) at direct operation for the blinds, shutter or ventilation flap.

Function: Positioning

☐↓ 29, 55 …

211[3] Positioning Output 1/2 –15/16[3] 1 Byte 5.001 C W –, (R)[1]

Description: 1 Byte object for setting a louver position (0 … 255) at direct operation for the blinds.

[1] : Objects marked (R) permit read-out of the object status (set R flag).

[2] : Depending on the parameter, acknowledge objects are either active (T-Flag set) or passive and can be read out (set R-Flag).

[3] : Number of outputs or communication objects acc. to the chosen device (4-gang = 4 outputs or 8-gang = 8 outputs).

Superior channel functions

Delay after bus voltage recovery

In order to reduce the bus-traffic after bus-reset, connecting the devices to the bus or after ETS-download it is possible to delay all active sending acknowledges (ACK). A delay time can be adjusted.
The ACK to be delayed can be adjusted independently for each output and ACK-function.

Central function

All output channels can be linked by a 1-Bit central-communication object. The behaviour is assimilable with a central group address, linked to all switching objects.

Collective acknowledge

After central commands or bus voltage recovery the bus load is normally high as many devices send out an ACK about the status of its communication objects. This especially happens within visualizations. The collective ACK can be used to reduce the bus load.
In the collective ACK all switching status are combined in a 32 Bit communication object.

Byte 4	Byte 3	Byte 2	Byte 1

mask output 16	mask output 15	mask output 14	mask output 13	mask output 12	mask output 11	mask output 10	mask output 9	mask output 8	mask output 7	mask output 6	mask output 5	mask output 4	mask output 3	mask output 2	mask output 1	output 16	output 15	output 14	output 13	output 12	output 11	output 10	output 9	output 8	output 7	output 6	output 5	output 4	output 3	output 2	output 1
31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0

M — M — S — S

Structure of object Collective Acknowledge
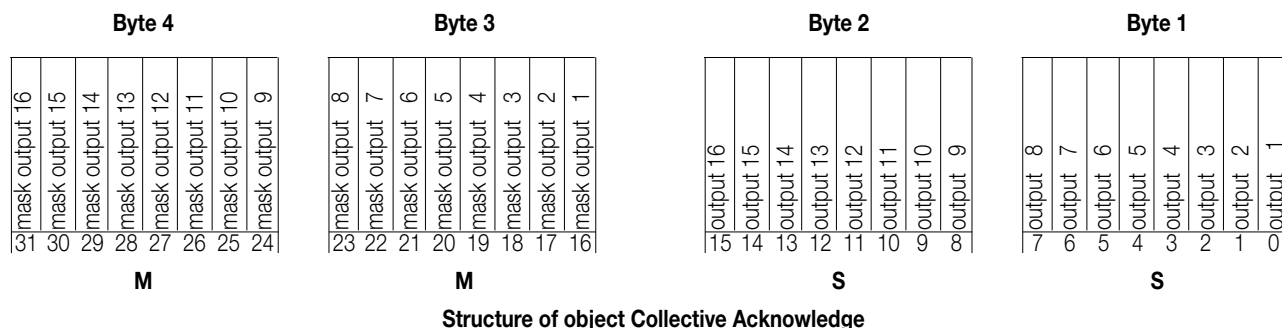
The collective ACK can be used as an active object – will be sent out with each change of a switching status – or as a passive status object – object value can be read out.

Actuators
Shutter/Blind, Flush mounted

1

2
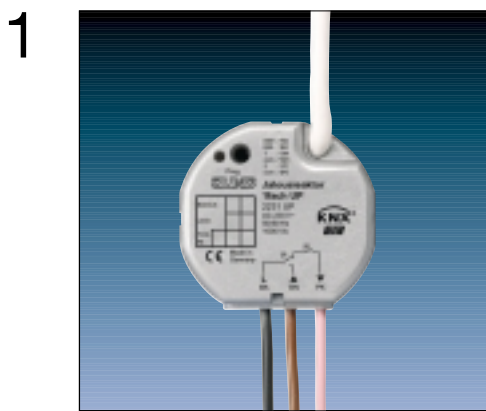
	Ref.-No.
KNX blinds actuator, flush mounted	**2231 UP**
ETS-product family:	Shutter
Product type:	Shutter

3

The shutter/blind actuator receives telegrams from sensors via the KNX and controls a shutter or blind motor with its output.
Both travel directions are mechanically interlocked. With sun protection or positioning telegrams, the actuator offers moreover the possibility of moving shutters, blinds and slats into any desired position. On reception of a storm warning, the actuator is capable of moving shutters or blinds into a predefined safety position and to lock them up in this position.
The device is equipped with two extension inputs which – depending on parameterization – can act directly on the shutter/blind output (local control / double-sided push-button principle) or alternatively as binary inputs on the KNX. The connected potential-free switch or push-button contacts are sensed against a common reference potential at the shutter/blind actuator. As a binary input, the device can transmit telegrams for switching or dimming, for shutter/blind control or for value transmitter applications (dimming value transmitter, light-scene extension). Connecting 230 V signals or other external voltages to the extension inputs is not permitted.
The shutter/blind actuator is supplied from the KNX and needs therefore no additional external power supply.

4

Technical data

KNX supply
Cable type:	YY 6 x 6.0 mm; red: bus (+) / black: bus (–)
Voltage:	21 – 32 V DC SELV
Power consumption:	typically 150 mW
Connection:	approx. 33 cm ready-made; connecting terminal (0.6 – 0.8 mm)
Type of protection:	IP 20
Safety class:	III
Mark of approval:	KNX
Ambient temperature:	–5°C ... +45°C
Storage/transport temperature:	–25°C ... +70°C (storage above +45°C results in shorter lifetime)
Mounting position:	any
Minimum spacings:	none
Type of fastening:	e.g. placing into deep flush-mounting box (Ø 60 mm x 60 mm)

4 Technical data

Input

Number: 2 (depending on parameterization either as extension inputs for push-button local control of the actuator or as independent binary inputs acting on the bus)

Cable type: YY 6 x 0.6 mm

green:	extension input 1
white:	reference potential (com)
yellow:	extension input 2
brown:	reference potential (com)

Cable length: approx. 33 cm ready-made, extendible to 5 m max.

Scanning voltage: approx. – 19 V DC referred to "com"; continuous signal

Loop resistance: max. 2 kOhm for safe "1" signal detection (rising edge)

Output

Number: 1

Cable type: 3 x H05 V-K 1.5 mm^2 with ferrules

Cable length: approx. 20 cm ready-made

Switch type: 1 change-over contact + 1 make-contact, potential-free relay contacts (µ-contact), bistable

Switching voltage: 230 V AC; 50/60 Hz

Switching capacity: max. 1 motor 1000 VA

Note:
- Never connect the mains voltage (230 V) or other external voltages to the extension inputs.
  Connecting an external voltage endangers the electrical safety of the entire KNX system (SELV / no electrical insulation).
  Persons may be put at risk and devices and installations may suffer irreparable damage.
- Make sure during the installation that there is always sufficient insulation between the mains voltage and the bus or the extensions.
  A minimum spacing of 4 mm must be ensured between the bus/extension wires and the mains wires.
- Non-used wires of the 6-wire connecting cable must be insulated with respect to one another and with respect to external voltages.
- To avoid EMC disturbances, the lines to the inputs should not be laid parallel to lines and cables carrying mains voltage.
- If motors are to be connected in parallel to an output, it is absolutely indispensable to observe the corresponding instructions of the motor manufacturers to avoid irreparable damage to the motors. If necessary, use supplementary isolating relays.
- Use only shutters or blinds with end position limit switches (mechanical or electronic). The limit switches of the motors connected must be checked for correct adjustment.

Inputs:

General
- Mode of functioning of the inputs parameterizable:
  – function as extension inputs for double-sided actuation of button acting directly on shutter/blind output,
  – function as general binary inputs acting separately on the bus.

Function as binary inputs to the bus:
- Switching, dimming, shutter/blind and value transmitter functions freely assignable to the max. 2 inputs.
- Disable object for disabling of individual inputs (polarity of disable object presettable).
- Delay on return of bus voltage and debouncing time centrally adjustable.
- Response to bus voltage return separately parameterizable for each input.
- Telegram rate limitation generally parameterizable for all inputs.

Switching function
- Two independent switching objects available for each input (switching commands individually parameterizable).
- Command for rising and falling edge individually adjustable (ON, OFF, TOGGLE, no reaction).
- Independent cyclical transmission of switching objects depending on edge or on object value selectable.

Dimming function
- Single level and two level dimming function.
- Time between dimming and switching and dimming step width presettable.
- Telegram repetition and stop telegram transmission possible.

Stutter/blind function
- Command for rising edge adjustable (no function, UP, DOWN, TOGGLE).
- Operation concept parameterizable ("step – move – step" resp. "move – step").
- Time between STEP and MOVE operation presettable (only with "step – move – step").
- Slat adjustment time presettable (time during which a "MOVE" command can be terminated by releasing a push-button on the input).

Value transmitter and light-scene extension functions
- Edge (push-button as n.o. contact, push-button as n.c. contact, switch) and value for edge parameterizable.
- Value change in push-button mode possible with long press on the button for value transmitter.
- In light-scene extension with storage function, a light-scene can be stored without preceding recall.

4 Technical data

Output:
- One channel for a shutter/blind motor.
- Type adjustable (shutter or blind).
- Switch-over delay during travel direction change adjustable.
- Priority assignment to incoming telegrams parameterizable for sun protection and parameterise (STEP / MOVE).
- Automatic sun protection function for brightness-dependent moving of a shutter or blind into a parameterised position.
- Safety function with cyclical checking and assigning to shutter or blind channels.
- Movement into parameterizable limit position on reception of safety message.
- Response to failure and return of bus voltage adjustable.

5 Description of software application

Objects

Number of addresses:	26
Number of assignments:	27
Communication objects:	11

Objects for the binary inputs (extension inputs), if acting on the bus:

Object	Name	Function	Type	Flag
Function: "Switching" (for all 2 inputs[2])				
1 – 2	Input 1 – Input 2	Switching object X.1 (X = 1 to 2)	1 Bit	C, W, T, (R)[1]
9 – 10	Input 1 – Input 2	Switching object X.2 (X = 1 to 2)	1 Bit	C, W, T, (R)[1]
Function: "Dimming" (for all 2 inputs[2])				
1 – 2	Input 1 – Input 2	Switching	1 Bit	C, W, T, (R)[1]
9 – 10	Input 1 – Input 2	Dimming	4 Bit	C, T, (R)[1]
Function: "Shutter/blind" (for all 2 inputs[2])				
1 – 2	Input 1 – Input 2	Short operation	1 Bit	C, T, (R)[1]
9 – 10	Input 1 – Input 2	Long operation	1 Bit	C, T, (R)[1]
Function: "Value transmitter" (Function: Dimming value transmitter for all 2 inputs[2])				
1 – 2	Input 1 – Input 2	Value	1 Byte	C, T, (R)[1]
Function: "Value transmitter" (Function: Light-scene extension with/without storage function for all 2 inputs[2])				
1 – 2	Input 1 – Input 2	Light-scene extension	1 Byte	C, T, (R)[1]
Function: "Disable" (for all 2 inputs[3])				
17 – 18	Input 1 – Input 2	Disabling	1 Bit	C, W, (R)[1]

[1] : Objects marked (R) permit read-out of the object status (set R flag).

[2] : The "No function", "Switching", "Dimming", "Shutter/blind" and "Value transmitter" functions can be selected per input.
The names of the communication objects and the object table (dynamic object structure) will change accordingly.

[3] : A disable function is not available if the inputs are parameterised for "No function".

Objects for the output:

Object	Name	Function	Type	Flag
0	Shutter/blind	Short operation	1 Bit	C, W, (R)[1]
4	Shutter/blind	Long operation	1 Bit	C, W, (R)[1]
Function: Safety function				
12	Safety 1	Safety function	1 Bit	C, W, (R)[1]
13	Safety 2	Safety function	1 Bit	C, W, (R)[1]
Function: Sun protection function				
8	Sun protection	Sun protection	1 Bit	C, W, (R)[1]

[1] : Objects marked (R) permit read-out of the object status (set R flag).

1

2
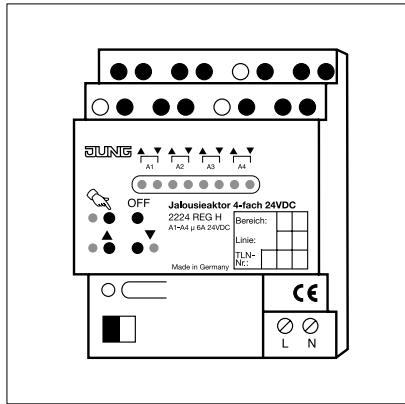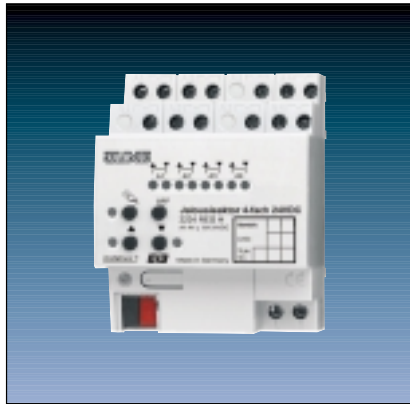
	Ref.-No.
KNX blinds actuator,	
4-gang, 24 VDC	**2224 REG H**
ETS-product family:	Shutter
Product type:	Shutter
Series embodiment (SE)-device (4 units)	

3

The blind / shutter actuator receives telegrams via the KNX and switches four mutually independent channels. Each channel can operate one drive. It is also possible to reduce the outputs to two, in order to control two drives at one output.

The actuator offers four push-buttons for manual control. Each output can be controlled manually temporary or permanently, independent of the bus.

Additionally, the actuator offers the possibility to drive the shutter or blind and louvres to a calculated position in case of sun-protection, central function or positioning-telegrams. At the receipt of a storm report, the actuator is able to drive and lock the shutter or blind into a defined safety position.

The behaviour at bus voltage drop and return can be parameterised.

4

Technical data

Supplying
Voltage: 21 – 32 V DC (SELV)
Power consumption: typical 150 mW
Connection: KNX connection block

Output
Number: 4
Performance: floating make-contacts
Rated voltage: 24 V AC ± 10%
Rated current: 6 A
Connection: screw terminals: 0,2 – 4 mm^2
Protection: IP 20
Behaviour at voltage
  drop and recovery: dependent on parameters
Operation temperature: –5°C ... +45°C
Storage temperature: –25°C ... +70°C
Mounting: on DIN rail 35 x 7.5

5 Description of software application

– 4 mutual independent channels, each for one drive.
– 2x2-channel operation possible
– Type of drive is adjustable (blind or shutter).
– The tracing time in case of changing the drive direction can be adjusted.
– A driving time prolongation, in order to match different driving times into the upper end position, is adjustable.
– Possibility to drive the shutter or blind and louvers into a calculated position.
– Positioning can be deactivated.
– The priority of single functions is adjustable.
– Sun protection automatic for brightness depending drive in a calculated position.
– Logical link of the sun protection objects.
– Safety function with cyclical monitoring and assignment to the channels.
– Driving into a parameterised end-position at a safety report.
– Reaction at bus voltage drop and recovery is adjustable.
– Four central functions possible at 2x2-channel operation.
– The current position of the shutter/blind can be transmitted (i.e. for visualization purposes).

Objects

Number of addresses (dynamic):	32
Number of assignments (dynamic):	32
Communication objects:	20

Operation mode: 4 x 1 channel operation

Object	Name	Function	Type	Flag
0	Output 1	Short time operation (step)	1 Bit	C, W
1	Output 2	Short time operation (step)	1 Bit	C, W
2	Output 3	Short time operation (step)	1 Bit	C, W
3	Output 4	Short time operation (step)	1 Bit	C, W
4	Output 1	Long time operation (move)	1 Bit	C, W
5	Output 2	Long time operation (move)	1 Bit	C, W
6	Output 3	Long time operation (move)	1 Bit	C, W
7	Output 4	Long time operation (move)	1 Bit	C, W

Function: Blind

8	Position output 1 blind	Positioning	1 Byte	C, W
9	Position output 2 blind	Positioning	1 Byte	C, W
10	Position output 3 blind	Positioning	1 Byte	C, W
11	Position output 4 blind	Positioning	1 Byte	C, W
12	Position output 1 louvres	Positioning	1 Byte	C, W
13	Position output 2 louvres	Positioning	1 Byte	C, W
14	Position output 3 louvres	Positioning	1 Byte	C, W
15	Position output 4 louvres	Positioning	1 Byte	C, W

Function: Shutter

8	Position output 1 shutter	Positioning	1 Byte	C, W
9	Position output 2 shutter	Positioning	1 Byte	C, W
10	Position output 3 shutter	Positioning	1 Byte	C, W
11	Position output 4 shutter	Positioning	1 Byte	C, W
16	Safety 1	Safety	1 Bit	C, W
17	Safety 2	Safety	1 Bit	C, W
18	Automatic 1	Sun protection	1 Bit	C, W
19	Automatic 2	Sun protection	1 Bit	C, W

5 **Objects**

Operation mode: 2 x 2 channel operation

Object	Name	Function	Type	Flag
0	Output 1/3	Short time operation (step)	1 Bit	C, W
1	Output 2/4	Short time operation (step)	1 Bit	C, W
2	Central 1	Central	1 Bit	C, W
3	Central 2	Central	1 Bit	C, W
4	Output 1/3	Long time operation (move)	1 Bit	C, W
5	Output 2/4	Long time operation (move)	1 Bit	C, W
6	Central 3	Central	1 Bit	C, W
7	Central 4	Central	1 Bit	C, W

Function: Blind

8	Position output 1/3 blind	Positioning	1 Byte	C, W
9	Position output 2/4 blind	Positioning	1 Byte	C, W
12	Position output 1/3 louvres	Positioning	1 Byte	C, W
13	Position output 2/4 louvres	Positioning	1 Byte	C, W

Function: Shutter

8	Position output 1/3 shutter	Positioning	1 Byte	C, W
9	Position output 2/4 shutter	Positioning	1 Byte	C, W
16	Safety 1	Safety	1 Bit	C, W
17	Safety 2	Safety	1 Bit	C, W
18	Automatic 1	Sun protection	1 Bit	C, W
19	Automatic 2	Sun protection	1 Bit	C, W

5 **Notes to software application:**

Parameter 'Positioning'
This parameter defines the position of the shutter or blinds, if the positioning function, which is, among others, necessary for the sun protection and central function, is released.
If the positioning function is released, an additional set of parameter as: 'moving time shutter', 'moving time louvres' and 'positioning' will be visible. In this case the driving time of a e. g. safety drive in one of the end positions has to be set by the parameters 'moving time shutter' and by the parameter 'driving time prolongation'.
If the positioning function is blocked, only the parameter for 'safety', 'step' and 'move' are adjustable. Now the driving time of a safety drive in one of both end positions is internally fixed at 2 minutes.

Reference drive / positioning
After a bus reset, download or after a 'move' command in none of the end positions, a reference drive (drive to the upper end position) will be carried out in general before the positioning starts.
At sun-protection, central function or positioning, a reference drive can be forced before the shutter/blind drives to the calculated position.
This helps to ensure that in case of several controlled drives each drive goes exactly to the same position even if one has been moved before by a 'step' command manually.
The time for a reference drive is fixed by the 'moving time shutter' plus the adjusted 'moving time prolongation'. After the reference drive is carried out, each output drives automatically to its calculated position.
This device has the adventage that the actual position is carried out by the positioning object of the corresponding output each time the bind or shutter has been moved.
Also the actual position is stored in the memory, even after a step command.

Bus voltage drop: tracing time at change of driving direction
At bus voltage drop and a possible change of driving direction (depending on the parameter 'behavior at bus voltage drop') a fixed tracing time of 120 ms will be kept.

Actuators

Shutters / Blinds

1

2
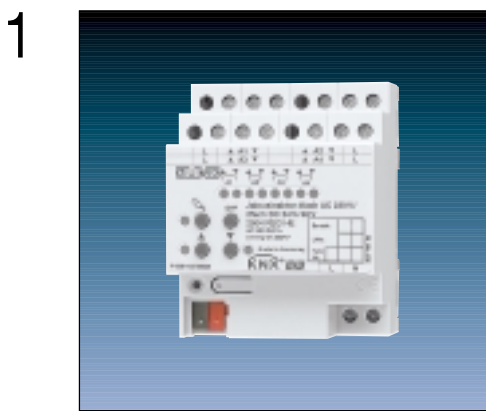
	Ref.-No.
KNX shutter/blind actuator	
4-gang 230 V AC / 2-gang 24 V DC	**2504 REG HE**
ETS-product family:	Shutter
Product type:	Shutter/blind 4-gang
Series embodiment (SE)-device (4 units)	

3

The shutter/blind actuator receives telegrams from sensors or other controls via the KNX and uses its independent relay contacts for switching electrically operated blinds, shutters, awnings, venting louvers or similar devices for 230 V AC mains voltage (4 channels) or extra-low voltage 12 ... 48 V DC (2 channels). Each relay output is equipped with mains-operated monostable switching relays so that the preferred contact positions are maintained also during bus voltage failure.

The 4 manual switches on the front panel of the device permit switching the relays on and off by hand in parallel with the KNX even without bus voltage or in a non-programmed state. This feature permits fast checking of connected motors for proper functioning.

The functionalities that can be preset with the ETS independently for each output channel include, for instance, separately adjustable moving times, an automatic end position detection with 230 V drives with mechanical limit switches as an alternative, enlarged feedback functions, assignment to up to five different safety functions, a sun protection function adapted to a great variety of requirements and the incorporation into scenes or forced-position applications.

Centralized control of all outputs is also available. Moreover, the preferred states of the relays in case of bus voltage failure or bus / mains voltage return and after ETS programming can be preset separately.

For project design and commissioning of this device it is recommended to use the ETS3.0d. The advantages with regard to downloading (shorter loading times) and parameter programming are available only if this ETS version or later versions are used (vd4-file). For the ETS2 and older versions of the ETS3 a separate product database is available (vd2-file).

The shutter/blind actuator has its own mains supply independent of the connected drives. For actuation of the outputs, the mains supply must always be on. The device electronics are supplied from the bus voltage or from the mains voltage.
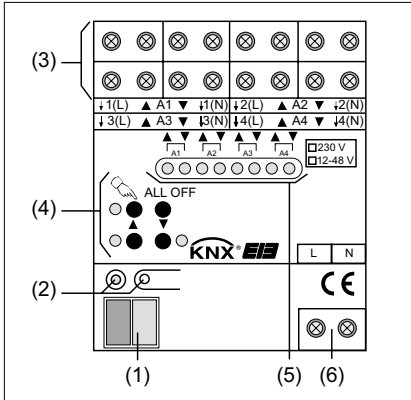
(1) KNX bus connection
(2) Programming button and programming LED (red).
   The programming LED flashes slowly when the safe-state mode is active.
(3) Screw terminal for connection of the motors.
(4) Keypad for manual control with status LED
(5) Output state LEDs with movement direction indicator (2 LEDs per output):
   LED off: output is off
   LED on: output on (upward movement "▲" or downward movement "▼")
   LED flashing slowly: output controlled manually
   LED flashing fast: output disabled by manual control
(6) Mains voltage terminal for power supply to the device electronics

4 Technical data

KNX supply
Voltage: 21 … 32 V DC SELV
Power consumption: typically 150 mW
Connection: standard KNX bus connection terminal
External supply
Voltage: 230 ... 240 V AC ±10%, 50/60 Hz
Power consumption: max. 5.6 VA
Connection: with screw terminals:
0.5 … 4 mm² solid and stranded wire without ferrule
0.5 … 2.5 mm² stranded wire with ferrule
Max. tightening torque: 0.8 Nm
Total power loss: max. 4.52 W

Response to bus voltage failure: depending on parameterization
Response to mains voltage failure: outputs are shut off (stop)
Response to bus/mains voltage return: depending on parameterization
Number: 4 / 2
depending on parameterized channel definition
(4-channel 230 V) or (2-channel 12...48 V DC).
Connection: with screw terminals:
0.5 … 4 mm² solid and stranded wire without ferrule
0.5 … 2.5 mm² stranded wire with ferrule
Type of contact: µ-contact, monostable, movement directions software-locked
Switching voltage AC: 230...240 V AC ±10 %, 50/60 Hz
Switching capacity AC 230/240 V 6 A AC1
Min. Switching voltage AC: 100 mA
Switching voltage DC: 12 ... 48 V DC
Switching capacity DC: 6 A
Switching capacity DC: 3 A
Min. switching current DC: 100 mA
Type of protection IP 20
Safety class: III
Mark of approval: KNX/VDE
Ambient temperature: –5 °C … +45 °C
Storage / transport temperature: (Storage above + 45 °C reduces the lifetime)
Mounting position: any position (preferred: output terminals at the top)
Type of fastening: Snap-fastening on DIN rail in closed cabinets.

5 Application with 230 V drives (without automatic end position detection)

Without the automatic end position detection, the movement times of the different blinds/shutters are programmed in the ETS independent of one another After commissioning, the preset times can be changed only by reprogramming of the parameters.
The shutter actuator must have been preset in the ETS for 4-channel operation.

Note: When the N conductor is connected and when the concerned output is energized without interruption for a prolonged time due to retriggering, the device may heat up excessively. Risk of irreparable damage to the device.
Do not connect the N conductors !

– Connect the drives as shown in fig. A.
– Tick the box "230 V" on the device label.
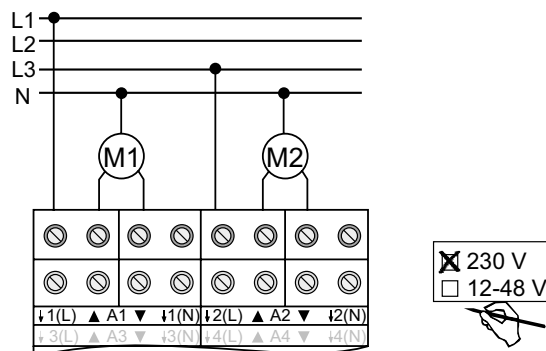
Fig. A: Electrical connection for 230 V drives

5

Application with 230 V drives (without automatic end position detection)

– The device can be used with different phase conductors (L1, L2, L3).
– The N terminals are used only for automatic end position detection and must not be used as neutral potential for other loads in the distribution.
– Venting louvers must be connected in such a way that they open in movement direction "UP – ▲" and close in movement "DOWN – ▼".

Application with 230 V drives (with automatic end position detection)

If programmed and connected accordingly, the shutter actuator auto-detects the movement time of a connected output and stores it. In drives with mechanical limit switches, the actuator measures the voltage against the N conductor (connected to the device) in order to detect the end positions. In operation, the shutter actuator can adapt itself to changes in the travelling times of the drives (e.g. caused by ageing of the motors). The shutter actuator must have been preset in the ETS for 4-channel operation.

The automatic end position detection must have been activated in the ETS for the output concerned. Only 230 V AC drives with mechanical limit switches must be connected to the device. Connect only one drive to each output.

The automatic movement time detection cannot be used for 12 ... 48 V DC drives or for drives with electronic limit switches and for drives connected to the outputs via isolating (decoupling) relays.

The blinds/shutters controlled by the device must not be blocked.

– Connect the drives with mechanical limit switches as shown in fig. B.
– Tick the box "230 V" on the device label.
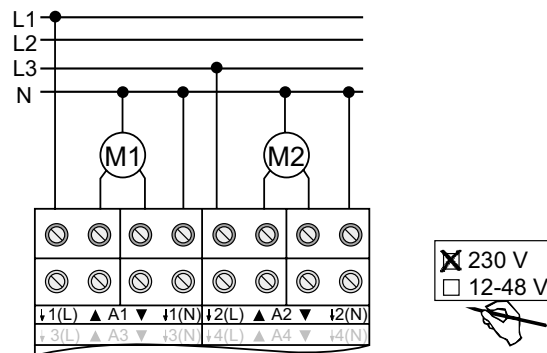
Fig. B: Electrical connection for 230 V drives with automatic end position detection

– The device can be used with different phase conductors (L1, L2, L3).
– The neutral conductor of the respective motor must be connected to the N terminal of the device (pay attention to existing ELCB wiring).
  The N terminals are used only for automatic end position detection and must not be used as N potential for other loads in the distribution.
  The N conductor terminals of the individual outputs and of the mains connection terminal are internally not connected.
– When an output is energized without interruption for a prolonged time due to retriggering, the device may heat up excessively.
– The automatic end position detection is performed during commissioning and the detected movement time is permanently stored.
– Venting louvers must be connected in such a way that they open in movement direction "UP – ▲" and close in direction "DOWN – ▼".

Note: Risk of irreparable damage if several drives are connected in parallel to one output. Limit switch contacts can weld together and drives, blinds/shutters and the shutter actuator can be irreparably damaged.
Observe the manufacturer's instructions and use isolating (decoupling) relays, if necessary !

Application with device 12 ... 48 V DC drives (without automatic end position detection)

The movement times of the different blinds/shutters are programmed in the ETS independent of one another. After commissioning, the preset times can be changed only by reprogramming of the parameters. The shutter outputs A1 and A2 (A3 and A4) are paired and used for controlling a DC drive.

The shutter actuator must have been preset in the ETS for 2-channel operation.

5 Application with device 12 ... 48 V DC drives (without automatic end position detection)

– Connect the drives as shown in fig. C.
– Tick the box "12 ... 48 V" on the device label.
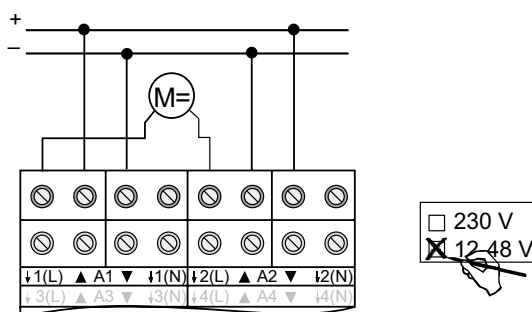
Fig. C: Electrical connection for 12 … 48 V drives

– Connect only one drive to each output.
– In the 2-channel mode, outputs 1 & 2 and 3 & 4 are paired also in case of manual control.
  The status LEDs always indicate the relay states of the paired output.
– Venting louvers must be connected in such a way that they open in movement direction "UP –▲" and close in movement "DOWN – ▼".

Description of software application

Objects

Number of communication objects: 84
Number of addresses (max):   254
Number of assignments (max):   255

Channel-independent objects:

Object	Function	Name	Type	DP-Type	Flag

Function: Manual control

| ☐↓ 0 | Disabling | Manual control | 1 Bit | 1.003 | C, W, –, (R) [1] |

Description: 1-bit object for disabling the keys for manual control on the device. The polarity can be parameterized.

Function: Manual control

| ☐↓ 1 | Status | Manual control | 1 Bit | 1.002 | C, –, T, (R) [1] |

Description: 1-bit object for manual control status transmission The object is "0", when manual control is deactivated (bus control). The object is "1", when manual control is being activated. The user can parameterize whether the temporary or the permanent manual control will be indicated as status information or not.

Function: Shutter central function

| ☐↓ 2 | Central travel control | All shutter outputs | 1 Bit | 1.008 | C, W, – (R) [1] |

Description: 1-bit object for central actuation (long-time travel) of assigned shutter outputs The polarity can be parameterized.

Function: Safety function

| ☐↓ 3 | Wind alarm 1 | Safety | 1 Bit | 1.005 | C, W, –, (R) [1] |

Description: 1-bit object for central activation or deactivation of the first wind alarm
("0" = wind alarm deactivated / "1" = wind alarm activated).

Function: Safety function

| ☐↓ 4 | Wind alarm 2 | Safety | 1 Bit | 1.005 | C, W, –, (R) [1] |

Description: 1-bit object for central activation or deactivation of the second wind alarm
("0" = wind alarm deactivated / "1" = wind alarm activated).

Function: Safety function

| ☐↓ 5 | Wind alarm 3 | Safety | 1 Bit | 1.005 | C, W, –, (R) [1] |

Description: 1-bit object for central activation or deactivation of the third wind alarm
("0" = wind alarm deactivated / "1" = wind alarm activated).

[1] Each communication object can be read out. For reading, the R-flag must be set.

5 Description of software application

Channel-independent objects:

Object	Function	Name	Type	DP-Type	Flag

Function: Safety function

⬚↲ 6	Rain alarm	Blind safety	1 Bit	1.005	C, W, –, (R) [1]

Description: 1-bit object for central activation or deactivation of the rain alarm
("0" = rain alarm deactivated / "1" = rain alarm activated).

Function: Safety function

⬚↲ 7	Frost alarm	Safety	1 Bit	1.005	C, W, –, (R) 1

Description: 1-bit object for central activation or deactivation of the frost alarm
("0" = frost alarm deactivated / "1" = frost alarm activated).

Channel-oriented objects:

Function: Long-time operation

⬚↲ 10, 36, 62, 88	Long-time operation	Output 1 – 4 [2]	1 Bit	1.008	C, W, –, (R) [1]

Description: 1-bit object for activation of the long-time operation

Function: Short-time operation

⬚↲ 11, 37, 63, 89	Short-time operation	Output 1 – 4 [2]	1 Bit	1.007	C, W, –, (R) [1]

Description: 1-bit object for activation of the short-time operation or for stopping of a travel movement.

Function: Forced position

⬚↲ 12, 38, 64, 90	Forced position	Output 1 – 4 [2]	2 Bit	2.008	C, W, –, (R) [1]

Description: 2-bit object for forced control of an output. The object state after bus voltage return can be predefined by means of a parameter.

Function: Scene function

⬚↲ 13, 39, 65, 91	Scene extension	Output 1 – 4 [2]	1 Byte	18.001	C, W, –, (R) [1]

Description: 1-byte object for recalling scenes or for storing new scene values.

Function: Sun protection function

⬚↲ 15, 41, 67, 93	Automatic mode	Output 1 – 4 [2]	1 Bit	1.003	C, W, –, (R) [1]

Description: 1-bit object for activation or deactivation of the automatic sun protection in the enlarged sun protection mode
("1" = automatic mode activated / "0" = automatic mode deactivated). The object is only visible, if the automatic sun
protection is to be tracked immediately when the state of the automatic object changes (parameter setting).

Function: Sun protection function

⬚↲ 16, 42, 68, 94	Automatic mode disable	Output 1 – 4 [2]	1 Bit	1.003	C, W, –, (R) [1]

Description: 1-bit object for disabling of the automatic sun protection in the enlarged sun protection mode.
The polarity can be parameterized. The object is only visible, if the automatic sun protection is to be tracked
immediately when the state of the automatic object changes (parameter setting).

Function: Sun protection function

⬚↲ 16, 42, 68, 94	Automatic mode	Output 1 – 4 [2]	1 Bit	1.003	C, W, –, (R) [1]

Description: 1-bit object for activation or deactivation of the automatic sun protection in the enlarged sun protection mode.
The polarity can be parameterized. The object is only visible, if the automatic sun protection is to be tracked only when
the state of the automatic object changes next time (parameter setting).

Function: Sun protection function

⬚↲ 17, 43, 69, 95	Disabling direct operation	Output 1 – 4 [2]	1 Bit	1.003	C, W, –, (R) [1]

Description: 1-bit object for disabling direct operation in the enlarged sun protection mode
(direct operation = Move / Step / Position / Scene / Central). The polarity can be parameterized.

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[1] Each communication object can be read out. For reading, the R-flag must be set.

[2] The object designations are independent of the selected channel definition. In 2-channel operation, outputs 1&2 and 3&4
are combined into channel pairs (output 1/2 and output 3/4).

5 Description of software application

Channel-oriented objects:

Object	Function	Name	Type	DP-Type	Flag

Function: Sun protection function

☐⌐ 18, 44, 70, 96   Sunshine / shading façade   Output 1 – 4 [2]   1 Bit   1.002   C, W, –, (R) [1]

Description: 1-bit object for activation or deactivation of sun shading in the simple or enlarged sun protection mode (sun / no sun). The polarity can be parameterized.

Function: Sun protection function

☐⌐ 19, 45, 71, 97   Sunsh./shading position [3]   Output 1 – 4 [2]   1 Byte   5.001   C, W, –, (R) [1]

Description: 1-byte object for presetting a variable position value (0 … 255) for the height of the blind/shutter curtain or the venting louver position when the sun protection is active.

Function: Sun protection function

☐⌐ 20, 46, 72, 98   Sunsh./shading slat position   Output 1 – 4 [2]   1 Byte   5.001   C, W, –, (R) [1]

Description: 1-byte object for presetting a variable slat position value (0 … 255) when the sun protection is active.

Function: Sun protection function

☐⌐ 21, 47, 73, 99   Sunshine slat position offset   Output 1 – 4 [2]   1 Byte   6.001   C, W, –, (R) [1]

Description: 1-byte object for presetting a slat position angle (–100 % … +100 % / smaller or larger position angles are treated as + or –100 %) for 'manual' readjustment of the slat position during active sun protection.

Function: Sun protection function – automatic heating/cooling

☐⌐ 22, 48, 74, 100   Heating/cooling presence   Output 1 – 4 [2]   1 Bit   1.018   C, W, –, (R) [1]

Description: 1-bit object for activation of the presence mode during automatic heating/cooling The polarity can be parameterized. This object is generally linked with presence detectors.

Function: Sun protection function – automatic heating/cooling

☐⌐ 23, 49, 75, 101   Heating/cooling change-over: Output 1 – 4 [2]   1 Bit   1.100   C, W, –, (R) [1]

Description: 1-bit object for changing over between heating and cooling operation during automatic heating/cooling The polarity can be parameterized. This object is generally linked with room temperature controllers (object "heating/cooling change-over").

Function: Position feedback

☐⌐ 24, 50, 76, 102   Position feedback 3   Output 1 – 4 [2]   1 Byte   5.001   C, –, T, R [1, 4]

Description: 1-byte object for position feedback of the blind/shutter curtain height or louver position (0 … 255)

Function: Position feedback

☐⌐ 25, 51, 77, 103   Slat position feedback   Output 1 – 4 [2]   1 Byte   5.001   C, –, T, R [1]

Description: 1-byte object for position feedback of the slat position (0 … 255).

Function: Position feedback

☐⌐ 26, 52, 78, 104   Invalid position feedback   Output 1 – 4 [2]   1 Bit   1.002   C, –, T, R [1]

Description: 1-bit object for reporting back an invalid position of the blind/shutter curtain height or louver position ("0" = position valid / "1" = position invalid).

Function: Travel movement feedback

☐⌐ 27, 53, 79, 105   Travel movement feedback   Output 1 – 4 [2]   1 Bit   1.002   C, –, T, R [1, 4]

Description: 1-bit object for active travel movement feedback (output active – up or down). ("0" = no travel movement / "1" = travel movement)

---

[1] Each communication object can be read out. For reading, the R-flag must be set.

[2] The object designations are independent of the selected channel definition. In 2-channel operation, outputs 1&2 and 3&4 are combined into channel pairs (output 1/2 and output 3/4).

[3] The object designation varies with the type of curtain (blind, shutter / awning, venting louver).

[4] Depending on parameterization, feedback objects are either actively transmitting (T-flag set) or passively readable (R-flag set).

5

Description of software application

Channel-oriented objects:

Object	Function	Name	Type	DP-Type	Flag
Function: Position preset					
⌑⏋ 28, 54, 80, 106	Position 3	Output 1 – 4 [2]	1 Byte	5.001	C, W, – (R) [1]
Description:	1-byte object for presetting a position value (0…255) for the height of the blind/shutter curtain or the venting louver position in direct operation.				
Function: Position preset					
⌑⏋ 29, 55, 81, 107	Slat position	Output 1 – 4 [2]	1 Byte	5.001	C, W, – (R) [1]
Description:	1-byte object for presetting a slat position value (0 … 255) in direct operation.				

[1] Each communication object can be read out. For reading, the R-flag must be set.
[2] The object designations are independent of the selected channel definition. In 2-channel operation, outputs 1&2 and 3&4 are combined into channel pairs (output 1/2 and output 3/4).

Scope of functions

General:
- 4-channel operation for direct connection of four 230 V AC drive motors. As an alternative, the shutter/blind actuator can be configured for 2-channel operation with direct control of two 12 ... 48 V DC drives. Mixed operation of 230 V AC and 12 ... 48 V DC motors is not possible.
- Behaviour in case of bus voltage failure and bus voltage return as well as after ETS programming presettable for each output.
- Central control of all shutter outputs via 1-bit long-time operation telegram possible.
- Active feedback telegrams can be globally delayed after bus voltage return.
- Manual control of outputs independent of the bus (for instance, site operation) with LED state indicators.

Channel-oriented functions:
- Each output offers the full scope of functions without any restrictions. All channel-oriented functions can be parameterized separately for each output. This feature permits independent and multi-functional control of the shutter outputs.
- Mode of operation parameterizable: control of blinds with slats, shutters or venting louvers.
- Separately parameterizable blind/shutter movement times with time extension for moves into the upper end position.
- Optionally with automatic end position detection (automatic determination of the blind/shutter movement time) for 230 V drive motors with mechanical limit switches.
- For blinds with slats, a slat-moving time can be independently parameterized
- Direction change-over time and the times for short-time and long-time operation (step, move) presettable.
- Blind/shutter or slat position feedback telegram (only with bus control). In addition, an invalid blind/shutter position or an invalid travel movement can be reported back. Active (transmitting after changes) or passive (object readout) feedback functions.
- Assigning of outputs to up to 5 different safety functions (3 wind alarms, 1 rain alarm, 1 frost alarm) optionally with cyclical monitoring. The safety functions (objects, cycle times, priority) are programmed device-oriented and in common for all outputs. The assignment of individual outputs to the safety functions and the safety measures can be parameterized for each channel.
- An extensive sun protection function with fixed and variable blind/shutter or slat positions at the beginning and at the end of the function can be activated separately for each output. Dynamic slat offset for slatted blinds included. Also with enlarged sun protection feature for integration into sophisticated shading control programs. Optionally also with automatic heating/cooling and presence detection function.
- Forced-position function can be implemented for each shutter output.
- Integration into light-scenes possible: up to 8 internal scenes adjustable per output.
- In the shutter/awning mode of operation, the fabric-stretching function can be activated. The fabric-stretching function permits stretching the fabric of an awning tight after lowering. The fabric-stretching function can also be used with shutters to re-open the slits of the shutter curtain after a downward movement into the lower end position.

5 Description of software application

Sun protection function – General information

Each output of the shutter actuator can be separately configured for the execution of a sun protection function. Sun protection is generally realized with blinds, shutters or awnings and offers an intelligent method of shading rooms, terraces or balconies during sunshine depending on the altitude of the sun in the sky and on the intensity of the sunlight (Fig. D).
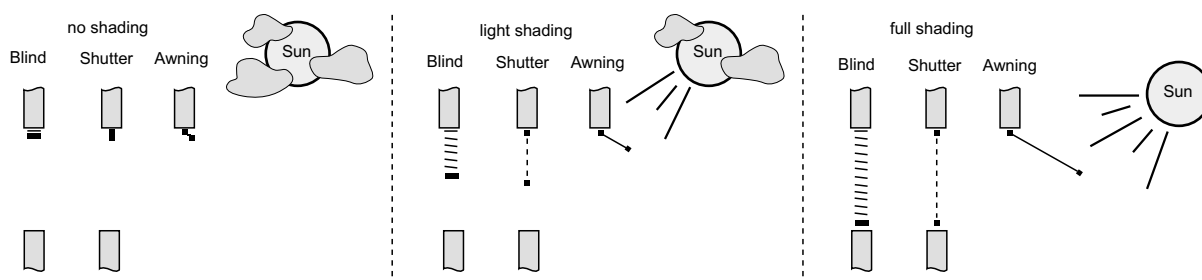
Fig. D: Sun protection principles (example)

The sun protection functions of the shutter actuator can be adapted to many different applications.
In simple sun protection applications as, for instance, in case of direction-dependent measurement of the sun's intensity by means of a brightness sensor, the curtains controlled can be closed partly or completely to prevent being disturbed by direct sunlight. In these applications, the sun protection function merely evaluates the 1-bit sun signal from the brightness or a similar sensor (e.g. weather station with limit value monitoring) and makes a drive open or close the controlled curtains by moving them into fixed parameterized positions or into variable positions preset via the bus.
In extended (enlarged) sun protection applications – for instance where the degree of shading is controlled by weather stations evaluating additionally the sun angle as a function of astro coordinates and presetting the blind and also the slat positions dynamically – the sun protection function can be supplemented by an automatic control system.
In such applications, the sun protection function evaluates additional bus communication objects allowing to enable or to disable the automatic control while the shutter actuator is in operation. This results in a large number of combination variants with intelligent blind/shutter control systems.
Already simple sun protection applications are sufficient to permit a fixed or variable re-adjustment of the positions of blind slats for adapting the curtain to individual shading requirements. For such purpose, it is possible to preset a statical slat offset in the ETS parameters, for instance, for adapting the reflection of sunlight depending on the building situation, or additionally, a dynamical slat offset via a bus communication object, for instance, for manual re-adjustment of the slat opening by persons in the room or otherwise by a central building services control system.
In all cases, the priority between an incoming sunshine or automatic telegram and the direct operation of an output (short-time, long-time telegram, scenes, positioning, central) is also presettable in the ETS. This way, a sun protection position can, for instance, be influenced by a 'manual' operation of a touch sensor in the room and the sun protection function be interrupted. Alternatively, the protection function cannot be interrupted by a direct operation. I.e. the output is interlocked.
A sun protection function can be overridden by a safety function, a forced position or also by a manual control locally on the device itself as these functions of the actuator invariably have a higher priority. At the end of one of the mentioned functions with a higher priority, the same reaction as the one at the beginning of sun protection will be re-executed, if the sun protection function is still active at this time.

Automatic heating/cooling function

When automatic heating/cooling is active, a presence signal – e.g. from a KNX presence monitor or a detector – is evaluated in addition to the signals of the enlarged sun protection function. The automatic sun protection function will then only be activated by the shutter actuator when persons are in the room. Depending on the sunshine signal, the room is then protected against sunshine or not as described in the preceding chapters.
Without receiving a presence signal the shutter actuator evaluates in addition a heating/cooling signal derived, for instance, from a room temperature controller or from an outside thermostat. In this case, the shading function can be used to support the heating or cooling function in a room. As no persons are present in the room, intensive sunlight can be used, for instance, to heat up the room by opening the slats or by raising the curtain. Similarly, the room can also be shaded against sunlight during the absence of persons, if additional heating up of the room is not desired.

Actuators

Shutters

1

2
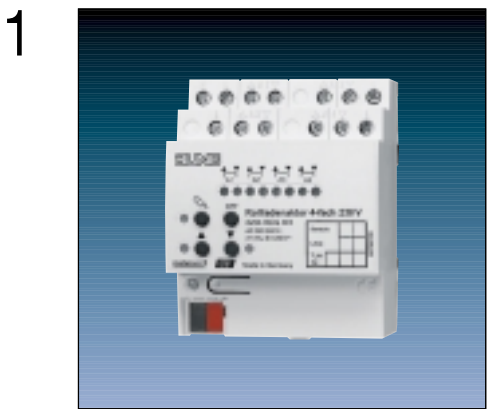
	Ref.-No.
KNX shutter actuator,	
4-gang 230 V AC	**2204 REG HR**
ETS-product family:	Shutter
Product type:	Shutter 4-gang
Series embodiment (SE)-device (4 units)	

3 Depending on KNX telegrams received, the shutter actuator switches up to four independent output channels, one for each motor (4-channel operation). The number of output channels can also be reduced to two so that up to two shutter motors can be controlled per channel (2 x 2-channel operation).

The shutter actuator is equipped with a manual control feature permitting bus-independent operation of the individual outputs in a permanent or temporary mode.

On reception of a storm warning, the actuator can, for instance, move the shutter into a predefined safety position and lock them there.

Each output can be independently parameterized for individual moving times.

The 4 manual switches on the front panel of the device permit switching the relays on and off by hand in parallel with the KNX even without bus voltage or in a non-programmed state. This feature permits fast checking of connected motors for proper functioning.

The shutter actuator has its own mains supply independent of the connected drives. For actuation of the outputs, the mains supply must always be on.

Connection diagram:
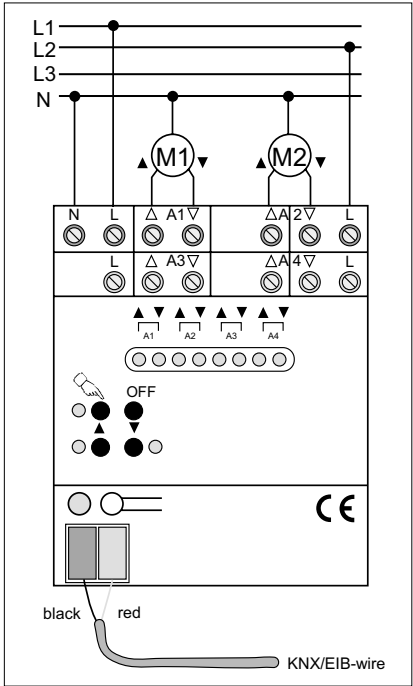
1 programming button
1 programming LED (red)

Manual controls:
1 " ✎ " key for manual control mode activation (select key)
1 "OFF" key (ALL stop)
1 "▲" key for manual UP movement
1 "▼" key for manual DOWN movement

Status indicators:
8 LEDs (red) to indicate the movement direction of the individual
  outputs or of the manually selected output
1 LED (red) to indicate the "permanent manual mode"
1 LED (red) to indicate the "UP" movement of the manually selected output
1 LED (red) to indicate the "DOWN" movement of the manually selected output

4   Technical data

Supply

Voltage:	21 – 32 V DC (SELV)
Power consumption:	max. 150 mW
Connection:	KNX connection and branching terminal

External supply

Voltage:	110 V (–10 %) – 240 V (+10 %) AC; 50/60 Hz (no DC)
Total power dissipation:	min. 0.3 W up to max. 1.8 W (no load connected)
Connection:	screw terminals:
	0.5 – 4 mm^2 single wire and stranded without ferrule
	0.5 – 2.5 mm^2 stranded wire with ferrule

Response to voltage failure

Bus voltage only:	parameter-dependent
Mains voltage only:	All outputs switch off (stop); manual control not possible.
Bus and mains voltage:	All outputs switch off (stop); manual control not possible.

Response on reactivation

Bus voltage only:	Mains voltage not available:
	Outputs are off (stop); bus communication is possible, i.e. safety functions can be activated
	Mains voltage available:
	parameter-dependent
Mains voltage only:	Bus voltage not available:
	parameter-dependent, manual control is possible.
	Bus voltage available:
	All outputs switch off or remain off (stop) until a new bus telegram is received and until the switching state changes.
	Exception: The actuator automatically reactivates the safety function(s) for the outputs assigned if the safety objects were activated before or during the mains failure. The parameterized "response at the beginning of the safety function" is repeated. A safety function activated before and deactivated during the mains failure does not launch a new movement on return of the mains voltage. If a safety function was at first activated and then deactivated again during the mains failure, the actuator launches a new movement for the outputs assigned after return of the mains as parameterized for "at the end of a safety function". In any case, the outputs assigned are re-enabled after safety deactivation.
	Manual control is possible.
Bus and mains voltage:	parameter-dependent

Output

Type of switching contact:	1 make contact and 1 change-over contact per output, monostable
	(movement directions mechanically interlocked.)
Number of outputs:	4
Switching voltage:	110 V – 240 V AC +/–10 %, 50/60Hz (no DC)
Max. switching current:	6 A at 230 V AC: non inductive or low-inductance loads (e.g. condenser-type motors)
Connection:	Screw terminals:
	0.5 – 4 mm^2 single wire and stranded without ferrule
	0.5 – 2.5 mm^2 stranded wire with ferrule

5

Description of software application

Objects

Number of addresses (max):	32
Number of assignments (max):	32
Communication objects:	10

Object	Name	Function	Type	Flag
Mode of operation "4–channel operation"				
⬜↲ 0	Output 1	Short operation (STEP)	1 Bit	C, W, (R*)
⬜↲ 1	Output 2	Short operation (STEP)	1 Bit	C, W, (R*)
⬜↲ 2	Output 3	Short operation (STEP)	1 Bit	C, W, (R*)
⬜↲ 3	Output 4	Short operation (STEP)	1 Bit	C, W, (R*)
⬜↲ 4	Output 1	Long operation (MOVE)	1 Bit	C, W, (R*)
⬜↲ 5	Output 2	Long operation (MOVE)	1 Bit	C, W, (R*)
⬜↲ 6	Output 3	Long operation (MOVE)	1 Bit	C, W, (R*)
⬜↲ 7	Output 4	Long operation (MOVE)	1 Bit	C, W, (R*)
Mode of operation "2 x 2-channel operation"				
⬜↲ 0	Output 1/3	Short operation (STEP)	1 Bit	C, W, (R*)
⬜↲ 1	Output 2/4	Short operation (STEP)	1 Bit	C, W, (R*)
⬜↲ 4	Output 1/3	Long operation (MOVE)	1 Bit	C, W, (R*)
⬜↲ 5	Output 2/4	Long operation (MOVE)	1 Bit	C, W, (R*)
⬜↲ 16	Safety 1	Safety	1 Bit	C, W, (R*)
⬜↲ 17	Safety 2	Safety	1 Bit	C, W, (R*)

* : For objects marked (R), the current object status can be read out (set "R" flag).

Description of objects (dynamic object structure):

⬜↲ 0 – 3	Short operation (STEP):	1-bit object for short operation (STEP) of a shutter
⬜↲ 4 – 7	Long operation (MOVE):	1-bit object for long operation (MOVE) of a shutter
⬜↲ 16 – 17	Safety:	1-bit object for reception of an alarm resp. safety message (polarity can be parameterized)

Scope of functions

- Mode of operation: 4-channel operation or 2 x 2-channel adjustable:
  - In 4-channel operation, 4 independent output channels, each for one shutter motor or for similar systems.
  - In 2 x 2-channel operation, reduction of output channels, so that two output terminals can be used in common for two motors per output channel.
- Short operation (STEP) or long operation (MOVE) presettable independently for each output channel (long operation (MOVE) also infinitely).
- Switch-over delay at change of movement direction independently presettable for each output.
- Automatic moving time extension (3 %) for the adaptation of different moving times to upper limit stop (dependent on drive unit). This is useful since shutters are slower during UP movements.
- Two safety functions separately assignable to shutter channels and common cyclical monitoring: Movement into a parameterized limit position on activation and deactivation of the safety function(s). The polarity of the safety objects is adjustable.
- Response after failure and return of bus voltage adjustable.
- Manual control of the output channels is possible even without bus voltage. The manual control mode can be inhibited.

5 Safety function

The shutter actuator has two safety functions with separate assignment to the shutter. Safety functions can be activated or deactivated by separate objects. The priority of the objects can be parameterized.

Scope of functions

Safety reaction
The reaction of the assigned output channels at the beginning and at the end of a safety function can be preset.

Response at the beginning of a safety function
The actuator moves the shutters alternatively into one of the limit stop position, if the response at safety is parameterized for "Moving up" or "Moving down". With these settings, the shutters are locked up in the limit position after the end of the safety movement. If the response at safety at the beginning of the safety function is parameterized for "No reaction", no movement is started and the output channels are locked in the actual position.
With respect to all other bus-controllable functions of the actuator, the safety function has the highest priority. This means that all functions in progress for the outputs (e.g. short or long operations) will be aborted and the safety reaction is executed. The safety function can be interrupted only by manual control on the device itself.

Response at the end of a safety function
At the end of a safety function, the actuator immediately re-enables the output channels concerned when the setting is "Moving up" or "Moving down" and approaches the corresponding limit stop positions. If the response at the end of a safety function is parameterized for "No reaction", the corresponding outputs are enabled without starting a new movement. If enabling by "No reaction" occurs during a safety movement still in progress, the outputs are enabled without interrupting the movement.

Safety assignment
Each output channel can be assigned separately to safety functions 1 or 2 or alternatively to both safety functions. If a channel is intended to respond to both functions, the safety objects resp. the functions are combined by a logic OR. This means that the corresponding output channel goes into the safety lock state as soon as one of the objects is active. In this case, the channel will be re-enabled only if both objects are deactivated. Only then can a position follow-up be performed at the end of the safety lock of a channel assigned to both functions!
If the setting is "No assignment", the safety function for this output channel is deactivated.

Actuators
Dimming, 1-gang, Flush mounted

1
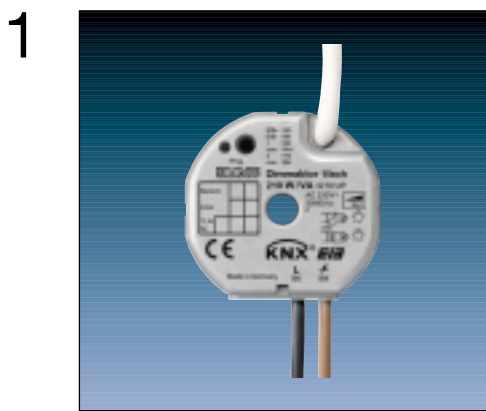
2

	Ref.-No.
KNX dimming actuator, flush mounted	
1-gang	**3210 UP**
ETS-product family:	Illumination
Product type:	Dimmer

3

The universal dimming actuator receives telegrams for switching or dimming purposes. It can work with the principle of trailing or leading edge control. That means either low voltage halogen lamps with TRONIC transformer or conventional (inductive) transformer can be controlled.

The device is equipped with two extension inputs which – depending on parameterization – can act directly on the switching output (local control with input 1) or alternatively as binary inputs on the KNX. The connected potential-free switch or push-button contacts are sensed against a common reference potential at the dimming actuator. As a binary input, the device can transmit telegrams for switching or dimming, for shutter/blind control or for value transmitter applications (dimming value transmitter, light-scene extension).
Connecting 230 V signals or other external voltages to the extension inputs is not permitted. The dimming actuator is supplied from the KNX and needs therefore no additional external power supply.

4   **Technical data**

KNX supply
Cable type: YY 6 x 6.0 mm; red: bus (+) / black: bus (–)
Voltage: 21 – 32 V DC SELV
Power consumption: typically 150 mW
Connection: approx. 33 cm ready-made; connecting terminal (0.6 – 0.8 mm)

Input
Number: 2 (depending on parameterization either as extension inputs for push-button local control
                          of the actuator or as independent binary inputs acting on the bus)
Cable type: YY 6 x 0.6 mm
                          green: extension input 1
                          white: reference potential (com)
                          yellow: extension input 2
                          brown: reference potential (com)
Cable length: approx. 33 cm ready-made, extendible to 5 m max.
Scanning voltage: approx. – 19 V DC referred to "com"; continuous signal
Loop resistance: max. 2 kOhm for safe "1" signal detection (rising edge)

4 Technical data

Output

Number:	1
Cable type:	2 x H05 V-K 2.5 mm² with ferrules
Cable length:	approx. 20 cm ready-made
Switch type:	Power MOS-FET, leading or trailing edge
Nominal voltage:	230 V AC; 50/60 Hz
Nominal current:	0,9 A
Nominal load:	50 – 210 W/VA

Dimmable loads:	Incandescent lamps	trailing edge
	HV halogen lamps	trailing edge
	LV halogen lamps	
	inductive transformers	leading edge
	electornic transformers	trailing edge

Type of protection:	IP 20
Safety class:	III
Mark of approval:	KNX
Ambient temperature:	–5°C ... +45°C
Storage/transport temperature:	–25°C ... +70°C (storage above +45°C results in shorter lifetime)
Mounting position:	any
Minimum spacings:	none
Type of fastening:	e.g. placing into deep flush-mounting box (Ø 60 mm x 60 mm)

Note:
- Never connect the mains voltage (230 V) or other external voltages to the extension inputs. Connecting an external voltage endangers the electrical safety of the entire KNX system (SELV/no electrical insulation)
- Make sure during the installation that there is always sufficient insulation between the mains voltage and the bus or the extensions. A minimum spacing of 4 mm must be ensured between the bus/extension wires and the mains wires.
- Non-used wires of the 6-wire connecting cable must be insulated with respect to one another and with respect to external voltages.
- To avoid EMC disturbances, the lines to the inputs should not be laid parallel to lines and cables carrying mains voltage.

5 Description of software application

Objects

Number of addresses:	26
Number of assignments:	27
Communication objects:	19

Objects for the binary inputs (extension inputs), if acting on the bus:

Object	Name	Function	Type	Flag
Function: "Switching" (for all 2 inputs[2])				
2 – 3	Input 1 – Input 2	Switching object X.1 (X = 1 to 2)	1 Bit	C, W, T, (R)[1]
10 – 11	Input 1 – Input 2	Switching object X.2 (X = 1 to 2)	1 Bit	C, W, T, (R)[1]
Function: "Dimming" (for all 2 inputs[2])				
2 – 3	Input 1 – Input 2	Switching	1 Bit	C, W, T, (R)[1]
10 – 11	Input 1 – Input 2	Dimming	4 Bit	C, T, (R)[1]
Function: "Shutter/blind" (for all 2 inputs[2])				
2 – 3	Input 1 – Input 2	Short operation	1 Bit	C, T, (R)[1]
10 – 11	Input 1 – Input 2	Long operation	1 Bit	C, T, (R)[1]
Function: "Value transmitter" (Function: Dimming value transmitter for all 2 inputs[2])				
2 – 3	Input 1 – Input 2	Value	1 Byte	C, T, (R)[1]
Function: "Value transmitter" (Function: Light-scene extension with/without storage function for all 2 inputs[2])				
2 – 3	Input 1 – Input 2	Light-scene extension	1 Byte	C, T, (R)[1]
Function: "Disable" (for all 2 inputs[3])				
2 – 3	Input 1 – Input 2	Disabling	1 Bit	C, W, (R)[1]

[1] : Objects marked (R) permit read-out of the object status (set R flag).

[2] : The "No function", "Switching", "Dimming", "Shutter/blind" and "Value transmitter" functions can be selected per input.
The names of the communication objects and the object table (dynamic object structure) will change accordingly.

[3] : A disable function is not available if the inputs are parameterised for "No function".

5

Objects for the output:

Object	Name	Function	Type	Flag
0	Output	Switching	1 Bit	C, W, (R)[1]
3	Output	Dimming	4 Bit	C, W, (R)[1]
4	Output	Brightness value	1 Byte	C, W, T[2], (R)[1]
5	Output	ACK switching	1 Bit	C, W, (R)[1]
6	Output	ACK brightness value	1 Byte	C, W, (R)[1]
7	Output	Inhibit	1 Bit	C, W, (R)[1]
11	Output	Light scene extension	1 Byte	C, W, (R)[1]
12	Output	Message short circuit	1 Bit	C, W, (R)[1]
13	Output	Message load failure	1 Bit	C, W, (R)[1]

[1] : Objects marked (R): permit read-out of the object status (set R flag).

[2] : Objects marked (T): the actual brightness value is transmitted automatically to the bus set (T) flag.
This function requires the following parameter setting: "Value acknowledge object available? = NO".

Description of software application

- Switching and dimming behaviour adjustable by parameters.
- Acknowledge for switching status by special acknowledge objects.
- Transmission of actual brightness value via the brightness value object (set T-flag!) or by the special acknowledge objects.
- Soft-ON, soft-OFF and delayed dimming adjustable by parameters.
- Dimming to or jumping to brightness vaule.
- Light scene operation possibility (up to eight different saved values can be recalled as a light scene) → no special light scene push-button necessary!
- Blocking operation by special object with parameterised brightness value at start and end of blocking.
- Additional objects for short circuit message or load failure message.
- Behaviour on bus voltage recovery adjustable.

1

2

KNX universal dimming actuator	Ref.-No.
1-gang	**3601 REG**
ETS-product family:	Illumination
Product type:	Dimmer
Series embodiment (SE)-device (4 units)	

3

The universal dimming actuator receives telegrams for switching or dimming purposes. It can work with the principle of trailing or leading edge control. That means either low voltage halogen lamps with TRONIC transformer or conventional (inductive) transformer can be controlled.
The max. capacity can be extended by using JUNG power amplifiers (see main catalogue).
Depending on the parameter it is possible to activate various additional functions.

4

Technical data

Supply
Voltage:	24 V DC (+6 V / –4 V)
Power consumption:	150 mW
Connection:	KNX connection block

Output
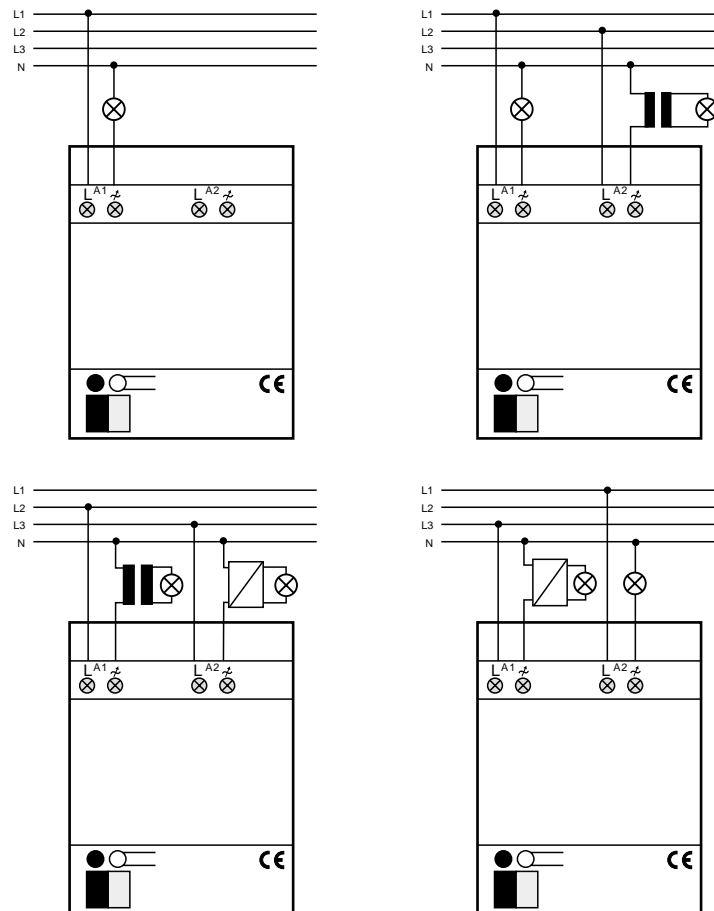|	
Number:	1
Performance:	Power MOS-FET, trailing edge or leading edge
Rated voltage:	230 V AC ± 10 %, 50/60 Hz
Rated current:	2.2 A
Min. Capacity:	50 W
Capacity:	50 to 500 W ohmic load
	50 to 500 W high voltage halogen load
	50 to 500 W LV halogen with conventional transformer
	50 to 525 W LV halogen with TRONIC transformer
Connection:	clamp bar
Protection:	IP 20
Behaviour at voltage drop	
only bus voltage:	dimming actuator switches off
only mains:	dimming actuator switches off
bus and mains:	dimming actuator switches off
Behaviour at voltage recovery	
only bus voltage:	dependent on parameters
only mains:	device controls brightness according to object value
bus and mains:	dependent on parameters
Operation temperature:	–5°C ... +45°C
Storage/transport temperature:	–25°C ... +75°C
Mounting:	on DIN rail 35 x 7.5

5 Wiring diagrams:
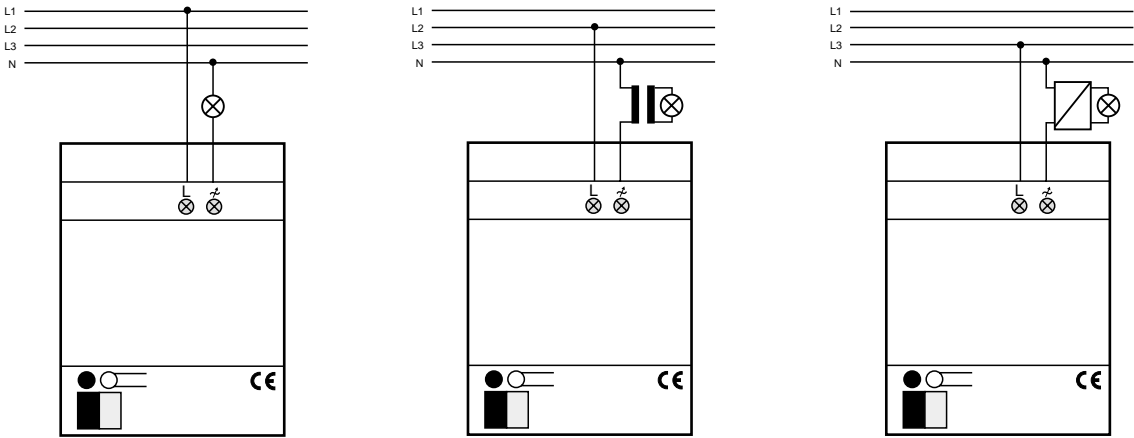
Notes:

- The device is equipped with a short circuit and over temperature protection.
  Trailing edge control: The channel switches off after 7 s.
  Leading edge control: The channel switches off after 100 ms.
- After over temperature detection the channel is switched on again to the given brightness value after it is cooled down.
- After the first installation or after mains recovery the device detects the load and will be adjusted (between 1 and 10 s) to the corresponding load (trailing or leading edge control).
- Mixed loads, i.e. TRONIC and inductive transformer are NOT allowed !
- Within a mixed load with inductive transformers and ohmic load the ohmic part must be below 50 % !

Description of software application:

– Switching and dimming behaviour adjustable by parameters.
– Acknowledge for switching status by special acknowledge objects.
– Transmission of actual brightness value via the brightness value object (set T-flag!) or by the special acknowledge objects.
– Soft-ON, soft-OFF and delayed dimming adjustable by parameters.
– Dimming to or jumping to brightness value.
– Light scene operation possibility (up to eight different saved values can be recalled as a light mood) no special light scene push-button necessary !
– Blocking operation by special object with parameterised brightness value at start and end of blocking.
– Additional objects for short circuit message or load failure message.
– Behaviour on bus voltage recovery adjustable

Objects

Number of addresses: 27
Number of assignments: 27
Communication objects: 18

Object	Name	Function	Type	Flag
0	Output	Sswitching	1 Bit	C, W, (R)
2	Output	Dimming	4 Bit	C, W ,(R)
4	Output	Brightness value	1 Byte	C, W, (R), (T)
6	Output	Acknowledge switching	1 Bit	C, T, (R)
8	Output	Acknowledge value	1 Byte	C, T, (R)
10	Output	Blocking	1 Bit	C, W, (R)
12	Output	Light mood extension input	1 Byte	C, W, (R)
14	Output	Message short circuit	1 Bit	C, T, (R)
16	Output	Load failure message	1 Byte	C, T ,(R)

Objects marked with (R): Object value can be read out (set R-flag!)
Objects marked with (T): The actual brightness value is transmitted automatically to the bus (set T-flag!).
                          This function requires the following parameter setting: "Value acknowledge object available ? = NO"

5

Notes to software application:

• Blocking function
The dimming actuator can be blocked via the bus while the actual brightness value is saved and kept constantly. A certain brightness value can be adjusted by parameters at start and end of blocking.

• Brightness value object
The actual brightness value is adjusted automatically in the brightness value object. By setting the R-flag the actual value can be read out.
By setting the T-flag the actual brightness value can be transmitted to the bus only with the following parameter setting: "Value acknowledge object available ? = NO"

• Acknowledge of switching status
When the switch status of the dimming actuator is changed from OFF to ON, or from ON to OFF, a corresponding switch telegram is transmitted to the bus via the acknowledge object. Also during a change from OFF to OFF or ON to ON the corresponding acknowledge telegram is transmitted.
During a soft-ON function the acknowledge is transmitted at the start of the dimming process, whereby with an activated soft-OFF function the corresponding acknowledge is transmitted at the end of the dimming process.

• Short circuit / load failure message
The dimming actuator is capable to transmit a 1 Bit telegram on the bus when a short circuit is detected. Simultaneously if selected by parameters the switching or the value status is transmitted, too.
Additionally, when a load failure is detected, i.e. a damaged bulb, the device transmits a 1 Bit load failure telegram on the bus.

Actuators

Dimming 2-gang

1

2

KNX universal dimming actuator	Ref.-No.
2-gang	**3602 REG**
ETS-product family:	Illumination
Product type:	Dimmer
Series embodiment (SE)-device (4 units)	

3

The universal dimming actuator receives telegrams for switching or dimming purposes. It can work with the principle of trailing or leading edge control. That means either low voltage halogen lamps with TRONIC transformer or conventional (inductive) transformer can be controlled.
The max. capacity can be extended by using power amplifiers (see main catalogue).
Depending on the parameter it is possible to activate various additional functions.

4

Technical data

Supply
Voltage: 24 V DC (+6 V / –4 V)
Power consumption: 150 mW
Connection: KNX connection block

Output
Number: 2
Performance: Power MOS-FET, trailing edge or leading edge
Rated voltage: 230 V AC ± 10 %, 50/60 Hz
Rated current: 2 x 1.1 A
Min. Capacity: 50 W per channel (if channel ist loaded)
Symmetrical capacity: in total 50 to 600 W / VA
50 to 300 W ohmic load
50 to 300 W high voltage halogen load
50 to 300 W LV halogen with conventional transformer
50 to 300 W LV halogen with TRONIC transformer
Unsymmetrical capacity: • both channels loaded with max. 600 W/VA, with single load
max. 400 W/VA per channel:
i.e. channel 1: 350 W (ohmic load)
channel 2: 250 VA (TRONIC load)
• only one channel is used: max. 400 W/VA
Connection: clamp bar
Protection: IP 20

4 Technical data

Behaviour at voltage drop
  only bus voltage: dimming actuator switches off
  only mains: dimming actuator switches off
  bus and mains: dimming actuator switches off
Behaviour at voltage recovery
  only bus voltage: dependent on parameters
  only mains: device controls brightness according to object value
  bus and mains: dependent on parameters
Operation temperature: –5°C ... +45°C
Storage/transport temperature: –25°C ... +75°C
Mounting: on DIN rail 35 x 7.5

5 Wiring diagrams:

Notes:
- Different lines can be connected to the device.
- Each channel is equipped with a short circuit and over temperature protection.
  Trailing edge control: The channel switches off after 7 s.
  Leading edge control: The channel switches off after 100 ms.
- After over temperature detection the channel is switched on again to the given brightness value after it is cooled down.
- After the first installation or after mains recovery the device detects the load and will be adjusted (between 1 and 10s) to the corresponding load (trailing or leading edge control).
- Mixed loads, i.e. TRONIC and inductive transformer are allowed between the two channels, but NOT within one channel !
- Within a mixed load with inductive transformers and ohmic load the ohmic part must be below 50 % !

5

Description of software application:

– Switching and dimming behaviour adjustable by parameters.
– Acknowledge for switching status by special acknowledge objects.
– Transmission of actual brightness value via the brightness value object (set T-flag!) which is recommended or by the special acknowledge objects.
– Soft-ON, soft-OFF and delayed dimming adjustable by parameters.
– Dimming to or jumping to brightness value.
– Light scene operation possibility (up to eight different saved values can be recalled as a light scene) → no special light scene push-button necessary !
– Blocking operation by special object with parameterised brightness value at start and end of blocking.
– Additional objects for short circuit message or load failure message.
– Behaviour on bus voltage recovery adjustable.

Objects

Number of addresses (dynamic):   27
Number of assignments (dynamic):   27
Communication objects: 18

Object	Name	Function	Type	Flag
0	Output 1	Switching	1 Bit	C, W, (R)
1	Output 2	Switching	1 Bit	C, W, (R)
2	Output 1	Dimming	4 Bit	C, W, (R)
3	Output 2	Dimming	4 Bit	C, W, (R)
4	Output 1	Brightness value	1 Byte	C, W, (R), (T)
5	Output 2	Brightness value	1 Byte	C, W, (R), (T)
6	Output 1	Acknowledge switching	1 Bit	C, T, (R)
7	Output 2	Acknowledge switching	1 Bit	C, T, (R)
8	Output 1	Acknowledge value	1 Byte	C, T, (R)
9	Output 2	Acknowledge value	1 Byte	C, T, (R)
10	Output 1	Blocking	1 Bit	C, W, (R)
11	Output 2	Blocking	1 Bit	C, W, (R)
12	Output 1	Light scene extension input	1 Byte	C, W, (R)
13	Output 2	Light scene extension input	1 Byte	C, W, (R)
14	Output 1	Message short circuit	1 Bit	C, T, (R)
15	Output 2	Message short circuit	1 Bit	C, T, (R)
16	Output 1	Load failure message	1 Byte	C, T, (R)
17	Output 2	Load failure message	1 Byte	C, T, (R)

Objects marked with (R): Object value can be read out (set R-flag!)
Objects marked with (T): The actual brightness value is transmitted automatically to the bus (set T-flag!).
This function requires the following parameter setting: "Value acknowledge object available ? = NO"

Notes to software application:

• Blocking function

Each channel of the dimming actuator can be blocked via the bus while the actual brightness value is saved and kept constantly.
A certain brightness value can be adjusted by parameters at start and end of blocking.

• Brightness value object

The actual brightness value is adjusted automatically in the brightness value objects. By setting the R-flag the actual value can be read out.
By setting the T-flag the actual brightness value can be transmitted to the bus only with the following parameter setting: "Value acknowledge object available ? = NO"

• Acknowledge of switching status

When the switch status of the dimming actuator is changed from OFF to ON, or from ON to OFF, a corresponding switch telegram is transmitted to the bus via the acknowledge object. Also during a change from OFF to OFF or ON to ON the corresponding acknowledge telegram is transmitted.
During a soft-ON function the acknowledge is transmitted at the start of the dimming process, whereby with an activated soft-OFF function the corresponding acknowledge is transmitted at the end of the dimming process.

• Short circuit / load failure message

The dimming actuator is capable to transmit a 1 Bit telegram on the bus when a short circuit is detected. Simultaneously if selected by parameters the switching or the value status is transmitted, too.
Additionally, when a load failure is detected, i.e. a damaged bulb, the device transmits a 1 Bit load failure telegram on the bus.

1

2

	Ref.-No.
KNX universal dimming actuator	
4-gang	**3704 REG HE**
ETS-product family:	Illumination
Product type:	Dimmer
Series embodiment (SE)-device (8 units)	

3

The universal dimming actuator receives telegrams for switching or dimming purposes. It can work with the principle of trailing or leading edge control. That means either low voltage halogen lamps with TRONIC transformer or conventional (inductive) transformer can be controlled.
In a trailing edge application, the max. capacity can be extended by using power amplifiers (see main catalogue).
If the max. capacity of an output shall be extended by JUNG power amplifiers, the max. brightness (parameter) of the universal dimmer output must be set to maximum 90 %.
The universal dimming actuator offers a separate acknowledge of the single switching and dimming conditions of the connected loads.
Above that a short circuit or load failure message can be transmitted on the bus.
By means of its control elements (4 push-buttons) the dimming outputs can be operated also without bus connection or programming.

It is recommended to use the ETS3.0d version.
Depending on the parameter it is possible to activate various additional functions.

4   **Technical data**

KNX Supply
Voltage: 21 – 32 V DC (SELV)
Power consumption: typically 150 mW
Connection: Bus terminal (KNX Type 5.1)
External supply
Voltage: 190 ... 230 V AC +10 %/–15 %, 50/60 Hz
Power consumption: approx. 1 W
Total power loss: max. 8.5 W (at max. load)
Behavior at bus voltage drop: Depending on parameter
Behavior at bus voltage recovery: Depending on parameter

Outputs
Number: 4 (electronic, MosFETs)
Connection: Screw terminals: 0.5 mm² to 4 mm², solid or finely stranded conductor
                                           without wire end sleeve
                                           0.5 mm² to 2.5 mm², finely stranded conductor
                                           with wire end sleeve

Cable length per output: max. 100 m

4 Technical data

Capacity per output

230 V-incandescent:	20 ... 210 W
230 V-HV-halogen:	20 ... 210 W
LV-halogen	
Conventional transformer:	20 ... 210 VA
Tronic-transformer:	20 ... 210 W
Mixed load, resistive-inductive:	20 ... 210 W/VA
Mixed load, resistive-capacitive:	20 ... 210 W
Mixed load, inductive-capacitive:	not allowed!
Motor load:	not allowed!

Type of protection:	IP 20
Safety class:	III
Mark of approval:	KNX/VDE
Ambient temperature:	–5°C ... +45°C
Storage/transport temperature:	–25°C ... +70°C (storage above +45°C results in shorter lifetime)
Mounting position:	any, recommended: output terminals on top
Minimum spacings:	none
Type of fastening:	on DIN rail 35 x 7.5

5 Description of software application

- Independent control of up to 4 dimming outputs.
- Independent hand-operation of the outputs.
- Central switching function for the collective control of all outputs.
- Acknowledge switching: active (at changing or cyclically) or passive (object can be read out).
- Preset of load-type and adjustment of the dimming principle for each output possible:
  – universal (with automatic teach-in),
  – electronic transformer (capacitive/trailing edge control),
  – conventional transformer (inductive/leading edge control).
- Adjustment of brightness limits (basic and max. brightness).
- Dimming behaviour (also fading) and dimming characteristic can be adjusted.
- Soft-On or Soft-Off-function.
- Separate report telegrams for each output regarding short-circuit/overload and load failure can be transmitted to the bus.
  The acknowledge of the connected load type is also possible.
- Inhibit or alternatively forced position function per output. During inhibit function the blinking of the connected load is possible.
- Time-functions (Switch On/Off delay, stair-case function – also with advance warning).
- Elapsed hour counter per output.
- Up to 8 light scenes per output.
- The reaction at bus-voltage drop and recovery and after an ETS-download can be adjusted per output.

Objects

Number of addresses:	254
Number of assignments:	255
Communication objects:	75

Superior channel objects:

Object	Name	Function	Type	DP-Type	Flag
Function: Hand-operation					
0	Inhibit	Hand-operation	1 Bit	1.003	C, W, –, (R)[1]
Description:	1 Bit object for inhibiting the push-buttons. Polarity adjustable.				
Function: Hand-operation					
1	Status	Hand-operation	1 Bit	1.002	C, –, T, (R)[1]
Description:	1 Bit object for the status of hand-operation. Object "0": hand-operation deactivated (bus-operation)-Object "1": hand-operation activated.				
Function: Central function					
2	Switching	Central	1 Bit	1.001	C, W, –, (R)[1]
Description:	1 Bit object for central switching of all assigned outputs. Polarity adjustable.				

[1] Each communication object can be read out. Set "R" flag.

5

Description of software application

Channel objects:

Object	Name	Function	Type	DP-Type	Flag

Function: Output switching

☐⌐ 3, 21, 39,

57	Switching	Output 1 ... 4	1 Bit	1.001	C, W, −, (R)[1]

Description: 1 Bit object for switching On/Off ("1" = On/"0" = Off).

Function: Relative dimming

☐⌐ 6, 24, 42,

60	Dimming	Output 1 ... 4	4 Bit	3.007	C, W, −, (R)[1]

Description: 4 Bit object for dimming of an output.

Function: Absolute dimming

☐⌐ 7, 25, 43,

61	Brightness value	Output 1 ... 4	1 Byte	5.001	C, W, −, (R)[1]

Description: 1 Byte object for an absolute value (brightness value 0 ... 255).

Function: Acknowledge switching

☐⌐ 8, 26, 44,

62	ACK switching	Output 1 ... 4	1 Bit	1.001	C, −, T, R[2]

Description: 1 Bit object for ACK of the switching status ("1" = On/"0" = Off).

Function: Acknowledge absolute switching

☐⌐ 9, 27, 45,

63	ACK brightness value	Output 1 ... 4	1 Byte	5.001	C, −, T, R[1, 2]

Description: 1 Byte object for ACK of an adjusted dimming value.

Function: Stair-case function

☐⌐ 4, 22, 40,

58	Stair-case function start/stop	Output 1 ... 4	1 Bit	1.010	C, W, −, (R)[1]

Description: 1 Bit object for activation or deactivation of the switch-on time of the stair-case function ("1" = On/"0" = Off).

Function: Stair-case function

☐⌐ 5, 23, 41,

59	Stair-case time factor	Output 1 ... 4	1 Byte	5.010	C, W, −, (R)[1]

Description: 1 Byte object for setting the time factor of the stair-case time (0 ... 255).

Function: Inhibit

☐⌐ 10, 28, 46

64	Inhibit	Output 1 ... 4	1 Bit	1.003	C, W, −, (R)[1]

Description: 1 Bit object for inhibiting of an output. Polarity adjustable.

Function: Forced position

☐⌐ 11, 29, 47,

65	Forced position	Output 1 ... 4	2 Bit	2.001	C, W, −, (R)[1]

Description: 2 Bit object for the forced position of an output. Polarity given by the telegram.

Function: Scenario

☐⌐ 12, 30, 48,

66	Light scene extension	Output 1 ... 4	1 Byte	18.001	C, W, −, (R)[1]

Description: 1 Byte object for calling-up or storing scenarios.

Function: Short-circuit and overload detection

☐⌐ 14, 32, 50,

68	Report short-circuit/overload	Output 1 ... 4	1 Bit	1.005	C, −, T, (R)[1]

Description: 1 Bit object for reporting of short-circuit or overload of an output.

[1] Each communication object can be read out. Set "R" flag.

[2] Depending on the parameter, acknowledge objects are either active (T-Flag set) or passive, can be read out (set "R" flag).

Actuators

Dimming Control Unit 1 — 10 V, 2-gang

1

2092 LFX

2
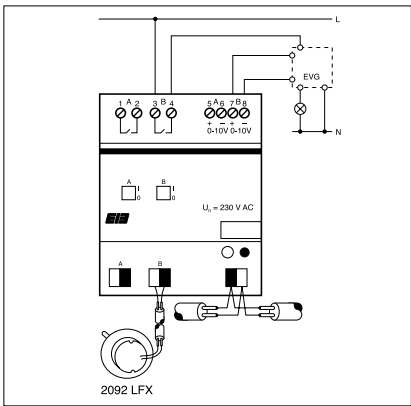
	Ref.-No.
KNX control unit 1 – 10 V, 2-gang	**2092 REG X**
ETS-product family:	Illumination
Product type:	Dimmer
Series embodiment (SE)-device (4 units)	

3

The dimming actuator receives telegrams for switching or dimming two groups of fluorescent lamps together with an electronic lamp ballast with 1 – 10 V interface (ELB-dynamic-type).
The dimming signal is controlled by a 1 – 10 V interface input. Depending on the parameter it is possible to activate additional functions.
Together with the accessory light sensor (ref.-no. 2092 LFX) the device can be used for a constant light control.
The control unit is a passive device which needs an active signal supplied by the 1 – 10 V input.

ATTENTION: The min. version of the ETS must be at least ETS 2 Version 1.1/Service release B!
Non-observance causes heavy software damages, the device cannot be programmed.

4

Technical data

Supply
Voltage: 24 V DC (+6 V / –4 V)
Power consumption: max. 150 mW
Connection: KNX connection block

Input
Number: 2 (configured for light sensor 2092 LFX)
Range: 200 ... 1200 Lux
Output
Number: 2
Signal voltage: 1 – 10 V
Signal current: dependent on type of ballast
                                     (e.g. 1 Siemens EVC: 1 mA)
                                     max. 30 mA
Connection: clamp bar
Length of wire: max. 100 m
Performance: 2 make-contact
Rated voltage: 230 V AC
Rated current: 16 A (ohmic load), dependent on ballast
Connection: clamp bar
Protection: IP 20
Operation temperature: –5°C ... +45°C
Storage temperature: –25°C ... +55°C
Mounting: on DIN rail 35 x 7.5

5

Description of application **Control unit 301302**

Description of software application:
– Switching and dimming behaviour adjustable by parameters.
– Dimming range can be restricted by a lower and upper limit value.
– Transmission of actual brightness value via the brightness value object.
– Transmission of actual switch status (0 or 1) via switch object **and** parameter „after switching ON/OFF object 0 sends its status". That function is used to control the status LED in the push-button.
– Switching ON by switching or dimming object or **only** by switching object adjustable.
– Dimming to or jumping to brightness value.
– Behaviour on bus voltage drop/recovery adjustable.

The control unit switches or dimms (via a 1 – 10 V control voltage) in dependance of the telegramms received via the KNX.
After receiving a switch ON telegram the max. brightness will be adjusted. The initial brightness, dimming speed as well as the dimming speed to a brightness value can be adjusted by parameter.
The current brightness value can be read out (e.g. by a push-button in order to store a light scene). For that purpose the **R-flag** of object 4/5 must be set in one device per group.
Furthermore, there is a parameter to select if the control unit shall be switched off by receiving a telegram with the brightness value = 0.
Additionally, the control unit switches OFF automatically if the brightness value falls below the adjusted setpoint.
This application is recommended for constant light controls with fluorescent lamps.

Constant light control:
When the device is configured as "Controller and dimmer", the control unit works in a constant light control operation. The actual brightness value is evaluated via the special light sensor (ref.-no. 2092 LFX).
In that operation mode an additional object and parameters are visible. Generally, there are two different control methods:
1. The brightness setpoint is fixed and cannot be changed by the user.
2. The brightness setpoint can be changed by the user with the parameter "dimm brighter/darker...used as a new setpoint".
   That new setpoint is active until the next switch command is transmitted.

Adjustment of the light sensor:
1. Avoid natural light, only the artificial light has to be adjusted to the desired value by dimming commands.
2. A telegram with the value "1" has to be transmitted to the object 6/7.
3. The brightness value measured by the light sensor is the new setpoint.
4. For testing dimm down the lighting, the control unit will dimm up to adjust the new setpoint.

Additional dimming actuators can be triggered on by the 1 Byte objects 4/5. The control unit will transmit the brightness value via these objects.
Now also other dimming actuators such as leading/trailing edge control dimmer can be integrated into the constant light control.

Objects

Number of addresses (dynamic):   18
Number of assignments (dynamic):   18
Communication objects: 8

Object	Name	Function	Type	Flag
0	Switching	Channel A	1 Bit	W, C, T
1	Switching	Channel B	1 Bit	W, C, T
2	Dimming	Channel A	4 Bit	W, C
3	Dimming	Channel B	4 Bit	W, C
4	Brightness value	Channel A	1 Byte	W, C, T, (R)
5	Brightness value	Channel B	1 Byte	W, C, T, (R)
With constant light control operation additionally				
6	Setpoint value	Channel A	1 Bit	W, C
7	Setpoint value	Channel B	1 Bit	W, C

Actuators

Dimming

1
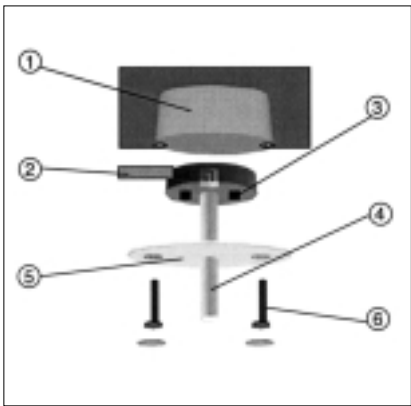
1 = Flush mounted wall box
2 = 2 wire cable
3 = Adhesive sticks
4 = Plastic stick (flad or angled)
5 = Cover
6 = Screws for cover

2

	Ref.-No.
Light sensor for control unit	
1 – 10 V (2092 REG X)	**2092 LFX**
Flush mounted device	
(No KNX device)	

3

Together with the control unit 2092 REG X the light sensor is used for a constant light control. It evaluates the brightness value in closed rooms. The sensor has to be installed in a flush mounted box mounted in the ceiling.
The device is connected via a 2 wire cable and a max. length of 100 m.
The light sensor is delivered with two different plastic sticks for different detection areas.

4

Technical data

Supply:	SELV via 2092 REG X
Connection:	on terminals of 2092 REG X
Protection:	IP 20
Operation temperature:	+5°C ... +45°C
Mounting:	fitted in wall box 60 mm
Length of wire:	max. 100 m
Dimensions:	54 x 10 mm (Ø x H)

Installation notes

The locaction of the sensor is strongly dependent on the rooms:
– avoid direct light from windows, lamps, mirrors, etc.
– install the light sensor as far from the windows as possible
– the detection area of the sensor should be pointed to an area which keeps a constant condition
– when the angled plastic stick is used, the angled side should be turned to the window side
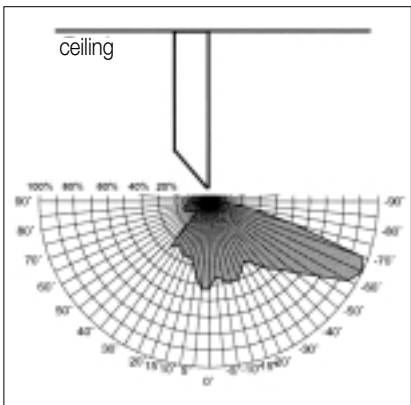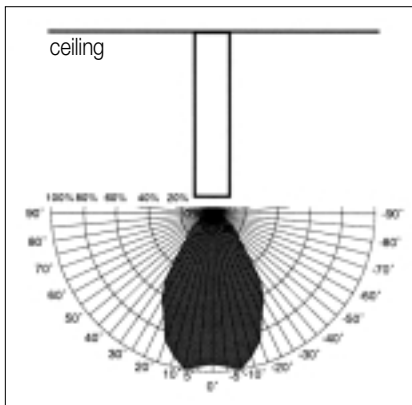
Actuators
Dimming Control unit 1 – 10 V, 3-gang

1

2
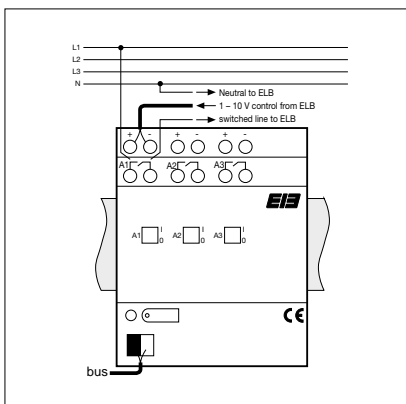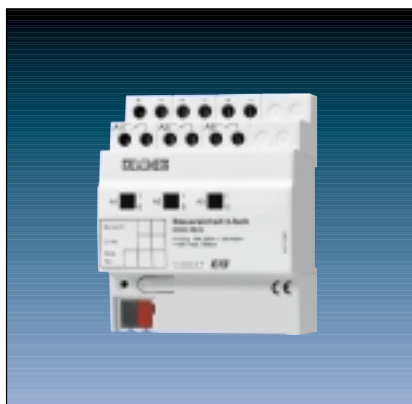
	Ref.-No.
KNX control unit, 3-gang	**2193 REG**
ETS-product family:	Illumination
Product type:	Dimmer
Series embodiment (SE)-device (4 units)	

3

The control unit receives telegrams for switching or dimming fluorescent lamps operated with an electronic ballast (ELB dynamic-type).
The dimming signal is controlled by a 1 – 10 V interface input. Switching is effected by a relay contact that switches the ballast´s voltage supply ON and OFF. This contact can also be actuated manually without any effect on the bus by 3 hardware slide switches.

4   **Technical data**

Supply
Voltage: 24 V DC (+6 V / –4 V)
Power consumption: max. 240 mW
Connection: KNX connection block

Input
Number: 3
Signal voltage: 1 – 10 V
Signal current: max. 100 mA per channel
                                     dependent on type of ballast
                                     (e.g. 1 INSTA ELB: 0.8 mA, Siemens ELB: 1 mA)
Performance: Power MOS-FET, trailing edge or leading edge
Rated voltage: 230 V AC ± 10 %, 50/60 Hz
Rated current: 2 x 1.1 A
Connection: clamp bar
Length of wire: max. 500 m at 0.5 mm^2

Output
Number: 3
Performance: 3 make-contact, floating point
Rated voltage: 230 V AC ± 10 %, 50 Hz
Rated current: 16 A (ohmic load), dependent on the fluorescent lamps
Capacity: 2500 W ohmic load
                                     1100 W / 140 µF capacitive load
                                     dependent on the ballast due to different inrush currents:
                                     i.e. max. 15 INSTA ELB TC 1 – 10 V (single tube)
                                          max. 12 INSTA ELB TC 1 – 10 V (double tube)
Connection: clamp bar
Protection: IP 20

4

Technical data

Behaviour at voltage drop

only bus voltage:	1 – 10 V input controls a connected voltage to 10 V, relay switches off
only mains:	the connected voltage to input 1 – 10 V is undefined, status of relay keeps value before voltage drop
bus and mains:	the connected voltage to input 1 – 10 V is undefined relay switches off

Behaviour at voltage recovery

only bus voltage:	dependent on parameters
only mains:	control unit controls brightness according to object value
bus and mains:	dependent on parameters

Operation temperature:	–5°C ... +45°C
Storage temperature:	–25°C ... +70°C
Mounting:	on DIN rail 35 x 7.5

Notes:
• Different lines can be connected to the device.

• A manual switching by the slide switches is not detected by the software ! If a channel is blocked via bus, it can be switched by the slide switch.

Description of software application:
– Switching and dimming behaviour adjustable by parameters.

– Acknowledge for switching status by special objects.

– Transmission of actual brightness value via the brightness value object (set T-flag!).

– Soft-ON, soft-OFF and delayed dimming adjustable by parameters.

– Dimming to or jumping to brightness value.

– Light scene operation possibility (up to eight different saved values can be recalled as a light scene) → no special light scene push-button necessary !

– Blocking operation by special object with parameterised brightness value on start and end of blocking.

– Behaviour on bus voltage recovery adjustable.

Objects

Number of addresses:	27
Number of assignments:	27
Communication objects:	18

Object	Name	Function	Type	Flag
0	Output 1	Switching	1 Bit	C, W, (R)
1	Output 2	Switching	1 Bit	C, W, (R)
2	Output 3	Switching	1 Bit	C, W, (R)
3	Output 1	Dimming	4 Bit	C, W, (R)
4	Output 2	Dimming	4 Bit	C, W, (R)
5	Output 3	Dimming	4 Bit	C, W, (R)
6	Output 1	Brightness value	1 Byte	C, W, (R), (T)
7	Output 2	Brightness value	1 Byte	C, W, (R), (T)
8	Output 3	Brightness value	1 Byte	C, W, (R), (T)
9	Output 1	Acknowledge	1 Bit	C, W, (R)
10	Output 2	Acknowledge	1 Bit	C, W, (R)
11	Output 3	Acknowledge	1 Bit	C, W, (R)
12	Output 1	Blocking	1 Bit	C, W, (R)
13	Output 2	Blocking	1 Bit	C, W, (R)
14	Output 3	Blocking	1 Bit	C, W, (R)
15	Output 1	Light scene extension input	1 Byte	C, W, (R)
16	Output 2	Light scene extension input	1 Byte	C, W, (R)
17	Output 3	Light scene extension input	1 Byte	C, W, (R)

Objects marked with (R): Object value can be read out (set R-flag!)

Objects marked with (T): The actual brightness value is transmitted automatically to the bus (set T-flag!).

5 **Notes to software application:**

• Blocking function
Each channel of the control unit can be blocked via the bus while the actual brightness value is saved and kept constantly. A certain brightness value can be adjusted by parameters at start and end of blocking.

• Brightness value object
The actual brightness value is adjusted automatically in the brightness value objects. By setting the R-flag the actual value can be read out. By setting the T-flag the actual brightness value can be transmitted to the bus.

• Acknowledge of switching status
When the switch status of the control unit is changed from OFF to ON, or from ON to OFF, a corresponding switch telegram is transmitted to the bus via the acknowledge object. Also during a change from OFF to OFF or ON to ON the corresponding acknowledge telegram is transmitted. During a soft-ON function the acknowledge is transmitted at the start of the dimming process, whereby with an activated soft-OFF function the corresponding acknowledge is transmitted at the end of the dimming process.

Actuactors
Heating Valve Drive

1

2

	Ref.-No.
KNX valve drive	**2176 SV**
ETS-product family:	Heating, A/C, ventilation
Product type:	Valve

3   The KNX valve drive is connected directly to the KNX without an additional bus coupling unit. An external power supply is also not necessary, the valve is supplied by the bus. The physical address has to be set with a magnet instead of a programming push-button. Together with the steady controlled temperature sensor 2178 or RCD, the valve receives a 8 bit regulation variable, resulting in 256 positions of the valve. The valve is suitable to be mounted to all thermostat valve bottoms for temperature regulation with e.g. radiators, floor heating, convectors etc.
It offers two additional potential free inputs where e.g. window-contacts can be connected. The inputs also can be used to connect conventional push-buttons or switches which can act directly on the valve drive or can be used for any other KNX functions.

Note: Before use, check the valve bottom parts!

4   **Technical data**

Supply
Voltage:	24 V DC (+6 V / –4 V)
Power consumption:	max. 240 mW (max. 12 mA at 20 V)
Connection:	KNX connection block via prepared connection pipe
	(1m (J)EYY-OB 3 x 2 x 0.6)

Input
Number:	2
Signal voltage:	20 V impulses, duration approx. 3 ms
Signal current:	approx. 1 mA per channel

Output
Number:	1
Stroke:	max. 4.5 mm
Run time:	25 s/mm
Connection:	to be put onto the valve bottom with gentle pressure and fixed with a suitable pliers.
Protection:	IP 44 (vertically mounted)
Behavior at bus voltage drop:	valve drive stops in its last position
recovery:	the valve drive runs through an adjustment routine and afterwards drives into the parameterized control variable.
	Inputs will be read out and sent to the bus, depending on parameters.
Operation temperature:	0°C ... +50°C
Storage temperature:	–20°C ... +70°C
Mounting:	screwed onto valve bottom parts from Heimeier
	(other bottom parts have to be checked)

4 Technical data

Note:

The valve drive is suited for Heimeier valve bottom parts and, in combination with the corresponding KNX room temperature sensors or RCD's, it makes optimal controlling results with high exactness possible.

In the initial operation phase the valve drive recognizes the position of the lifting valve in the closed and fully open position by its adjustment routine. Afterwards, the 8 Bit control variable received via the KNX, will be allocated to the effective valve motion in a linear relation. From this results the high suspension of the valve motion in 256 positions. After a given number of position changing (4000) and after each bus voltage drop, the valve starts the adjustment routine automatically.

5 Description of software application:

The KNX valve drive receives a valve control variable signal as a 1 byte telegram, demand orientated or cyclically, from the room temperature sensor RCD or via the KNX. According to the received control variable (0 – 100 %), the valve drives the valve bottom part into a position between 'closed' and 'max. open'.

The parameter 'flashing of programming LED, should a drive fault occur?' activates an optical signal at the valve drive.

In the normal operation mode, the position of the valve bottom part can be read out at any time by a 1 Byte telegram. Using the 1 Bit forced position object, the valve drive can be driven into a parameterised position. In this case the control variable input of the room temperature sensor or RCD is without influence.

This can be realized with window or door contacts to avoid the loss of heating or cooling energy. A '0'-telegram resets this object from the forced position and the valve returns to the last received control value.

Objects

Number of addresses: 12
Number of assignments: 12
Communication objects: 12

Object	Name	Function	Type	Flag
0	Control variable	Input	1 Bit/1Byte	C, W, T
1	Control variable	Real position	1 Byte	C, W, R
2	Status	Operating condition	1 Bit/1Byte	C, W, R
3	Forced position 1	Input	1 Bit	C, W, T
4	Forced position 2	Input	1 Bit	C, W, T
5	Min. limit	Iinput	1 Bit	C, W
6	Max. limit	Input	1 Bit	C, W
7	Binary input 1	*	1 Bit/1Byte	C, W, (R), (T)
8	Binary input 1	*	1 Bit/4 Bit	C, W, (R), (T)
9	Binary input 2	*	1 Bit/1Byte	C, W, (R)
10	Binary input 2	*	1 Bit/4 Bit	C, W, (R)
11	Limiting value	*	1 Bit/1Byte	C, W, (R)

Actuactors

Heating Actuator

1

2

	Ref.-No.
KNX heating actuator,	
6-gang, 0,05 A	**2136 REG HZ**
ETS-product family:	Output
Product type:	6-gang binary output
Series embodiment (SE)-device (4 units)	

3

The heating actuator 6-gang serves to control electro-thermal valve drives for heating applications or cooling ceilings. It offers six electronic outputs which, depending on the KNX telegrams, allow the noiseless control of valve drives. Up to four electro-thermal valve drives (e.g. make Heimeier 1835, Sauter MTX 116F200, Möhlenhoff AA2001-00-1) can be conncted to each output.

The outputs are either switched or controlled by a PWM-signal (Pulse Width Modulation) on a continuars PI-regulation, depending on the adjusted set value (1 Bit or 8 Bit).

The actuator is able to detect any overload or short circuit at its outputs. In this case the short circuited outputs will be permanently deactivated after an identification time. It is also possible to send an overload report to the bus.

Via a separate object it can be toggled between summer and winter time operation.

Additionally, each output can be driven to a forced position in order to send a parameterised set value to the output by a separate object.

4

Technical data

Supply
Voltage: 24 V DC (+6 V / –4 V)
Power consumption: typical 125 mW
Connection: KNX connection block

Output
Number: 6
Performance: 6 electronic (Triac) outputs
Rated voltage: 230 – 240 V AC
Rated current: 50 mA ohmic load per output
Connection: screw terminals: 0.2 – 4 mm^2
Protection: IP 20
Operation temperature: –5°C ... +45°C
Storage temperature: –25°C ... +70°C
Mounting: on DIN rail 35 x 7.5

Note: The avoid an overload detection, the outputs never switch simultaneous.

5

Description of software application:

– 6 independent outputs, 1 Bit or 1 Byte
– 1 Byte set values to control via PWM-signal. The cycle time of the output signals can be parameterised.
– Status acknowledge of each output (1 Bit or 1 Byte) automatically or on request.
– Preferred valve position in case of bus voltage drop or recovery adjustable.
– Short circuit or overload report via separate objects per output.
– Acknowledge object can be inverted.
– Cyclical monitoring time of the set value of each output adjustable.
– Summer or winter time operation adjustable via object.
– Emergency operation after detection of mechanical malfunction.
– Behaviour at bus voltage drop/recovery adjustable.

Objects

Number of addresses: 29
Number of assignments: 29
Communication objects: 29

Object	Name	Function	Type	Flag
Set values:				
0 – 5	Output 1 – 6	Set value	1 Bit	C, W, (R)
0 – 5	Output 1 – 6	Set value	1 Byte	C, W, (R)
Status set values:				
6 – 11	Output 1 – 6	Status set value	1 Bit	C, T, (R)*
6 – 11	Output 1 – 6	Status set value	1 Bit	C, R*
6 – 11	Output 1 – 6	Status set value	1 Byte	C, T, (R)*
6 – 11	Output 1 – 6	Status set value	1 Byte	C, R*
12 – 17	Output 1 – 6	Forced position	1 Bit	C, W, (R)
18 – 23	Output 1 – 6	Overload/short circuit	1 Bit	C, W, (R)
24	Power failure	Alarm message	1 Bit	C, T, (R)
25	All valves closed	Status valves	1 Bit	C, T, (R)
26	Cycl. monitoring	Alarm message	1 Bit	C, T, (R)
27	Summer/winter	Switch over	1 Bit	C, W, (R)
28	Highest set value	ACK set value	1 Bit	C, T, (R)

Objects marked with (R): Object value can be read out (set R-flag!).

Objects marked with *:   Dependent on the parameter „transmit status of valve position" the status of a control variable is sent automatically
                          (set T-flag), or only if requested by a telegram (set R-flag).

Displaying – Reporting
LCD Info Display

1

A: Application module (AM)
B: Application interface (AI)
C: Bus coupling unit (BCU)
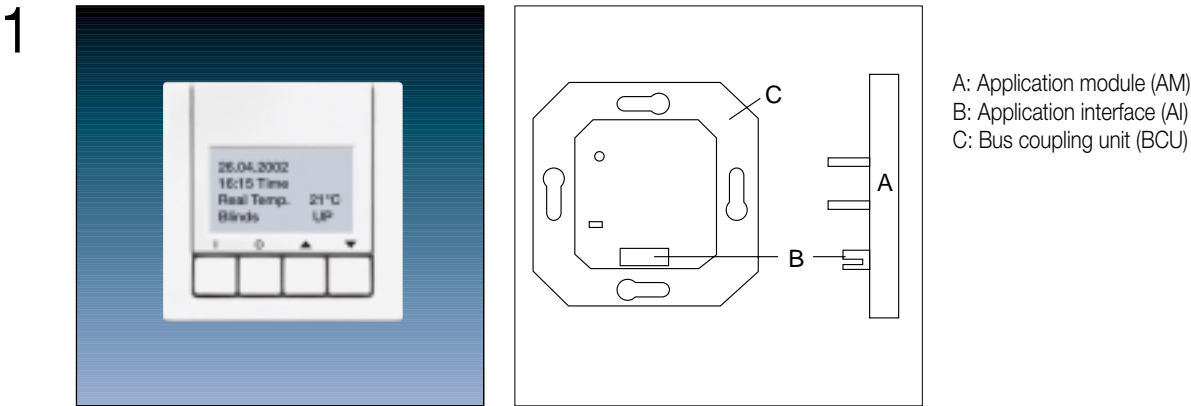
2

	Ref.-No.
KNX LCD Info Display	
ETS-product family:	Display
Product type:	Display
ranges CD 500/CD plus	
ivory	**2041**
white	**CD 2041 WW**
blue	**CD 2041 BL**
brown	**CD 2041 BR**
grey	**CD 2041 GR**
light grey	**CD 2041 LG**
black	**CD 2041 SW**
ranges LS 990/LS plus, Stainless Steel, Aluminiu, Chrome	
ivory	**LS 2041**
white	**LS 2041 WW**
light-grey	**LS 2041 LG**
stainless steel	**ES 2041**
aluminium (laquered)	**AL 2041**
anthracite	**AL 2041 AN**
gold coloured	**GO 2041**
chrome	**GCR 2041**

3

The LCD Info Display receives telegrams by the KNX and offers the possibility of a visual indication (LCD display) of free programmable text and values.
Up to 12 pages with 1, 2 or 4 lines can be defined. To each line one function (as switching, dimming, value indication, etc.) can be assigned.
On an additional alarm page up to 12 alarm messages can be administrated. To each alarm message, different alarm options as i.e. acoustic signal can be defined.

Note: For the programming of the device it is required to use at least the ETS 2 version 1.2a !

4 Technical data

Supply

Voltage:	24 V DC (+6 V / –4 V) via BCU
Power consumption:	max. 150 mW
Connection:	2 x 5-pole pin bar
Display:	4 lines → 16 characters
	2 lines → 8characters
	1 line → 4 characters
Operation elements:	4 push-buttons
Text memory:	max. 12 pages, each with 4 lines à 16 characters
Acoustic signal:	2 tones, can be confirmed
Protection:	IP 20
Operation temperature:	0°C ... +45°C
Storage temperature:	–25°C ... +70°C
Mounting:	plugged on a flush mounted BCU

Description of the software:

The Info Display has a special software which is embedded into the ETS. By opening the parameters that software starts automatically and the display can be configurated.

During the installation of the software it is important to select the directory where the corresponding ETS is located. Additionally, a vd2 data base file has to be installed somewhere on the PC. Now the data base can be imported as usual within the ETS module.

The software and the software manual can be downloaded from our web-page.

Commissioning note:

The physical address of the BCU is programmed by the ETS. Before the download of the Info Display software application to the application module, the device itself has to be plugged onto the BCU.

When an ETS project with an Info Display has to be exported and imported into another PC, please ensure that the software is also installed on the target PC!

Displaying – Reporting
LCD Mini Panel

1
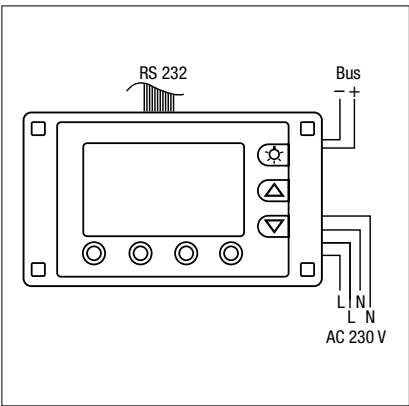
2

	Ref.-No.
LCD mini panel	**MT 701**
ETS-product family:	Display
Product type:	LCD display

3

The mini panel was developed as an extension of the product group of signal and operator panels, in order to control current building states from a central position and be able to influence functions. Due to its small flat design and scope of functions, the mini panel is intended for home and office applications.

The freely programmable LC graphic display can display up to 8 lines simultaneously while up to 16 elements can be arranged in two columns. The operation is interactive using sealed keypad.

As the user menu is freely programmable, it is possible to form functional groups that are individually matched to the building and which provide a clear representation of the various applications. Detailed functions can be displayed and operated via sub-menus. Up to 50 pages (25 pages while using the display in two columns) can be designed. It is also possible to integrate plan drawings, logos, general bitmaps etc. (240x128 pixel).

When configuring the mini panel, the menus and sub-menus can be set up as required and various KNX functions can be assigned.

Standard functions such as switching, dimming, shutter control and display of measured values can also be configured.

The formation of limiting values (up to 16) is also possible.

An internal real time clock is available for the execution of time functions (16 channel with 8 switching times per channel).

Furthermore, a complete light scene control is integrated, up to 32 lighting groups in up to 24 different light scenes can be assigned.

Within the different light scenes it is possible to activate or deactivate specific lighting groups. Hence, the device can be used to generate different independent light scene controls.

Up to 50 failure/alarm messages can be defined and up to 20 can be displayed simultaneously. All the messages are recorded in a listing within the system window and contains the last 100 entries.

The system page offers a password protection. The group addresses can be handled with "drag & drop". Internally up to 2000 group addresses can be handled.

The software allows the programming via the bus as well as with the RS232 interface.

Due to the slow transmission rate, it is recommended to use the programming via KNX just for changing of parameters/functions, not for the complete download of the application.

Furthermore, the software offers a preview monitor (simulation screen) where the current programming can be checked with interactive push-buttons. A resource monitor displays the current running capacity.

Finally, an internal powerful logic module is integrated which offers up to 80 logic links, 12 multiplexers (ideal for a partition wall application) as well as up to 40 filter timer elements.

Hence, additional hardware costs can be reduced.

3
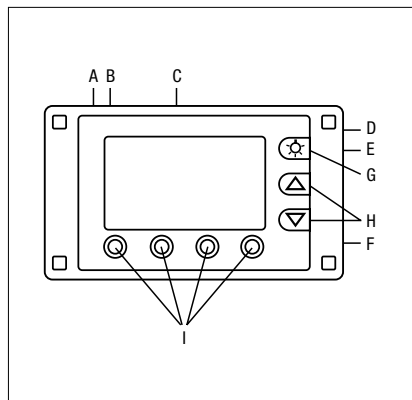
Dimensions:

W x H: 213 x 125 mm

Operating elements:

A) LC display contrast adjustment
B) Reset button
C) RS 232 interface
D) KNX connection terminal
E) KNX programming button
F) AC 230 V mains connection
G) Display illumination button
H) Scroll buttons
I) Freely programmable function push-buttons

Note: The LCD mini panel comes without design frame and flush-mounted wall box !

5

Description of the software:

The LCD mini panel has a special software which is embedded into the ETS. By opening the parameters that software starts automatically and the panel can be configured.
During the installation of the software it is important to select the directory where the corresponding ETS is located. Additionally, a vd2 data base file has to be installed somewhere on the PC. Now the data base can be imported as usual within the ETS.
When an ETS project of a MT 701 has to be exported and imported into another PC, please ensure that the software is also installed on the target PC!
The software and the software manual can be downloaded from our web-page.

An additional update tool for existing EIBTAB projects is available. Hence, it is possible to download the already existing project of an old LCD panel (ref.-no. 2425) into the MT 701 panel.

Displaying – Reporting

Colour Touch Panel

1

(2) Mains
(3) KNX
(4) Programming-LED
(5) Programming-push-button
(6) Connection for future applications
(7) Reset-button
(8) Reset-LED
(9) USB
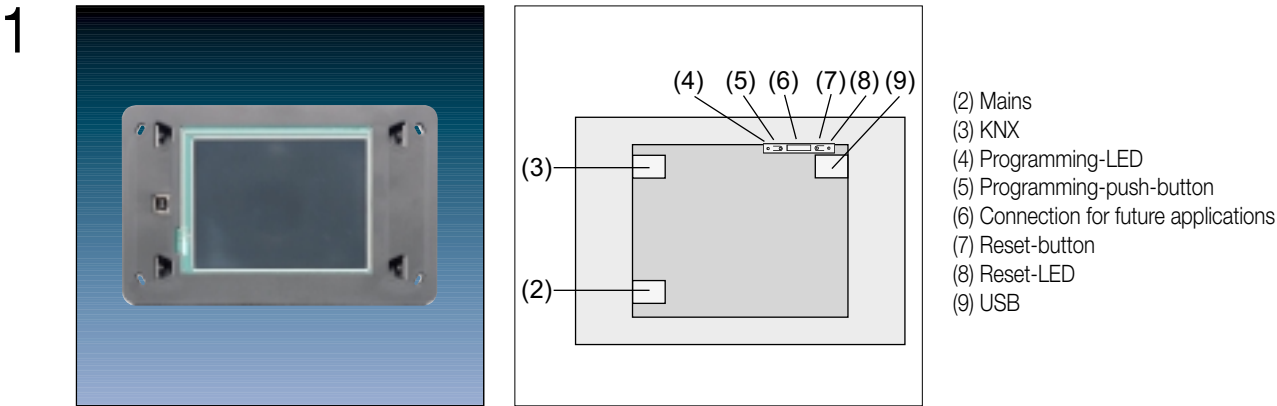
2

	Ref.-No.
Colour touch panel	**FP 701 CT**
ETS-product family:	Display
Product type:	LCD display

3

The innovative touch panel puts the user in the position of being able to monitor and regulate the complete sequences involved in the management of lighting, blinds and roller shutters, heating and air-conditioning systems, alarm systems, signalling devices and audio components, all conveniently from a single location. And indeed with navigation via a 5.7" TFT touch screen with a brilliant resolution of 4096 colours and 320 x 240 pixels, whereby 8 colour schemes are available for selection.

In addition to an accurate rendition of images and text, the monitor offers sufficient space to depict an individual background – in the form of photos, graphics our ground plans. The user interface can moreover be further optimised by retrieving drawings or flow charts for example onto the screen. There is also the possibility of linking up to 50 standard pages as required and accessing them directly. This clearly simplifies navigation and scrolling via the menus. All together up to 400 different display elements can be assigned on the different pages. The programming of the panel is carried out via the KNX or via the USB interface behind the frame which can be accessed from the front without any problems.
When configuring the mini panel, the menus and sub-menus can be set up as required and various KNX functions can be assigned.
Standard functions such as switching, dimming, shutter control and display of measured values can also be configured. The formation of limiting values (up to 16) is also possible.
An internal real time clock is available for the execution of time functions (16 channel with 8 switching times per channel).

Furthermore, a complete light scene control is integrated, up to 32 lighting groups in up to 24 different light scenes can be assigned.
Within the different light scenes it is possible to activate or deactivate specific lighting groups. Hence, the device can be used to generate different independent light scene controls.
Up to 50 failure/alarm messages can be defined and up to 20 can be displayed simultaneously. All the messages are recorded in a listing within the system window and contains the last 100 entries.
The system page offers a password protection. The group addresses can be handled with "drag & drop". Internally up to 2000 group addresses can be handled.

The colour touch panel comes without the design frame and the flush mounted recessed box !

4 Technical data

Supply of KNX
Voltage:	21 ... 32 V DC
Power consumption:	typ. 150 mW
Connection:	Bus terminal

External supply
Voltage:	230 V AC ± 10 %	
Current:	max. 250 mA	
Connection:	Screw terminals:	0.5 mm^2 to 4 mm^2, single wire
		0.34 mm^2 to 4 mm^2, stranded wire (without ferrule)
		0.14 mm^2 to 2.5 mm^2, stranded wire (with ferrule)

Response to mains failures
Bus voltage only:	no communication with KNX
Mains voltage only:	no communication with KNX
Bus and mains voltage:	no communication with KNX

Response on return of voltage
Bus voltage only:	no communication with KNX
Mains voltage only:	no communication with KNX
Bus and mains voltage:	communication with KNX according to parameter

Protection:	IP 20
Mark of approval:	KNX
Ambient temperature:	–5°C ... +45°C
Storage temperature:	–25°C ... +70°C (storage above +45°C reduces the service life)
Max. operational temperature:	$T_C = 75°C$
Fastening:	in flush mounted wall box
Dimensions W x H x D:	231 x 159 x 48 mm

Assembling of the Colour touch panel:

Note:
Due to the same dimensions the panel fits into the same box than the LCD mini panel, ref.-no. MT 701 !

5

Functional description:

- 5.7" TFT touch screen with a resolution of 4096 colours and 320 x 240 pixels.

- Panel can be installed in panel or landscape format.

- BMP- or JPG-format can be used for wall paper. Eight colour schemes can be defined.

- Up to 50 freely programmable pages with up to 400 display elements can be created.
  On each page up to 16 display elements can be defined.

- Each display element can be assigned to up to four different functions.

- The display elements can be used for all available KNX functions including displaying ASCI text.

- Four password levels are available for access control.

- Programming with a comfortable ETS Plug-in. The commissioning can be done directly via the integrated USB or via bus.
  The first download should be done with the direct USB which is much faster than via bus.

- Weekly timer with up to 16 channels.

- Internal clock which can be used as system time.

- Up to 24 light scenes with up to 32 different lighting groups can be assigned.
  The light scenes can be defined in independent light scene control zones.

- Up to 80 logic links with up to 8 inputs and up to 12 multiplexers with up to 3 channels are available.
  In addition, the panel offers up to 40 filter time elements which can be widely used.

- Up to 50 failure/alarm messages can be organised whereby up to 20 can be displayed simultaneously.
  The alarms are recorded in a protected message list.

1

FP GLAS 781 EX
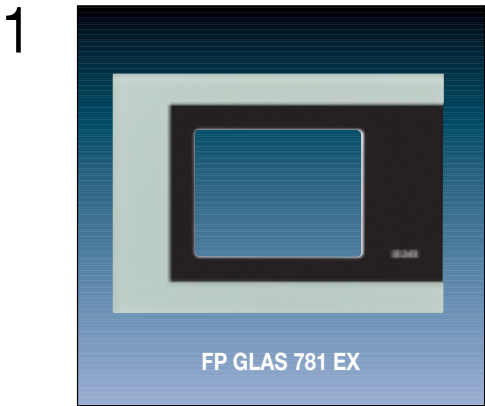
Dimensions (W x H x D) 236 x 170 x 10 mm

2

	Ref.-No.
Design frames	
for KNX Colour touch panel FP 701 CT	
stainless steel	**FP ES 781**
aluminium	**FP AL 781**
glass (safety glass – ref. DIN 1249 –,	
satined surface	**FP GLAS 781 EX**
without JUNG-logo on request	

1
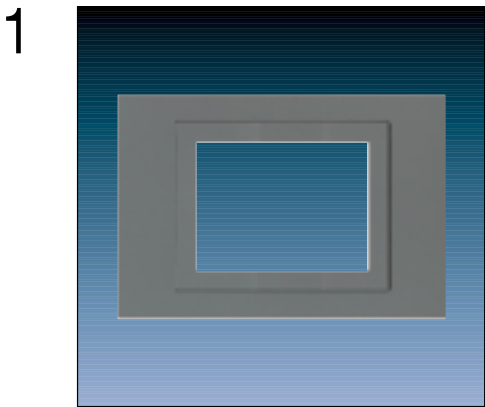
Dimensions (W x H x D) 236 x 170 x 6 mm

2

	Ref.-No.
Frame	
for KNX Colour touch panel FP 701 CT	
anthracite	**FP 781 AN**

Displaying – Reporting

Accessories

1

2

	Ref.-No.
Flush mounted recessed box	**EBG 24**
212 x 124 x 75 mm (W x H x D)	
Fits for MT 701 and FP 701 CT.	

1
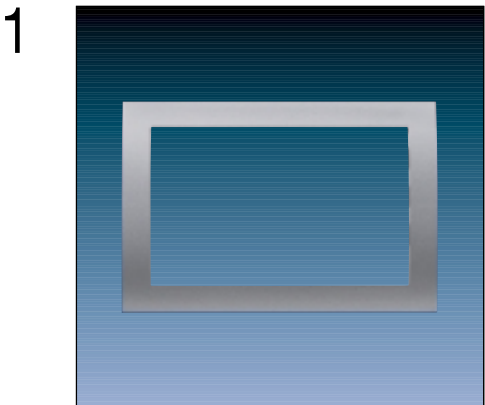
2

	Ref.-No.
Frame for mini panel MT 701	
white	**R 24 WW**
black	**R 24 SW**
stainless steel (painted)	**R 24 ES**
aluminium (painted)	**R 24 AL**

1

2

	Ref.-No.
KNX Telecontrol interface TC Plus	
wall mounted	**2601**
ETS-product family:	Communication
Product type:	Modem

3

The TC Plus is being offered in different types (analog, ISDN, GSM) with and without KNX module. These operating constructions apply to all types.

The TC Plus is an alarming and remote switching device by which up to 6 conventional devices can be switched via telephone. All settings will be saved in case of a power failure – **except for time and date**. The behaviour of the outputs in case of a power failure can be set (after return of the power voltage: ON, OFF or restoring the switching state before the power failure).

Conventional relays or current-impulse switches can be connected to the switching outputs.

Furthermore, the TC Plus is sending messages to selected participants (cf. phone numbers). These messages are activated by up to 6 contacts (series) which are connected to the alarm inputs (N1 to N6). At each of the inputs break or make contacts can be installed.

Additionally, when connected to KNX, up to twenty communications objects can be controlled and up to 6 alarms can be processed.

Should given messages – send off by the alarm inputs M1 to M6 or by KNX – not be confirmed, a local alarm output will be switched.

The controlling will either be performed with a DTMF telephone (DTMF = Dual-tone multi-frequency) or with a DTMF pocket dialer (optional).

In case of an answering machine being used at an analog connection (AB mode), either the answering machine or the TC Plus can be addressed. Individual user data are easy to program.

The TC Plus is operated by turnkey. Operation is supported by plain texts on a 20 character 4 line alphanumeric LCD field and also by announcements. The user can choose among 6 display languages for the messages.

The respective software is enclosed in the scope of delivery and supports comfortable configuration. The PC must have a serial interface.

Messages are transferred exactly to the selected participants by announcements, SMS, e-mail, or fax. The number of dial attempts (0 to 12) can be set.

The announcements can be individually recorded by the user. In order to do this, the handset (optional) with the 4-way RJ connector has to be inserted in the socket.

The device comes with a CD-ROM which includes the configuration software, an animation, the operation manual as well as the data base.

4

Technical data

Supply of KNX
Voltage:	21 ... 32 V DC (SELV)
Power consumption:	max. 150 mW
Connection:	screw terminals

External supply (plug power supply)
Voltage input:	100 – 240 V AC; 50 / 60 Hz
Voltage output:	12 V DC, 1.25 A
Length of power supply cord:	2 m

Response to voltage failure
Bus voltage and/or mains voltage:	device is not working, KNX settings are saved, date and time are deleted
Response on reactivation	
Bus voltage and/or mains voltage:	parameter-dependent, conditions of outputs (conventional and KNX) can be parameterized
Bus and mains voltage:	no communication with KNX

Input
Number:	6 conventional potential free contacts (terminal M1 – M6)
Connection:	screw terminals
Output	
Number of outputs:	6 (terminal A1 – A6), conventional
	1 local alarm output (terminal A0)
Switching voltage:	12 V DC, 100 mA
Max. switching current:	total max. rating of all outputs max. 700 mA, short circuit proof and surged with 200 mA
Connection:	screw terminals

Protection:	IP 30
Dimensions:	L x W x H (251 x 204 x 49 mm)
Weight:	700 g
Colour:	RAL 7035, light grey (material ABS)
Operation temperature:	–5°C ... +45°C
Max. operational temperature:	-5 °C to 45°

5

Description of software application

– Works as an additional device like an answering machine.
– The TC Plus is mainly developed for an analog telephone network. Optional it can be used also via an analog port of an ISDN unit.
– A special version for GSM is also available on request.
– All announcements / instructions are individually recorded.
– Access protection by a code number with 4 digits.
– A total status recall is possible.
– Control of up to 10 KNX functions whereby three different data formats can be selected: 1 bit, 1 byte and 2 byte.
– For the alarm inputs and the KNX inputs the contacts can be defined.
– Up to 4 destinations to each input can be defined.
– The TC Plus can be programmed by turnkey and the display, however the more comfortable method is by using the PC software tool (various languages available).
– Display messages can be adjusted to German, English, French, Spanish, Italian or Dutch.
– Provider selection for the transmission of SMS or e-mail (subject of corresponding country).
– Up to 20 alarm messages can be stored in an alarm buffer.

1

2

	Ref.-No.
KNX Radio-controlled converter	**2700 AP**
ETS-product family:	Communication
Product type:	Radio

3

The radio-controlled Converter serves to integrate the JUNG Radio Management transmitters into the KNX system. Radio telegrams from learned transmitters are converted into corresponding KNX telegrams. The data transfer is unidirectional.

The following Radio Management transmitters can be used:

– Hand-held transmitters: Comfort (48 KFH), Standard (48 FH) and Mini (42 FH)

– Wall-mounted transmitters: 40 FW, ..41 F.., ..42 F.., ..44 F..

– Universal Transmitter: FUS 22 UP

– Radio controlled observer: FW 100 WW

Up to 50 channels with different channel functions can be parameterised. A total of 100 memory locations for keys (e.g. hand-held transmitter keys) and devices (e.g. radio controlled observer) are available.

4

Technical data

Supply		**Input**	
Voltage:	24 V DC (+6 V / −4 V)	**Number:**	50
Power consumption:	typical 170 mW	**Transmission:**	radio frequency
Connection:	KNX connection block	**Frequency:**	433,42 MHz
External supply	Only required in the learn resp.	**Modulation:**	ASK (Amplitude Shift Keying)
	clear mode	**Protection:**	IP 20
Voltage:	9 V DC battery block (type 6LR61)	**Behavior at bus voltage drop:** no reaction	
Power consumption:	typ. 140 mW	**Behavior at bus voltage recovery:** no reaction	
		Operation temperature:	−5°C ... +45°C
		Storage temperature:	−25°C ... +70°C

Note: To improve the radio reception, the antenna must be brought outward through the cable support sleeve.

5

Channel functions:

• **Switching** – The function of the left (upper) and the right (lower) push button can be parameterised.

• **Toggling** – Alternating transmission of On and Off telegrams for each push button

• **Dimming** – Dimming steps adjustable / – Telegram repetition and stop telegram possible

• **Shutter/Blinds** – Push button function (Up, Down) and the time between short and long time operation adjustable.
  – Louvres adjustment time can be set.

• **Value transmitter** – Value (0…255) of the left (upper) and the right (lower) push button can be parameterised.

• **Light mood extension** – Number of light mood (1…8) of the left (upper) and the right (lower) push button can be parameterised.
  – Light mood storing function possible

• **Light mood** – Recalling and storing up to 5 light moods with eight outputs each.
  – The object type for switching (1 Bit) or dimming value (1 Byte) can be adjusted per output.

• **Automatic switch** – 1Bit switching or 1Byte value telegrams depending on the adjusted brightness value.
  – Telegram at the beginning and at the end of a detection adjustable.
  – Delay time at the end of detection and immunity time adjustable.

• **Universal Transmitter as switch** – On and Off telegrams according to the received Universal Transmitter telegrams.

5 Operation modes

The radio controlled KNX converter offers three different modes of operation:
1. Service mode: transfer of received radio telegrams to KNX telegrams (normal operation)
2. Learning mode: for teaching in keys and devices
3. Deleting mode: for deleting keys and devices
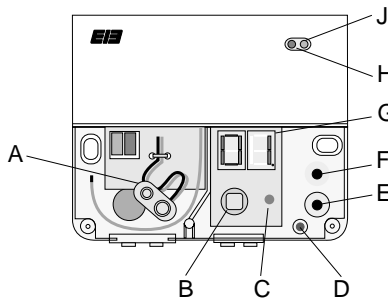
A: Battery-Clip
B: Acknowledge push-button
C: Programming-LED (red)
D: Programming push-button
E: Channel selection (downwards)
F: Channel selection (upwards)
G: Channel and status display
H: Receiving-LED (red): LED flashes when unknown telegams are received
J: Operation-LED (green): LED is on and flashes when known telegrams are received

Switching between the different modes
Changing between the different modes as shown in the diagram. For this purpose, the battery must be connected to clip (A).

Switching between operation mode ↔ Learning mode
– Connect the battery to clip (A) for activating the display (G).
– Press channel selection keys (E and F) simultaneous for approx. 5 seconds. The display will go to '01.', right decimal point being lit.

Learning a new key or a new device:
– Set desired ETS channel number with the channel selection keys (E and F).
– Actuate radio controlled transmitter until display reads 'LE' (learned).
   (Actuation time: between 1s (for channel keys) and 10s (for All-On or All-Off key)
– To save the key or the device on the ETS channel press acknowledge push-button (B).
   Learning will be indicated by the channel number shortly blinking in display (G).
– The learning process can be cancelled by channel selection keys (E or F).
   To have further devices or keys learned-in, start from the beginning again.
Note: If all 100 memory locations are occupied within the device, the display will read 'OF' (Overflow).

Deleting mode
The deleting mode allows the following operations:
– Delete a key or device of an ETS channel
– Delete all keys or devices of an ETS channel
– Delete the entire memory

Deleting a key or device of an ETS channel
1. Actuate the key or device to be deleted until the associated ETS channel number blinks in the display. Actuation time: between 1 s (for channel keys) and 10 s (for All-On or All-Off key).
2. By pressing the acknowledge key for approx. 3 s, the key or device can be deleted from the memory. During the deleting process, the display will read '- -'. After the completion of the deleting process, the channel number will be displayed.
3. The deleting process can be cancelled by pressing any channel selection key.

Deleting all keys and devices of an ETS channel
1. Select the ETS channel to be deleted with the channel selection keys.
2. By pressing the acknowledge key for approx. 3 s, the deleting process will be initiated. The display will read 'CE' (Clear Entry).
   After the completion of the deleting process, the ETS channel will reappear in the display.

Deleting the entire memory
1. By pressing the acknowledge key for approx. 3 s, the deleting process will be initiated.
   The display will read 'AC' (All Clear).
   After the completion of the deleting process the display will read '00'.
To return to the service mode after the deleting process, remove the battery.
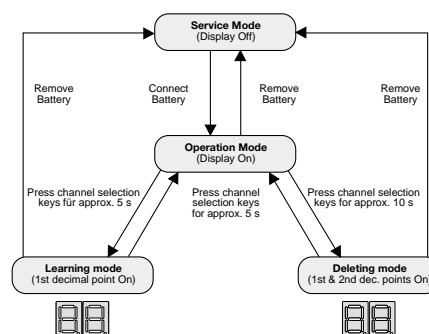
1

2

	Ref.-No.
KNX IR-Gateway	**A 2800 IR ..**
ETS-product family:	Communication
Product type:	Infrared

3

The KNX IR-Gateway is a device for the transmission and reception of IR signals.

As a receiver, the gateway converts the IR signal codes received from standard remote controls into KNX telegrams. As a transmitter, the KNX commands are converted into IR codes so that TV, HIFI, video or other IR-receiver-equipped devices within reach can be controlled. Both applications can also be combined.

In this way, existing consumer electronics equipment or IR-controllable lighting systems can be integrated into intelligent building automation systems and remote-controlled from other rooms, too.

The IR components can moreover be integrated into different scenes or presence simulations. A large number of commercial IR remote controls can be programmed to work with the IR-Gateway. For perfect operation, the remote controls must, however, comply with the RC-5 standard. In this standard, each signal key of the remote control activates a distinct IR signal code which can be understood by the IR-Gateway.

Programming of individual IR signals and the allocation to existing bus channels is effected simply triggering the sensor or actuator function on the bus side and by local actuation of the device itself. In this way, the user can always adapt the IR remote controls with minimum effort to the IR-Gateway.

The KNX channels and thus the link with the electrical installation are predefined in the ETS before commissioning.

The max. 32 bidirectional bus datapoints can be parameterised for the following functions:

"Switching (1 bit)", Dimming (4 bits)", or "Value (1 byte)".

In the switching and dimming functions, up to 2 IR signals respectively can be programmed (e.g. key A: "On" / key B: "Off" or key C: "Increase brightness" / key D: "Reduce brightness").

With the value transmission function, a distinct 1-byte value can be assigned to an IR signal. In the IR transmitter function, the programmed IR signals can be transmitted cyclically several times.

4

Technical data

KNX supply
Voltage:	21 – 32 V DC (via BCU)
Power consumption:	typ. 300 mW
Connection:	bus connecting and branching terminal
Response to voltage failure:	No reaction, IR communication no longer possible.
Response to return of voltage:	No reaction. The operating mode corresponding to the position of the slide switch or of the reset potentiometer is executed.

Infrared
Number of IR codes:	Max. 32 codes programmable for "Value" function
	Max. 64 codes programmable for "Switching" or "Dimming" functions
Coding:	In accordance with RC-5 standard (bit-phase coding)
Modulation:	ASK with 20 ... 70 kHz carrier frequency
Wavelenght of IR light:	920 ... 970 nm
Range:	approx. 10 m for a horizontal aperture of 30° from sensor centerline

4

Technical data

Protection: IP 20
Mark of approval: KNX
Ambient temperature: –5°C ... +45°C
Storage temperature: –25°C ... +70°C (storage above +45°C results in shorter lifetime)
Mounting position: Slide switch at the bottom
Minimum spacings: none
Fastening: Plug on flush-mounted BCU (BCU 2), included

5

Description of software application:

Objects

Number of addresses: 32
Number of assignments: 32
Communication objects: 32

Object	Name	Function	Type	Flag
Function: Switching (1 bit)*				
0 – 31	Channel 1 to 32	Switching	1 Bit	C, W, T (R)**, A
Function: Dimming (4 bit)*				
0 – 31	Channel 1 to 32	Dimming	4 Bit	C, W, T (R)**, A
Function: Value (1 byte)*				
0 – 31	Channel 1 to 32	Value transmitter	1 Byte	C, W, T (R)**, A

 * : Each channel can have its own function assigned independently. Therefore, also the visible objects change dynamically.
** : Objects marked (R) permit read-out of the object status (set R flag).
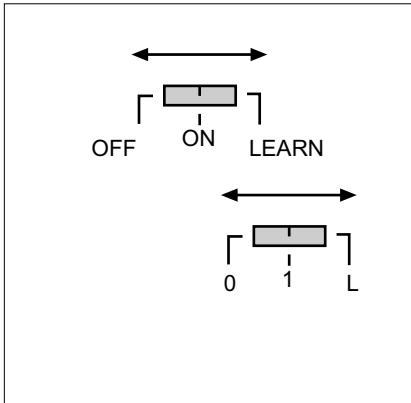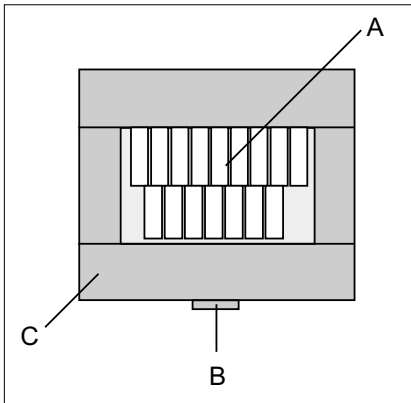
A : IR window with LED status display:

Red static: Charging of energy storage capacitor in progress.
The device is not ready for operation. Please wait!

Red flashing: Device is deactivated. Slide switch in position "OFF" or error during programming (learning mode).

Green static: Learning mode is active.

Green flashing: Learning mode automatically aborted (no input for more than 2 min during active time). Device without function.

Orange (flashing once briefly):
 In normal mode: IR signal transmission (can be enabled via parameter).
 In learning mode: IR signal is now programmed.

Orange static: Erase mode active. Device is without function.

B : Slide switch:
 – Pos. "ON": Normal operation   IR/bus conversion possible.
 – Pos. "OFF": Off   No IR communication. IR window flashes red.
 – Pos. "LEARN": Learn mode   IR signals can be programmed.
      No IR/bus conversion possible.

C : Reset potentiometer (at the rear)

5

Note:

- The IR-Gateway must only be used on BCU 2 bus coupler, supplied with the device. Installing the IR-Gateway on other flush-mounted bus couplers (BCU 1) results in a malfunction.

- As the IR-Gateway needs more energy during the transmission of IR signals and as the bus coupler can supply only a limited current, the device is equipped with an energy storage capacitor (Gold-Cap). This storage capacitor must be recharged after initial commissioning and after a prolonged bus voltage failure (> 5 h). During the recharging phase, the device is not ready for operation and the IR window shines permanently red. After a recharging time of approx. 10 minutes, the energy storage capacitor is recharged. After recharging, a prolonged and trouble-free operation is ensured.

- If he IR-Gateway is withdrawn from the bus coupler for a prolonged time (> 5 h), the slide switch should be moved to position "OFF". In this case, unnecessary discharging of the energy storage capacitor can be avoided.

- Transmission range reductions must be expected, if the batteries of the used and programmed IR transmitters (e.g. TV remote control) are weak or discharged.

- IR transmissions use frequencies on a non-exclusive basis. This means that IR transmissions from other transmitters that are not programmed into the gateway can cause malfunctions or make the recognition of programmed IR signals impossible.

Choosing the place of installation

The place of installation sould be chosen in such a way that the optimal communication range can be achieved in operation.
For proper functioning, the IR-Gateway needs visual contact with the IR devices (e.g. audio equipment) to be controlled and with the IR remote controls from which commands are transmitted to the gateway.
For this reason, the place of installation is to be chosen such that
– the IR-Gateway can be easily aimed at with an infrared remote control in operation,
– the visual contact between the gateway and the devices to be controlled is not restricted by objects, pieces of furniture, curtains, etc.
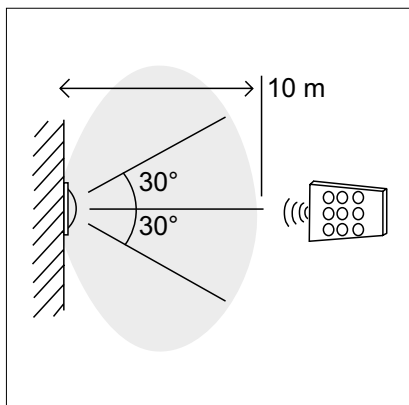
The range (approx. 10 m) is optimal within an angle 30° (from the median line).
Even greater distances and angles can be achieved when transmitter and receiver are arranged in a straight line. The same applies, if the IR light can be reflected from walls or pieces of furniture in the room.
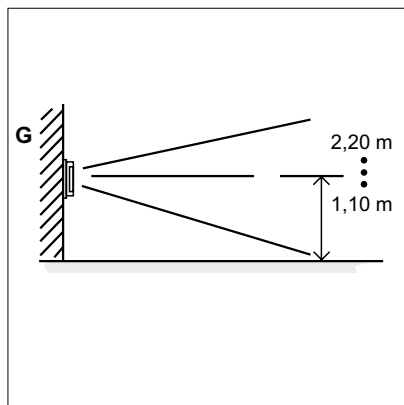
The gateway can be installed at hand level (1.10 m), but also at a height of 2.20 m.
The range is reduced
- outside the specified boundaries,
- when the IR remote control batteries are weak or discharged.

Communication
Bluetooth Gateway

1
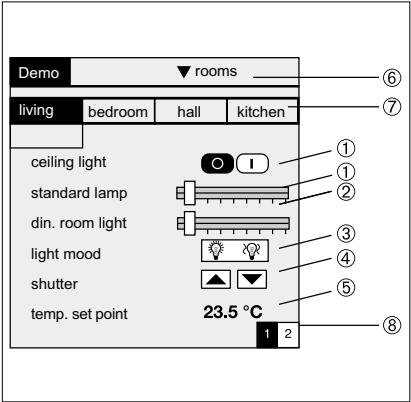
ABG 2041 WW

LSBG 2041 WW

ESBG 2041

Operating elements

① Switching: 1 = switch, 0 = switch off
② Dimming: 0 ... 100%
③ Light scene : Activated by pressing button
④ Blinds: UP/DOWN: long or short operation
⑤ Temperatures: Display of setpoint or actual values
⑥ Toggling between display of rooms, functions or messages
⑦ Selection of the required room
⑧ Further page(s) with further control options

2

	Ref.-No.
KNX Bluetooth Gateway	
ETS-product family:	Communication
Product type:	Radio
ranges CD 500/CD plus	
ivory	**BG 2041**
white	**CDBG 2041 WW**
blue	**CDBG 2041 BL**
brown	**CDBG 2041 BR**
grey	**CDBG 2041 GR**
light grey	**CDBG 2041 LG**
red	**CDBG 2041 RT**
black	**CDBG 2041 SW**
ranges LS 990/LS plus/Stainless Steel/Aluminium/Anthracite/Gold/Chrome	
ivory	**LSBG 2041**
white	**LSBG 2041 WW**
light grey	**LSBG 2041 LG**
Metal versions	
stainless steel	**ESBG 2041**
aluminium	**ALBG 2041**
anthracite	**ALBG 2041 AN**
gold coloured	**GOBG 2041**
chrome	**GCRBG 2041**
ranges AS 500/A 500/A plus	
ivory	**ABG 2041**
white	**ABG 2041 WW**
aluminium	**ABG 2041 AL**

2

Up to 8 terminal devices

JUNG – ACCESS
BT – Gateway
Version 0.1
Initialisierung
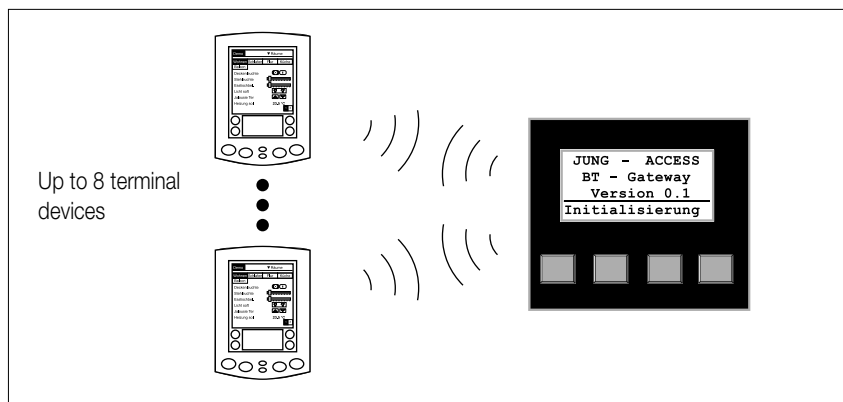
Bluetooth®

Bluetooth® wireless communication links a wide variety of devices without any cables over short distances and transfers speech, data and images so that cable connections can be completely replaced over these distances.

3

The Bluetooth Gateway allows the wireless control and visualization of KNX projects.

It is possible to switch or dim lightings, call-up and store light scenes, control shutter or blinds or to display and shift 2 Byte values (e.g. room temperatures).

The KNX project can be controlled via a hand held computer (PDA, **P**ersonal **D**igital **A**ssistant) taught into the Bluetoth Gateway with a special software.

The following end devices will be supported:
– PDA of the product family "Palm Tungsten T" with operation systems OS v 5.0; Palm Treo
– Pocket-PC with operation system Microsoft Windows, Version "Windows Mobile 2003" (WinCE) with Bluetooth linking-software of company "Widcom" or "Broadcom" (Fujitsu-Siemens Pocket L00X, A SUS Mypal, HP iPAQ hx 4700/hx 4705, HPI PAQ hx 2750 with Windows Mobile 2003 SE, HP iPAQ vx 3115).

For the time being, the software of the Bluetooth Gateway is under development to match the latest operation systems of modern **Windows based** PDA's!

Up to 8 end devices can be taught into the Bluetooth-Gateway. Vice versa the application software of an end device can act on up to 7 gateways.

In general only one connection to an end device or to a gateway can be active.

The operation push-buttons and the display ease the teach-in process and allow further adjustments at the Bluetooth-Gateway.

The user interface of the application software depends on the programming of the gateway by the ETS plug-in.

In the ETS up to 8 rooms and up to 8 functions can be assigned.

After an end device has been taugth into the gateway and connected for the first time, the KNX configuration will be downloaded to the end device automatically.

With any further connection, the end device recognises any update of the device configuration within the gateway and activates a balancing automatically.

During an active connection, the data received from the KNX will be transferred to the end device. Vice versa actions from the end device will be sent to the bus. The possibility of changing values at the end device can be locked within the ETS plug-in.

While starting a connection by the end device, the actual bus data will be aligned in the gateway, this way the end user always has the correct and topic conditions. In addition, depending on the parameterisation, the Bluetooth Gateway can read out the topic status of the data points after bus voltage recovery.

The operation at the gateway can be locked by a 6 digit PIN number.

For the communication between gateway and end device the "frequency hopping" transmission is used in order to avoid any disturbances by other radio systems.

The Bluetooth transmission between gateway and end device is coded (up to 128 bit). The coverage is up to 10 meter (free field) and is basically defined by the used hand held computer.

4

Technical data

KNX supply
Voltage: 21 – 32 V DC (via BCU)
Power consumption: typ. 300 mW
Connection: bus connecting and branching terminal
Response to voltage failure
Bus voltage only: No Bluetooth communication possible.
The end device announces failure and shuts down communication.

Response to return of voltage
Bus voltage only: A Bluetooth connection can be established. A connection shut down by voltage failure will **not** be reestablished automatically. During establishing of a connection by the end device, the read out status will be adjusted.

Bluetooth
Specification: Bluetooth Version 1.1 (IEEE 802.15.1-2002)
Transmission Mode: ISM-Band 2.4 ... 2.4835 GHz (licence free)
Frequency: Modulation: Gaussian Frequency Shift Keying (GFSK)
Frequency-Hopping acc. to Bluetooth-Standard with 79 channels
Spread Spectrum (FHSS)

4

Technical data

Frequency:	Modulation: Gaussian Frequency Shift Keying (GFSK)
	Frequency-Hopping acc. to BluetoothStandard with 79 channels
	Spread Spectrum (FHSS)
Transmitting power:	Controlled transmitting power
	max. 2.5 mW (class 2) (→ coverage max. 30 mm freefield)
	max. 10 m freefield using end devices of Class 3– (1 mW / e.g. PDA)
Security mode:	2
Protection:	IP 20
Mark of approval:	KNX
Ambient temperature:	–5°C ... +45°C
Storage temperature:	–25°C ... +70°C (storage above +45°C results in shorter lifetime)
Mounting position:	any
Minimum spacings:	none
Fastening:	Plug on BCU

Note:

• The Bluetooth Gateway must be used only with its accompanying BCU.
  This is a special BCU for devices with higher power consumption (2 bus loads).

5

Description of software application:

Objects

Number of addresses:	77	
Number of assignments:	200	
Communication objects:	77	

Object	Name	Function	Type	Flag
Function: Switching				
0 – 69	Object 0 – 69	–	1 Bit	C, W, T (R)*, status**
Function: Dimming value transmitter				
0 – 69	Object 0 – 69	–	1 Byte	C, W, T (R)*, status**
Function: Shutter/blinds				
0 – 69	Object 0 – 69	–	1 Bit	C, W, (R)*
Function: Light scene extension				
0 – 69	Object 0 – 69	–	1 Byte	C, W, (R)*
Function: Value indication				
0 – 69	Object 0 – 69	–	2 Byte	C, W, T (R)*, status**
Function: Alarm message				
0 – 69	Object 0 – 69	–	1 Bit	C, W, T (R)*
Function: Alarm message acknowledgement				
0 – 69	Object 0 – 69	–	1 Bit	C, W, T (R)*
Function: Alarm message after removal of application module				
0 – 69	Object 0 – 69	–	1 Bit	C, W, T (R)*

* : Objects marked (R) permit read-out of the object status (set R flag).

** : If the status inguiry is released, the object value will be read after bus voltage recovery (Value read). An answer (Value response) will be processed, stored and leaded to the end-device in case of an active connection, If no answer will be received (Na value response) the object value stays "OFF" resp. "0".

1
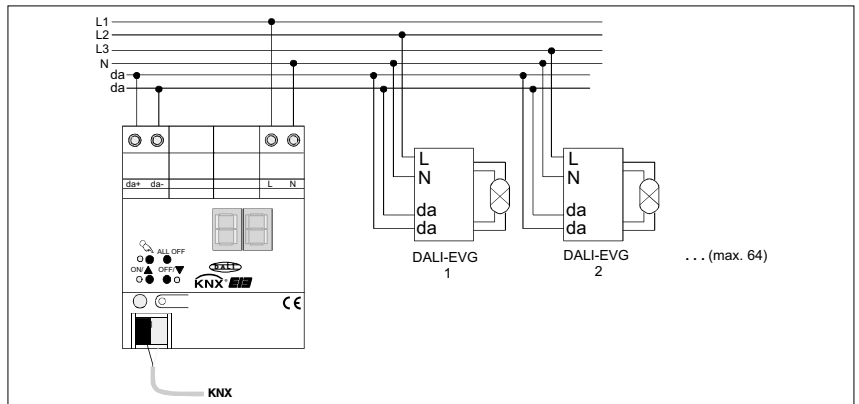
2

	Ref.-No.
KNX DALI-Gateway	**2097 REGHE**
ETS-product family:	Illumination
Product type:	Dimmer
Series embodiment (SE)-device (4 units)	

3

The DALI-Gateway serves as an interface between a KNX installation and a digital DALI (**D**igital **A**ddressable **L**ighting **I**nterface) lighting system.

The DALI-Gateway allows switching and dimming of max. 64 lamps with a DALI ballast.

Each lamp can be assigned into up to 32 different lighting-groups. This way, the integration of a room orientated lighting control for e.g. open-plan offices, multi-purpose rooms, factory floors and training class rooms into the KNX is possible.

The lighting groups can be integrated in up to 16 light scenarios in order to call up or save different light scenes.

A separate acknowledge of all single switching status and the brightness values is possible.

General DALI operation conditions such as failure, short circuit and supply voltage can be reported to the bus.

For a quick functional check, all lighting groups can be operated manually (switching and dimming) by means of the 4 push-buttons on the device, even without bus-voltage or programming

The DALI-Gateway will be configured by an ETS 3 embedded plug-in. It is recommended to use the ETS 3.0d version.

4

Technical data

KNX supply
Voltage: 21 – 32 V DC (SELV)
Power consumption: typ. 150 mW
Connection: Bus terminal (KNX Type 5.1)
External supply

Voltage: 110 ... 240 V AC +10 %/–15 %, 50/60 Hz
Power consumption: approx. 6 W
Connection: Screw terminals: 0.5 – 4 mm^2 solid or finely stranded conductor without wire end sleeve
0.5 – 2.5 mm^2 finely stranded conductor with wire end sleeve
Stud torque max. 0.8 Nm
Total power loss: max. 3 W
Behavior at bus voltage drop: Depending on parameter
Behavior at bus voltage recovery: Depending on parameter

DALI
Voltage: typ. 16 V DC, with over-voltage protection
Current: typ. 128 mA, max. 200 mA short term rated for max. 64 DALI-devices á 2 mA
with short-circuit and overload protection
Transfer rate: 1200 bit/s
Protocol: Acc. to DIN EN 60929, E4

4 Technical data

Cable length between gateway and all ballasts

Ø 1.5 mm²:	max. 300 m
Ø 1.0 mm²:	max. 238 m
Ø 0.75 mm²:	max. 174 m
Ø 0.5 mm²:	max. 116 m
Characteristic impedance:	max. 4 Ω (single length) / max. 8 Ω (return line)

Protection:	IP 20
Safety class:	III
Mark of approval:	KNX
Ambient temperature:	–5°C ... +45°C
Storage temperature:	–25°C ... +70°C (storage above +45°C results in shorter lifetime)
Mounting position:	any, recommended: output terminals on top
Minimum spacings:	none
Fastening:	on DIN rail 35 x 7.5

5 Description of software application:

- Control of max. 64 DALI devices in max. 32 groups.
- Independent hand-operation of the outputs.
- Acknowledge of DALI failure status, short-circuit and failure of supply voltage.
- Central switching function.
- Acknowledge switching: active (at changing or cyclically) or passive (object can be read out).
- Adjustment of brightness limits.
- Dimming behaviour can be adjusted.
- Soft-On or soft-Off-function.
- Inhibit or alternatively forced position function per group. During inhibit function the blinking of the connected lighting groups is possible.
- Time-functions (Switch On/Off delay, stair-case function – also with advance warning).
- Integration of the lighting groups in up to 16 light scenarios.
- DALI commissioning with ETS plug-in.

Objects

Number of addresses:	254
Number of assignments:	255
Communication objects:	216

Superior channel objects:

Object	Name	Function	Type	DP-Type	Flag
Function: Scenario					
⊡⌐ 208	Light scene extension	Scenario	1 Byte	18.001	C, W, –, (R)[1]
Description:	1 Byte object for calling-up or storing scenarios.				
Function: DALI-functional monitoring					
⊡⌐ 210	Acknowledge	DALI-failure status	1 Byte	---	K, S, Ü, (R)[1,2]
Description:	1 Byte Object for the transmission of the failure status of DALI devices to the bus.				

The bits are used as follows:

Bit 0 … 5:	Number of the DALI device (0 … 63)
Bit 6:	Lamp failure (0 = no failure, 1 = failure)
Bit 7:	Ballast failure (0 = no failure, 1 = failure)

This object can, independent of the parameter setting for the ACK, always also receive telegrams (Value Write).
A received telegram will be answered by that object directly (Value Write). The topic internal status will be sent out.
In the inquiry telegram, the Bits 0 … 5 must include the number of the DALI device. Bits 6 and 7 must be set to "1".
Otherwise the inquiry telegram will be ignored.

Object	Name	Function	Type	DP-Type	Flag
Function: DALI-functional monitoring					
⊡⌐ 211	Report	DALI voltage failure	1 Bit	1.005	C, –, T, (R)[1]
Description:	1 Bit object for reporting a net-voltage failure at the DALI-Gateway.				
	(Voltage ok = 0, voltage failure = 1)				

[1] : Objects marked (R) permit read-out of the object status (set R flag).

[2] : Depending on the parameter, acknowledge objects are either active (T-Flag set) or passive and can be read out (set R-Flag).

5

Object	Name	Function	Type	DP-Type	Flag

Function: DALI-functional monitoring

☐↵ 212   Report   DALI short circuit   1 Bit   1.005   C, –, T, (R)[1]
Description: 1 Bit object for reporting a short-circuit on the DALI wiring.
(no short-circuit = 0, short-circuit = 1)

Function: Central function

☐↵ 213   Switching   Central function   1 Bit   1.001   C, W, –, (R)
Description: 1 Bit Object for central switching of all assigned DALI groups. Polarity adjustable.

Function: Hand-operation

☐↵ 214   Inhibit   Hand-operation   1 Bit   1.003   C, W, –, R[1]
Description: 1 Bit Object for inhibiting the push buttons. Polarity adjustable.

Function: Hand-operation

☐↵ 215   Status   Hand-operation   1 Bit   1.002   C, –, T, R[1]
Description: 1 Bit Object fort the status of hand-operation. Object "0": hand-operation deactivated (bus-operation).
Object "1": hand-operation activated.

Channel objects:

Function: Output-switching

☐↵ 0, 7, 14, … , 105,
112, 118, …,
202   Group 1 … 32   Switching   1 Bit   1.001   C, W, –, (R)[1]
Description: 1 Bit object for switching a DALI group On/Off
("1" = On / "0" = Off).

Function: Relative dimming

☐↵ 1, 8, 15, … , 106
113, 119, …,
203   Group 1 … 32   Dimming   4 Bit   3.007   C, W, –, (R)
Description: 4 Bit object for dimming of a DALI group.

Function: Absolute dimming

☐↵ 2, 9, 16, … , 107
114, 120, …,
204   Group 1 … 32   Brightness value   1 Byte   5.001   C, W, –, (R)
Description: 1 Byte object for an absolute value (brightness value 0 … 255).

Function: Acknowledge absolute dimming

☐↵ 3, 10, 17, … , 108
115, 121, …,
205   Group 1 … 32   ACK brightness value   1 Byte   5.001   C, –, T, (R)[2]
Description: 1 Byte object for ACK of an adjusted dimming value.(0 … 255)

Function: Acknowledge switching

☐↵ 4, 11, 18, … , 109
116, 122, …,
206   Group 1 … 32   Acknowledge switching   1 Bit   1.001   C, –, T, (R)
Description: 1 Bit object for ACK of the switching status
("1" = On / "0" = Off).

Function: Stair-case function[3]

☐↵ 5, 12, 19, … ,
110   Group 1 … 16   Stair-case function
start / stop   1 Bit   1.010   C, W, –, (R)
Description: 1 Bit object for activation or deactivation of the switch-on time of the stair-case function
("1" = On / "0" = Off).

[1]: Objects marked (R) permit read-out of the object status (set R flag).

[2]: Depending on the parameter, acknowledge objects are either active (T-Flag set) or passive and can be read out (set R-Flag).

[3]: The stair-case function is available for the first 16 groups only.

5	**Object**	**Name**	**Function**	**Type**	**DP-Type**	**Flag**

Function: Inhibit

☐↵ 6, 13, 20, … , 111
117, 123, …,

	207	Group 1 … 32	Inhibit	1 Bit	1.003	C, W, –, (R)[1]

Description: 1 Bit object for inhibiting of a group (Polarity adjustable).

Function: Forced position

☐↵ 6, 13, 20, … , 111
117, 123, …,

	207	Group 1 … 32	Forced position	2 Bit	2.001	C, W, –, (R)

Description: 2 Bit object for the forced position of an output. Polarity given by the telegram.

[1] : Objects marked (R) permit read-out of the object status (set R flag).

1

A programming LED (red)
B programming button
C a/b trigger input (e.g. extension output of a telecommunication system for analog terminals)
D RS 232 (V.24) interface for connection of an external modem
E LAN connection RJ45 socket
F connection for local bus (reserved for future applications)
G terminals for connection of external power supply

Power (green): Permanently lit up after initialization when the supply voltage is present.

Online / Modem (yellow): Signals an active Internet connection via the modem (RS232)

Link / LAN (yellow): Lit up in case of an existing link with the LAN (link with an Ethernet connection point as, for instance, a hub or a switch (straight) or a PC (cross). Flickers during the transmission of data via the LAN.

2

	Ref.-No.
KNX IP Central unit	**IPZ 1000 REG**
ETS-product family:	Communication
Product type:	IP
Series embodiment (SE)-device (8 units)	

3

The IP central unit is the interface between an Ethernet (LAN = **L**ocal **A**rea **N**etwork) and the KNX. With the help of an Ethernet connection, the user has access to his intelligent building management system via a local PC of his LAN or via the Internet.
The connection with the Internet cannot only be established via an LAN (e.g. in conjunction with DSL) but also with an analog modem (e.g. V.90 56K) or with an ISDN modem (with RS232 interface). The IP central unit can thus be easily integrated into new or already existing home or office networks.
The IP central unit acts as a web server and can be comfortably operated from a browser (Microsoft© Internet Explorer Version 5.5 and higher) as a control, reporting and monitoring unit.
The IP central unit moreover permits user-guided commissioning and configuration by enabling the user to make different settings via the web user interface. The KNX configuration is ensured by an ETS-embedded plug-in.

The central unit can work as a bus system clock by using the standard time supplied by a time server in the Internet. The system clock can work as a central year time switch with astro function and day profiles (scheduler) and as a presence simulator. In addition, the following features are available: logic gates and information function per e-mail, an integrated e-mail address book, central functions and scenes for lighting, HVAC and alarm systems.

4 Technical data

KNX supply (bus terminal)
Voltage: 21 – 32 V DC SELV
Power consumption: typically 150 mW (the bus controller is supplied from the external power supply)
Connection: KNX supply and branch terminal

External supply (screw terminal)
Voltage: 24 V DC SELV (21 – 32 V DC. e.g. via unchoked output of a KNX power supply
Power consumption: typ. 3 W / 6 W max. if the local bus interface is used (at 24 V DC)
Connection: Screw terminals: 0.5 – 4.0 mm^2 single and stranded wire without ferrule
0.5 – 2.5 mm^2 stranded wire with ferrule

Response on bus voltage failure
Bus voltage only: no reaction (IP communication possible / any attempt to change
or to read KNX data points fails)

Supply voltage: no reaction (device shuts off completely)

Response on return of voltage
Bus voltage only: The KNX interface re-initializes itself. Default values as per presetting or
as read out by the bus and updated are assigned to KNX datapoints.

Supply voltage: The devices re-initializes itself (boot procedure starts and lasts a few seconds.
During booting, the green Power LED is off). Default values as per presetting or as read out by
the bus and updated are assigned to KNX datapoints.

LAN
Number: 1
Connection: RJ45 socket (10/100 MBit/s Fast Ethernet) 8-pole
LAN connection: straight with an Ethernet connection point (hub, switch, etc.), crossed with a PC
Protocols: TCP/IP (HTTP to port 80), UDP, POP, SMTP, SNTP, PPP
IP addressing: IP address, sub-net mask, gateway address and DNS server address presettable,
DHCP possible (factory-set to active), autoIP

a/b trigger input
Number: 1
Signal voltage: typ. 30 – 60 V AC (ringing tone signal of analog telephones)
max. $\hat{u}$ = 96 V AC
Signal duration: min. 40 ms
Connection: Screw terminals: 0.5 – 4.0 mm^2 single and stranded wire without ferrule
0.5 – 2.5 mm^2 stranded wire with ferrule

Protection: IP 20
Mark of approval: KNX
Ambient temperature: –5°C ... +45°C
Storage temperature: –25°C ... +70°C (storage above +45°C results in shorter lifetime)
Fastening: snap-fastening on DIN rail (no data rail required)

RS232 (V.24)
Number: 1
Connection: 9-pole sub-D connector (male)
Max. transmission rate: 115.200 kbauds
RS232 connection: A modem is connected by means of an RS232 extension cable (one-to-one wiring).
The length of the connecting cable should not exceed 15 m.

4 Technical data

Processor (LAN)
Type:	Netarm (Netsilicon)
Operating system:	Net OS
Architecture / speed:	32-bit RISC / 46 MHz
Memory:	16 MB RAM
	8 MB Flash
	(internally extendible to 64 MB Flash max.)
	separately buffered RTC (real time clock)
	can be synchronized with Internet time server or with KNX system clock

Communication objects:	Max. 275
	(256 freely available + 3 fixed objects for system clock +
	1 collective object request groups + 15 collective objects)
Group addresses:	transmitting to bus: max. 256
	receiving from bus: max. 250

Internal clock chip
Running reserve:	min. 12 hours
Clock error:	< 2 minutes per month
Power supply:	Gold-Cap capacitor supplied from external 24 V source

5 Hardware description

1. Connections

• Ethernet connection:
If it is intended to connect the IP central unit to a local network (LAN), possibly with a connection to the Internet, or also directly to a PC, an Ethernet link is required. For this purpose, the IP central unit is equipped with an 8-pole RJ45 socket as network interface.
This socket is connected by means of a twisted-pair (TP) cable which – depending on the devices to be connected with one another – must be designed as follows:
– as a one-to-one link cable (patch cable) in case of connection to the 'normal' or auto-MDIX port of a network distributor (e.g. hub, switch, router),
– as a crossover cable in case of direct connection to a PC (point-to-point link).
The Ethernet lines used should correspond at least to the Cat.5 standard. The general guidelines governing the installation of Ethernet lines must be observed.
The IP central unit supports the 10BaseT (10 Mbit) and 100BaseT (100 Mbit) standards.
When the physical connection with a network distributor or a PC is established, the yellow Link / LAN LED on the device front panel lights up when the supply voltage is applied. This LED flickers when data telegrams are being received via the Ethernet interface.
The logic link with the network will be established only after allocation of an IP address. The procedure of allocating an IP address is described in greater detail in chapter 2 "Configuration".

• Modem connection:
Depending on the type of connection, an analog modem or an an ISDN modem with serial RS232 interface can be connected to the IP central unit for Internet dial-in. The connection is made by means of a one-to-one interconnecting cable which should not be longer than 15 m.
As soon as an online link has been established by or with the IP central unit , the yellow Online / Modem LED on the front panel of the device lights up. In this case, the exchange of data is in progress and online or phone call charges are accruing. The modem is controlled by means of internationally standardized AT commands so that a large variety of current modems can be connected. Further configuration settings, especially the definition of the type of modem used, are explained in chapter 2 "Configuration".
The connection of a modem to the local telephone network is manufacturer-specific and the corresponding instructions should therefore be inferred from the documentation supplied with the modem used.

• Telephone connection:
The IP central unit is equipped with an analog telephone trigger input. Depending on the type of connection, this input can be used for triggering an Internet dial-in 'from outside'. This function is useful with time- or volume-based Internet charges (cf. 1.2 "Types of connection").
The IP central unit monitors the signal voltage at the a/b input for a ringing signal. If a ringing signal is detected, the central unit establishes a connection with the Internet via the configured link.
As the ringing signal is only 'overheard' by the unit without answering the call, no call charges are accrued.
There is no calling line identification (CLI) via the a/b terminals. Each call coming in on the connected line is therefore interpreted as a trigger signal. For this reason, the connected analog telephone line should have a phone number of its own. This can be achieved with an independent telephone line or a separate analog extension in a branch exchange.
The telephone line is connected to the IP central unit by means of the screw terminal pair "a/b".

5 Hardware description

The line itself is usually connected to the terminals of a PBX (cf. Fig. 1).

Fig. 1: Connection to the terminal strip of a PBX

For reasons of clarity, the polarity of the line should be observed. On principle, the polarity of an analog telephone line connected to the IP central unit is of no importance.

• Connection of the supply voltage and bus connection:
The IP central unit needs an external supply voltage of 24 V DC for operation. This supply voltage can be derived, for instance, from the unchoked voltage output of a KNX power supply (21 – 32 V DC)
The bus is connected with the bus connection terminal.

2. Network configuration

The main role of the IP central unit is to act as a Web server and to make the contents of its Web pages available to the user. For this purpose, the IP central unit is either integrated into a local area network (LAN) or connected with the Internet via suitable gateways or modems.
The user can then access the Web server of the IP central unit via the Web interface of the browser (Microsoft InternetExplorer 5.5 and higher) installed on his PC. The access to the site and the transfer of the Web pages is enabled by the Hyper Text Transfer Protocol HTTP used all over the world.
By default, this protocol is part of the Transport Control Protocol – Internet Protocol TCP/IP which ensures the safe, hard- and software-independent communication of data worldwide. It is this Internet Protocol which permits combining an undefined number of individual networks (e.g. pivate networks) into a global network (e.g. the Internet). It permits the exchange of data between any two network subscribers in any two private networks (cf. Fig. 2). The physical structure of the networks or the transmission system (Ethernet, DSL, ISDN, etc.) is of no importance. The networks themselves are physically (and most often also logically) interconnected by means of suitable network nodes (routers, modems, bridges).

• Straight LAN connection
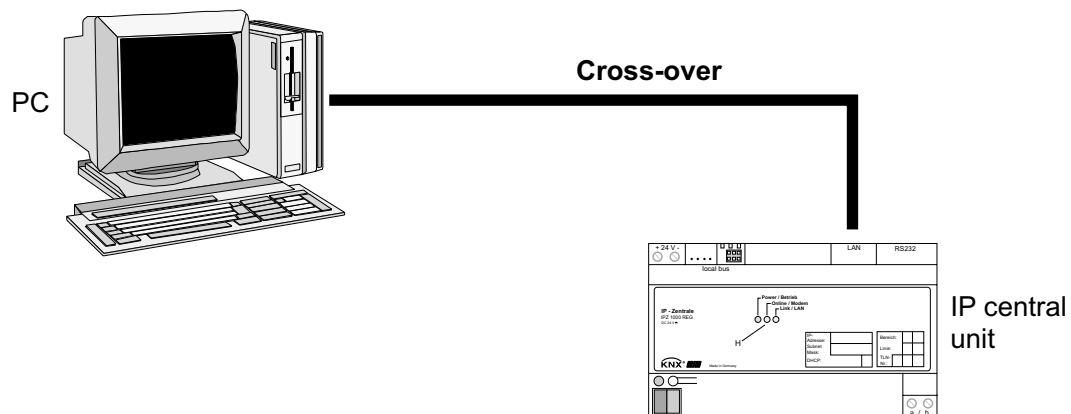
Direct connection of a PC with the IP central unit by means of a **crossover** cable (transmit and receive lines crossed over / special network cable required) In this type of connection, only the PC directly connected with the central unit has access to the device. This connection is recommended for commissioning and testing purposes.

5 Hardware description

• LAN connection with more than one PC via network distributor

PC 1 **Patch cable** e.g. Hub / Switch **Patch cable**

PC 2 **Patch cable**
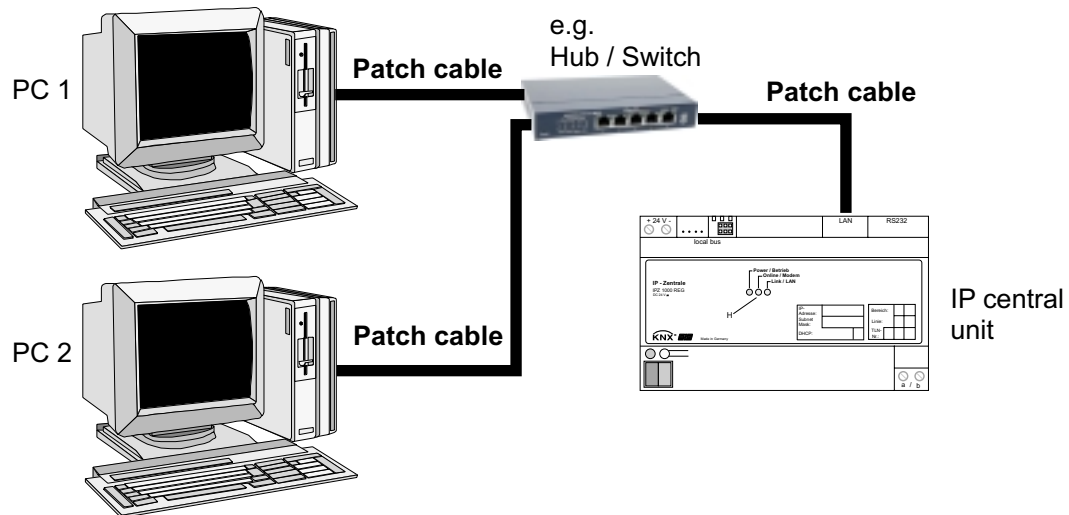
IP central unit

This type of connection permits access to the IP central unit by several PCs of the local area network. The physical connection of the network components is realized by means of one-to-one patch cables.

Information concerning the use of several PCs (clients):

The IP central unit can establish a maximum of 10 IP connections (sessions) at the same time, i.e that a maximum of 10 clients can load data from the central unit (the server) at the same time. It should be noted, that Microsoft's InternetExplorer sometimes launches several logic IP sessions at the same time in order to accelerate the loading process.

In spite of this strategy, the static viewing of a loaded website (no data download) is not dependent on a certain number of sessions.

• LAN connection with permanent connection to the Internet

e.g. DSL Internet

optional PC **Patch cable** Router **Patch cable**

IP central unit
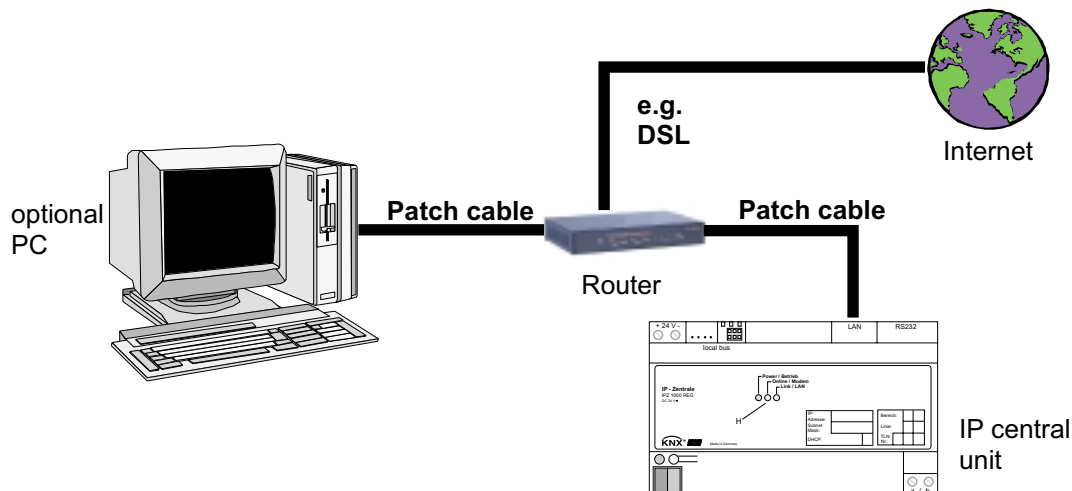
With the help of a router or a proxy server, a local Ethernet (LAN) makes a permanent Internet connection available. This type of connection makes sense, for instance, in case of a DSL flat-rate or a dedicated telephone line for the Internet.

The IP central unit can ensure by means of keep-alive telegrams that the link is not disconnected by the router or the service provider (ISP).

Even after a forced disconnect by the service provider (depending on subscriber rate often after 24 hours of permanent connection) a permanent connection with Internet can thus be be upheld.

The access "from outside" is effected from an external PC with the browser as user interface and by entering the password ensuring user authorization. After successful log-in, the Web page of the IP central unit is displayed. The KNX system can be controlled and monitored by direct access.

To enable the access to the IP central unit from the Internet, the router or the proxy server must redirect external HTTP requests addressed to the IP central unit inside the local area network. For redirection, the NAT (Network Address Translation) function can be used in the router.

In this mode, the router translates HTTP requests from the Internet to the local IP address of the IP central unit. HTTP request are directed to port 80 of the central unit. Further basic notions and configuration settings are discussed in chapter 2 "Configuration".

5   Hardware description

• **LAN connection with Internet dial-in connection after modem request**
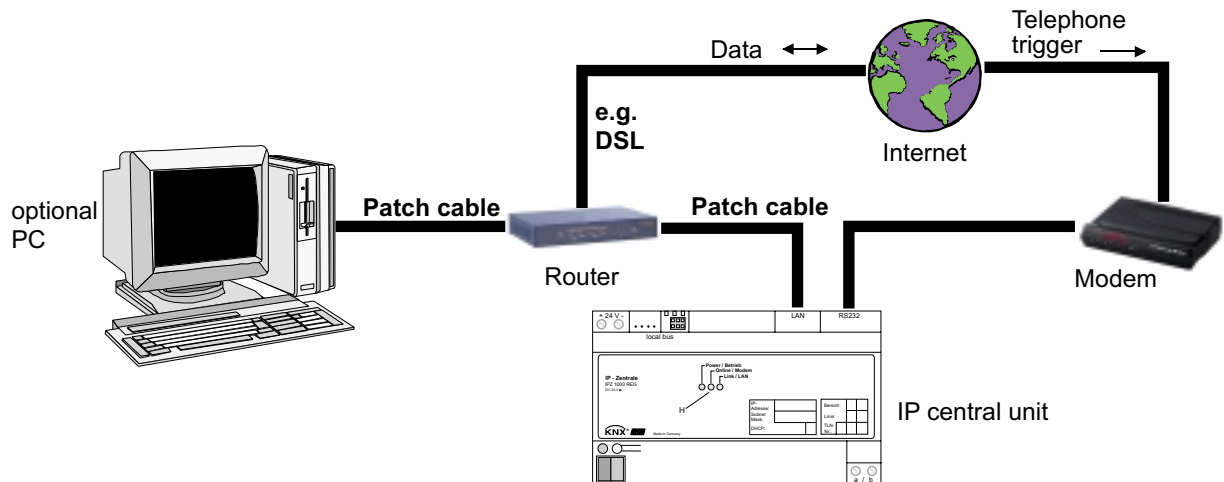
With the help of a router or a proxy server, a local Ethernet (LAN) establishes a connection with the Internet after a modem request.
This type of connection makes sense, for instance, in case of a DSL connection with a time- or volume-based rate.
The trigger call via a modem connection (simple call to the telephone number of the modem) causes the IP central unit to establish a link with the Internet via its LAN interface. As soon as the link is established, the IP central unit can be accessed. The call to the modem does not establish a telephone contact so that no call charges will accrue. The modem simply detects the ringing signal and informs the IP central unit accordingly.
In this case it is recommended to use modems permitting identification of the calling line (CLIP function). The feature can be used as a trigger call authorization function. When the CLIP function is active, only trigger calls from telephone numbers known to the IP central unit will be accepted.
In this case, the transmission of the caller's telephone number must be supported by the telephone line.

• **LAN connection with Internet dial-in after telephone request / triggering**
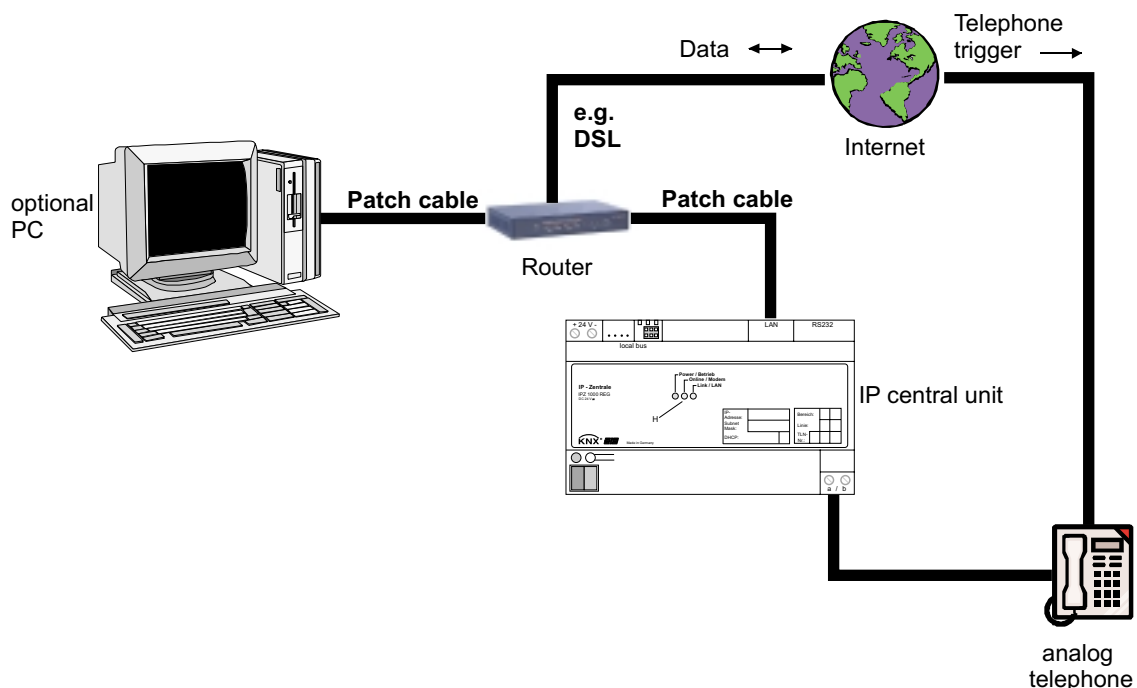
With the help of a router or a proxy server, a local Ethernet (LAN) establishes a connection with the Internet after a telephone request.
This type of connection makes sense, for instance, in case of a DSL connection with time- or volume-based rate.
The trigger call via the analog a-b input causes the IP central unit to establish a connection with the Internet via its LAN interface.
As soon as the connection is established, the IP central unit logs in with the directory server.
The call arriving at the a-b port does not establish a telephone contact so that no call charges will accrue. The IP central unit merely detects the ringing signal at the a-b terminals.
There is no calling line identification (CLI) via the the a/b terminals. Each call coming in on the connected line is therefore interpreted as a trigger signal.
For this reason, the connected analog telephone line should have a phone number of its own. This can be achieved with an independent telephone line or a separate analog extension in a branch exchange.

5

Hardware description

- **Operation with or without LAN connection and Internet dial-in by a modem**
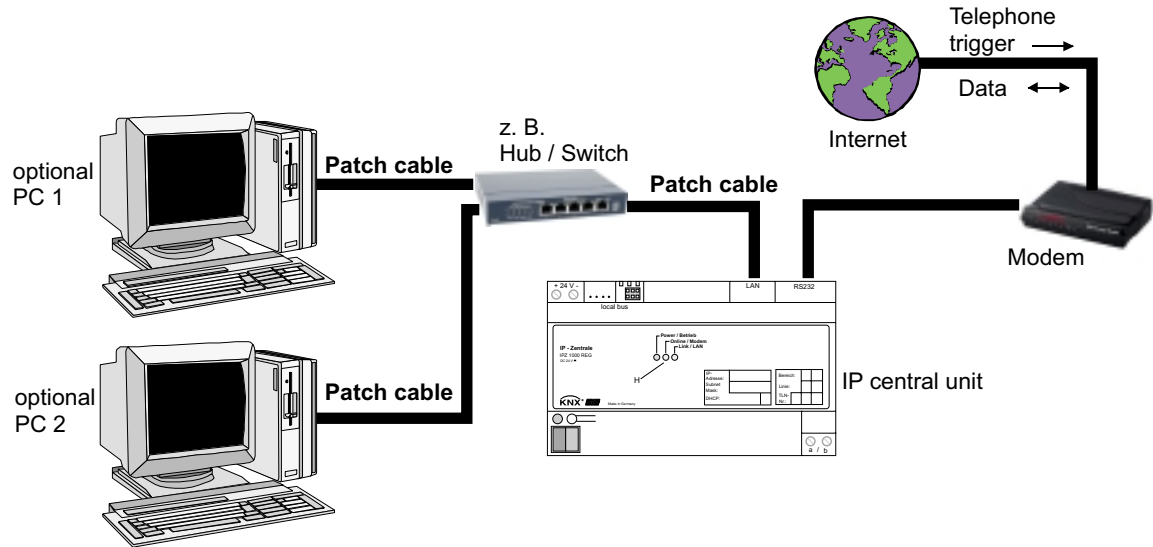
There is no Internet connection via the LAN. If needed, the LAN interface therefore only offers access via PC in the local area network.

The trigger call via a modem connection (simple call to the telephone number of the modem) causes the IP central unit to establish connection with the Internet via its LAN interface. For this purpose, the IP central unit dials in with the specified service provider (PPP: Point-to-Point Protocol) as soon as the trigger call is terminated. As soon as the link is established, the IP central unit can be accessed.

The trigger call to the modem does not establish a telephone contact so that no call charges will accrue. The modem merely detects the ringing signal and informs the IP central unit accordingly.

An Internet dial-in by the IP central via modem causes call charges and – depending on the online use rate – additionally also online charges to arise.

In this case, it is recommended to use modems permitting identification of the calling line (CLIP function). The feature can be used as a trigger authorization function. When the CLIP function is active, only trigger calls from telephone numbers known to the IP central unit will be accepted. In this case, the transmission of the caller's telephone number must be supported by the telephone line.

3. Configuration Settings

The IP central unit is configured by a plug-in integrated in the ETS. The configuration dialog appears after starting the plug-in and after clicking on the button "Configuration" in the righthand menu bar. As an alternative, the device configuration can be activated by selecting the menu item "Device configuration" in the context menu (right mouse click in left-hand tree view) or by clicking on the button in the upper menu bar. The configuration dialog consists of nine pages with parameter settings for the unit that are described in the following sub-chapters.

5

Software description

1. Projecting and ETS plug-in

If the IP central unit is to work as a visualization tool and as an operation or control unit for a KNX system, the device needs precise information about the existing KNX installation. A plug-in specially developed for the IP central unit 'translates' the projecting data into a separate object model which is loaded into the IP central unit. The object model contains all KNX data points and parameter data and acts as the logical interface between the network and the installation bus.
Each IP central unit in the ETS project has its own object model in the ETS database.
The user operates the object model created in the ETS by the systems administrator via the browser interface and has the possibility of changing or of viewing the state of the different data points. A change or an extension of the object model and thus of the data structure as such can only be made in the ETS.
The ETS plug-in of the IP central unit is an integral part of the product database (no external plug-in). The plug-in can be used in the ETS from version 1.3 and in the ETS 3 from version 3.0 onwards. With the ETS 3, the plug-in is installed by a normal import of the product database in the *.VD3 format.
With the ETS 2, the plug-in is installed in two steps, at first by running the installation program in the *.EXE format and by the subsequent import of the product database in the *.VD2 format.
It is basically recommended to install the latest ETS patches available.

Instructions for the use of ETS 2:
Compared to the ETS 3, the plug-in itself and thus the complete projecting and commissioning environment is absolutely identical.
With the ETS 2, only the data of the object model and the device configuration are not stored in the ETS database, but in a separate external file.
When the plug-in is started by opening the parameter menu in the ETS, a dialogue is displayed in which the start options of the plug-in are defined.

By selecting any of the following three options, the object model of the IP central unit is initialized after pressing "OK".

5

Software description

2. The ETS Plug-in

The plug-in is started by opening the parameter view in the ETS. After readout of an existing object model from the specified source or after creation of a new model, the projecting interface of the plug-in is opened.

The projecting interface is divided into four main parts (cf. Fig. 5). The size of each part or of the entire window can be changed at will by clicking and dragging with the mouse.

In the upper left part, the object model is represented in form of a tree structure with all building services, rooms, functional groups, KNX datapoints and linkage functions. The error report is also displayed in this window.

The sector below (B) shows the group addresses existing in the ETS project and read out from the database. A link between the group addresses and the entry fields for KNX datapoints can be established by drag & drop from this part of the window. Changing or deleting of existing group addresses in the plug-in is not possible.

The upper right part of the window (C) contains parameter sets and links of group addresses for the elements selected in the window on the left. The lower right part of the window (D) displays direct help texts describing the marked parameter element in the window above and shows the conflict descriptions of the error report.

5
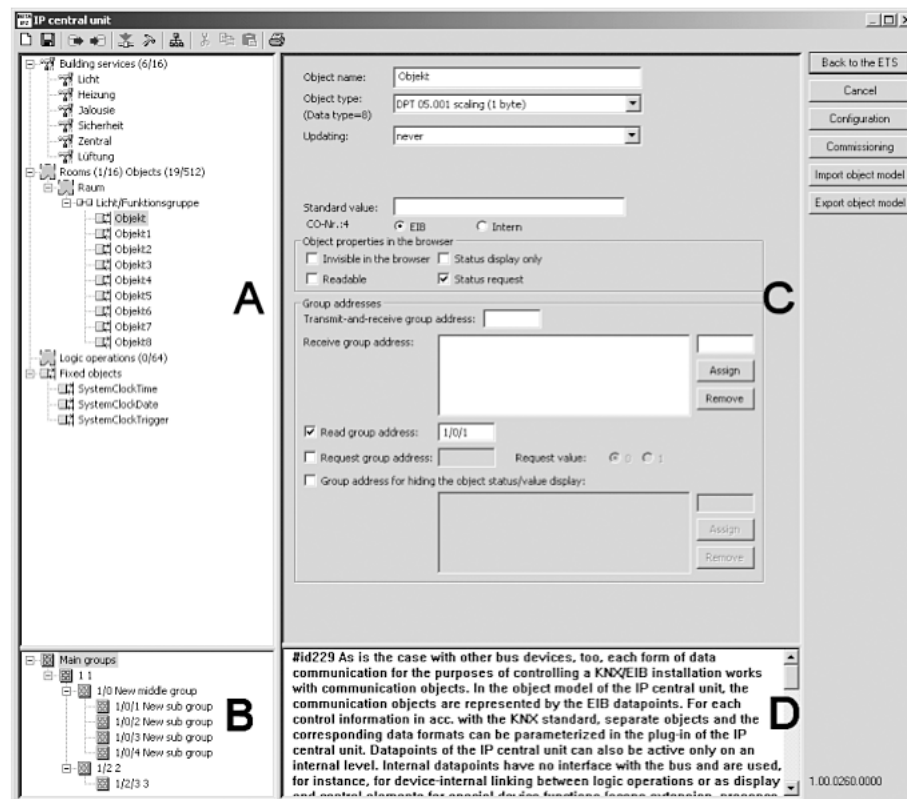
Software description

3. The user interface

The user interface of the IP central unit is operated like any other Internet page. It has graphical navigation, control and display elements that can be selected with the mouse pointer and edited. Text or values are entered by means of the PC keyboard.
Fig. 4 shows the basic view of the user interface in the Web browser after successful user log-in.
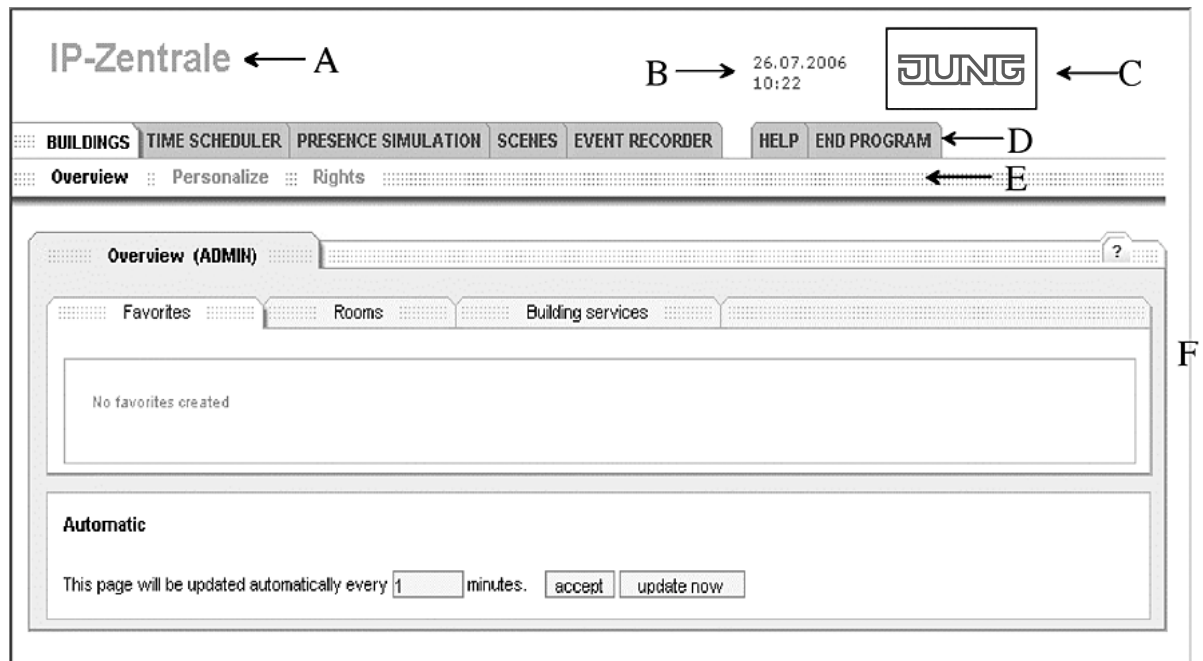
The Web browser window is basically divided in two sections. The upper part contains the information section and the main navigation elements. The lower part contains the workspace.

• Description of the IP central unit in information section (A):
A description of the IP central unit is displayed in the upper right corner of the Web browser. The description is entered in the ETS building or topology view under the properties of the projected IP central unit (double-click or context menu 'Properties') in the "Description" text field. During programming of the IP central unit, this description is stored in the memory of the device and displayed in all views of the Web browser – exactly as specified in the ITS. To avoid any uncontrolled access either by the plug-in or by the gateway browser, this designation should be chosen at the project start under mnemonic aspects.

• Actual system time of IP central unit (B):
The upper line indicates the actual system time at the time when the page is called up. The system time is used internally for the execution of time-controlled sequences. A mouse click on the line displays the settings of the system. As the browser view is static, the displayed time of day is stationary. The actual system time is displayed only after calling up a new page or during a data update.

• Manufacturer's logo (C)

• Main navigation (D):
The main navigation permits selecting the individual applications of the IP central unit. After log-in, the first tab "Building overview Favorites" is displayed.
The following applications are available:
– Buildings
– Time scheduler
– Presence simulation
– Scenes
– Event recorder
– Help

• Subnavigation (E):
Dependent on the selected application in the main navigation (D) and dependent on the respective work step, the subnavigation displays a selection of submenus. These submenus help with further navigation.

• Workspace (F):
The workspace presents the corresponding information about the selections made in the main and the subnavigation.
In the workspace, settings can be viewed and changed.

For more detailed information, please download the complete product description from our web-page !

1
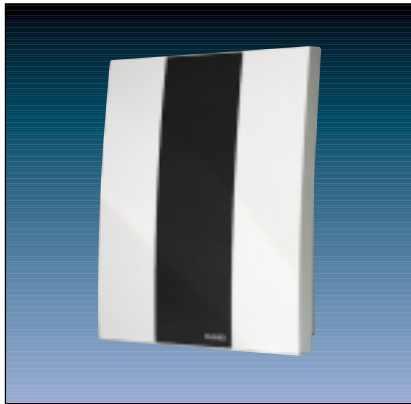
2

	Ref.-No.
KNX Alarm central unit	**EAM 4000**
ETS-product family:	Alarm system
Product type:	Alarm central unit

3

The alarm central unit is a modern alarm system using the KNX system. Detailed knowledge about planning, designing and commissioning of alarm systems are absolutely required.

The alarm central unit is a modern intruder alarm system using the KNX system for the transmission of information. It keeps an object under surveillance and detects and signals intrusion attempts. The system is no substitute for any mechanical safeguarding devices which prevent intrusion into your property.

You can use the alarm central unit as a comfortable extension for any existing KNX installations.

The alarm central unit has been designed in compliance with VdS (German Association of the Damage/Loss Insurers) guidelines.

The functionality of the device is dependent on the parameters of the software application. To install and configurate the software it requires at least the ETS 2 1.2a version.

By using the KNX the additional wiring and cabling effort of a separate alarm system can be reduced to a minimum. This is achieved by using sensors, i.e. movement detector not just purely for lighting control or alarm systems.

4

Technical data

Input supplying
Voltage: 230 V AC, ± 10 %, 50/60 HZ
Power consumption: max. 24 W
Current secondary: max. 50 mA; during changing process approx. 200 mA
Fuses: F1 = T 100 mA (5 V supply of central unit)
F2 = T 100 mA (12 V power supply)
F3 = T 100 mA (supply for telephone dialer)
F4 = T 3.15 A (main fuse 230 V)
F5 = T 3.15 A (protection of accumulator)
Output voltage for alarm device: SELV 12 V DC, ± 2 V
Max. capacity of outputs: Telephone dialer: 100 mA
12 V supply 100 mA
Sirens/flash in total 1.6 A (electronic overload protection)
Capacity of relay: SELV 12 V (AC/DC), 5 A (min. 30 mA)
Storage battery: 12 V / 1.2 Ah
Charge voltage: approx. 13.4 V
Charge current: approx. 150 mA
Supply KNX: SELV 21 V – 32 V
Power consumption: max. 240 mW

Connection
KNX: KNX connection block
mains: screw terminals up to 1.5 mm^2
Spare accumulator: 12 V/1,2 Ah, ref.-no. **DAS 4512**

4   **Technical data**

Protection:	IP 20
Operation temperature:	–5°C ... +45°C
Storing temperature:	–25°C ... +70°C
Dimension:	210 x 270 x 73 mm
Weight:	approx. 1500 g (including accumulator)
Event memory:	min. 80 events per security area
	40 events for each fire and alarm
Length of wires:	to alarm devices: 100 m at 0.8 mm diameter
	to telephone dialer: 200 m at 0.6 mm diameter
	to wired detectors: 200 m at 0.8 mm diameter
	to sabotage line: 600 m at 0.8 mm diameter
Resistance of wired detectors:	max. 1 kOhm

5   **System configuration:**
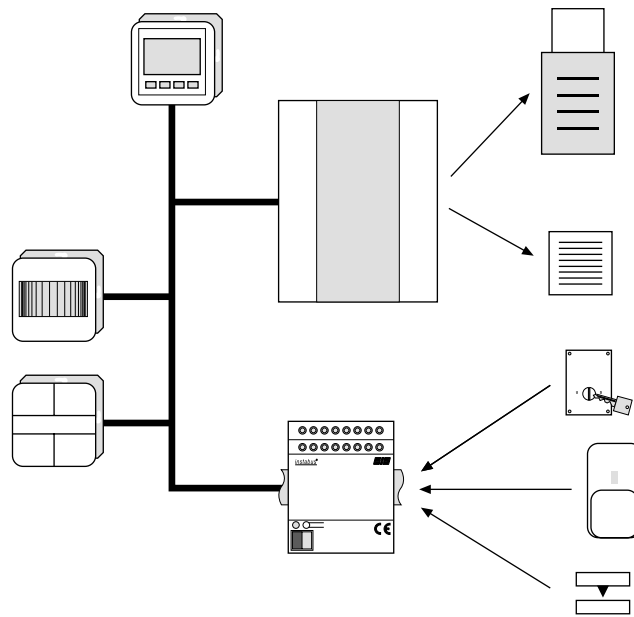
Note: For the planning and programming of the whole system it is absolutely necessary to have the knowledge about alarm systems and the specific terminology as well as a product training on the alarm central unit.

Functional features:

- Up to 160 sensors can be administrated and integrated in up to 4 separate safeguarding areas.
- All sensors are connected via the KNX to the alarm central unit. Hence, the identification and monitoring of all sensors is obtained.
- All events (as arming, alarm, failure) are saved with time and date in a protocol.
- Alarm devices (as siren, flash or telephone dialer) can be connected directly to the alarm central unit or can be controlled via KNX.
- The alarm central unit has an integrated floating storage battery which, in case of mains failure, guarantees a back-up time of approx. 12 hours.
- The displaying and operation is done by external KNX devices like Info Display, push-buttons, etc. In one armd area several operation units can be applied.
- An additional local sensor input can be used to protect the location where the alarm central unit is mounted.
- Furthermore, a relay contact can be used to connect additional alarm devices.

The alarm central unit is developed for different applications. It starts in residential buildings with the protection of the outside body (windows, doors) and the interior and ends in office buildings, whereby up to 4 different security areas can be defined and protected separately or linked together.

5 Alarm system configurations:

Due to many different parameterisation options, the KNX alarm central unit can be used in various objects – from the detached family house with outer shell and inner room safeguarding up to the office building where up to four arming areas (AA) can be safeguarded individually or in groups linked up with one another.

The following list shows the basic configurations which may also be combined with one another:

1 x inner room, 1 x outer shell (nested)*:
Detached family house, flat.
(AA1 = outer shell, AA2 = inner room;
AA 1 can be armed individually or together
with AA2).

AA1	AA2
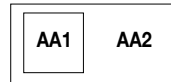
2 x [1 x inner room, 1 x outer shell (nested)*]:
Two-family house, house with granny flat,
2 separate safeguarding areas (workshop with flat).

AA1	AA2	AA3	AA4
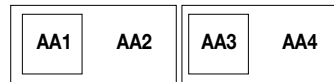
Up to 4 separate areas:
Shopping arcade, holiday houses, hotel/pension,
trade fair/exhibition halls.

AA1	AA2	AA3	AA4
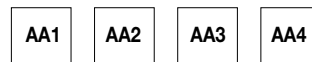
Up to 4 separate areas (cascaded):**
Office/industrial building, sports hall.
(AA4 only to be armed if AA1 to AA3 have
already been armed).

AA1	AA2	AA3	AA4
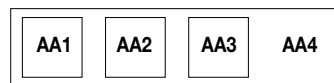
*   nested: The subordinate area is armed together with the higher-order area.
** cascaded: The higher-order area can only be armed if the subordinate areas have already been armed.

Fire and attack detectors:

Regardless of the configuration of the system, the fire and attack areas are always active. If a fire or attack detector is activated, the system will immediately set off an alarm, regardless of what its state is.
As a special variant, the alarm central unit can also be solely used for "attack" and "fire".

Security
Accessories

1

DAS 4110

DAS 4120

2601

2

	Ref.-No.
Outdoor siren with flash light	**DAS 4110**
Rated voltage: 12 V DC	
Protection: IP 34	
Indoor siren	**DAS 4120**
Rated voltage: 10 – 28 V DC	
Protection: IP 32	

TC Plus KNX analog	**2601**
(more details please refer to pages 217/218)	

1

DAS 4610

FUS 4620

2

	Ref.-No.
Automatic alarm dialer, Digital	**only on special request**
The digital automatic dialer provides a silent transmission	
of an alarm or malfunction to a permanent available security service.	

Automatic alarm dialer, Analog	**FUS 4620**
The analog automatic dialer provides a silent transmission	
of an alarm or malfunction.	
4 alarm inputs	
4 outputs to be switched via phone	

1

DAS 4300 A

DAS 4210

2

	Ref.-No.
Surface mounted key switch,	**DAS 4300 A**
For activating and deactivating of alarm systems	
Front plate material: Pressure casted aluminium	
Flush-mounted key switch	**DAS 4300 U**
Front plate material: Lost-wax casted aluminium	
(profile cylinder lock is not included!)	
Movement detector	**DAS 4210**
Passive infrared detection principle	
Detected area: 90° (volumetric)	
34 double zones in 3 levels	
Maximum detected area approx. 15 x 5 m	

1
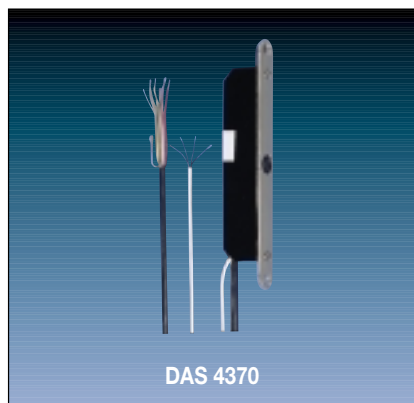
DAS 4370
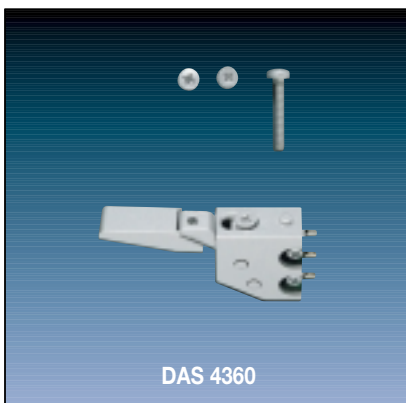
DAS 4360
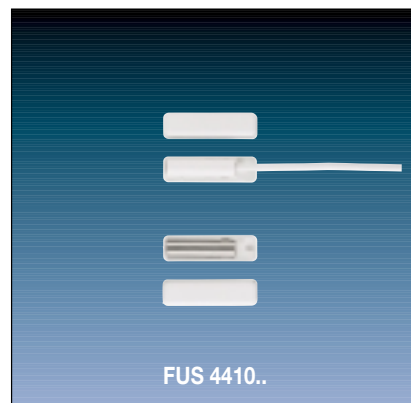
FUS 4410..

2

	Ref.-No.
Locking unit	**DAS 4370**
Frame joint switch contact	**DAS 4360**
Glass-break sensor, passive	**FUS 4415 WW**
Magnet contact	
white	**FUS 4410 WW**
brown	**FUS 4410 BR**

Synoptics

1

	Ref.-No.
2 **Signal panel L 40**	**2405**

3 The KNX signal panel allows to monitor the actual operating states of an KNX system and consists of 40 LED.
The data exchange between the KNX and the signal panel takes place via an electronic control system.
This is provided in specially designed flush or surface mounted panel boxes with appropriate power packs.
The signal panel is connected to the control system via a 20-pole parallel bus.
If the panel is used in an external performance the control system is also an external module (Ref.-No. 2430 REG).
The functions of the signal panel are programmed by using the special EIBTAB-software.
To assign the functions to the LED, description fields are provided to each LED.

1
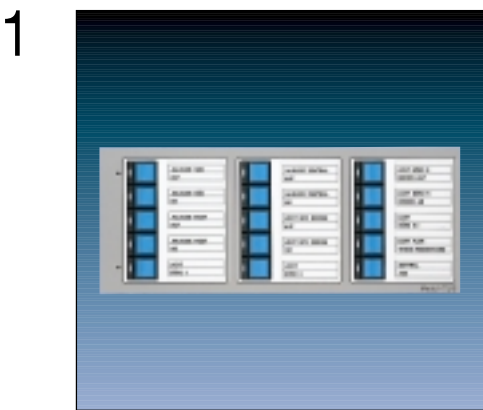
	Ref.-No.
2 **Operator panel TL 15**	**2410**

3 The KNX operator panel allows to monitor or have direct influence on the actual operating states of an KNX system and consists of 15 push-buttons with 15 integrated LED.
The data exchange between the KNX and the signal panel takes place via an electronic control system.
This is provided in specially designed flush or surface mounted panel boxes with appropriate power packs.
The operator panel is connected to the control system via a 20-pole parallel bus.
If the panel is used in an external performance the control system is also an external module (Ref.-No. 2430 REG).
The functions of the operator panel are programmed by using the special EIBTAB-software.
To assign the functions to the 15 push-buttons and 15 LED, description fields are provided to each element.

4 **Technical datas:**

External supply
Voltage: 5 V DC
Power consumption: max. 1.5 W
Connection: 20-poles jumper connector
Operation temperature: –5°C ... +45°C
Storage temperature: –25°C ... +55°C

1

2

	Ref.-No.
Blank plate, neutral	**2415**
for flush or surface mounted panel boxes	

Synoptics

1

	Ref.-No.
2 **Flush (U) mounted panel boxes**	**2422 U ... 2426 U**

1

	Ref.-No.
2 **Surface (A) mounted panel boxes**	**2422 A ... 2426 A**

3 The panel boxes are equipped with an integrated power supply, electronic control system and, of course, a BCU.
Dependent upon the size of the boxes it is possible to insert two up to six signal or operator panels in various combinations.
The panels are connected to the panel box with a 20-poles parallel bus connector included in the delivery.
The functions of the signal or operator panel are programmed by using the special EIBTAB-software. Only the physical address has to be given by the ETS.

4 **Technical data**

External supply
Voltage:	230 V AC
Power consumption:	max. 20 W
Connection:	clamp bar

Bus supply
Voltage:	24 V DC (+6 V / –4 V)
Power consumption:	max. 150 mW
Connection:	KNX connection block
Operation temperature:	–5°C ... +45°C
Storage temperature:	–25°C ... +55°C

Synoptics

1

2

	Ref.-No.
Electronic control module	**2430 REG**
Series embodiment (SE)-device (8 units)	

3

In combination with the power supply 2447 REG the control module is used for controlling up to six signal or operator panels.
The module has an integrated BCU and interface to the KNX, therefore this device is the link between KNX and the synoptic modules.
The functions of the signal or operator panel KNX are programmed using the special EIBTAB-software. Only the physical address
(no application) has to be given with the ETS using the special dummy application (ETS-path: system components, line coupler).

4

Technical data

External supply
Voltage: 230 V AC
Connection: clamp bar

Bus supply
Voltage: 24 V DC (+6 V / –4 V)
Power consumption: max. 150 mW
Connection: KNX connection block
Operation temperature: –5°C ... +45°C
Storage temperature: –25°C ... +55°C
Mounting: onto DIN rail 35 x 7.5

Synoptics

1

2

	Ref.-No.
Power supply 5 V	
for Signal/operator panel	**2447 REG**
Series embodiment (SE)-device (8 units)	

3

The power supply generates an output voltage of 5 V DC and is used for up to six signal or operator panels.
If these panels are installed outside of the panel box, the power supply is connected additionally with the control module 2430 REG via a 20-pole parallel bus connector.

4

Technical data

External supply
Voltage: 230 V AC
Connection: clamp bar

Input
Number: 6
Performance: 20-pole parallel bus connector
Rated voltage: 5.1 V DC (± 0.1 V)
Rated current: 2 A (all outputs together), short-circuit protected
Operation temperature: –5°C ... +45°C
Storage temperature: –25°C ... +55°C
Mounting: onto DIN rail 35 x 7.5

1

FAPVOLL
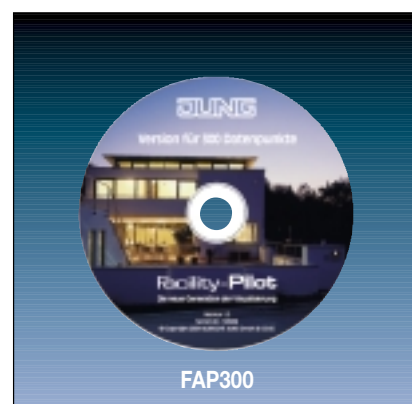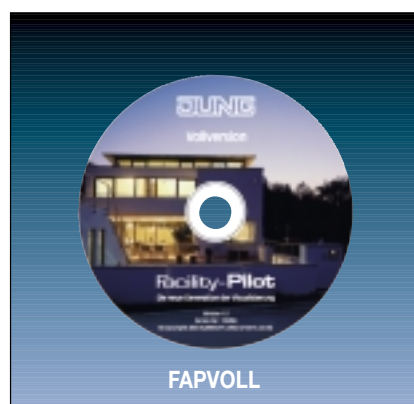
FAP50

FAP300

2

Ref.-No.

Facility-Pilot FAP

Software versions	
Planner version	**FAP-PLANER-GB**
50 data point version	**FAP50-GB**
300 data point version	**FAP300-GB**
Full version	**FAPVOLL-GB**

Software versions for network application (only with the FAP full version)	
For 1 – 4 PC	**FAPCLIENT14-GB**
For 5 – 9 PC	**FAPCLIENT59-GB**
For 10 – 24 PC	**FAPCLIENT1024-GB**

OPC editor	**OPC-EDITOR**

3 **System requirements**

Windows versions: 98 SE, ME, 2000, XP, Internet Explorer 6, DirectX (version 9b), Acrobat Reader.
For the installation under Windows 2000 and XP administrator rights are required.
Internet Explorer 6, DirectX (version 9b), Acrobat Reader are delivered with the FAP CDROM.

Recommended order of installation:
1. Internet Explorer
2. DirectX
3. Facility Pilot
4. Acrobat Reader

Note: The software is locked with a software key and must be activated within 20 days after the installation !

Hardware requirements:
– Pentium IV or equal
– RAM 256 MB
– Free space on hard disk 40 GB (dependent on the data processing / archives)
– Resolution 1024 x 768
– Colours min. 16 bit / pixel
– Interface serial or USB for the application of FALCON
– Internet connection (optional) when e-mail notification used

5 Visualization / Facility Management

Facility Pilot – the new open visualisation generation

The JUNG Facility-Pilot is a flexible, interactive software for extensive visualisation and control of the building system technology KNX.
Its areas of application extend from many different industrial applications through to up-market residential buildings. The software consists of individual modules (Fig. A) such as the EIB editor, process model, visualisation editor and a comprehensive system control.
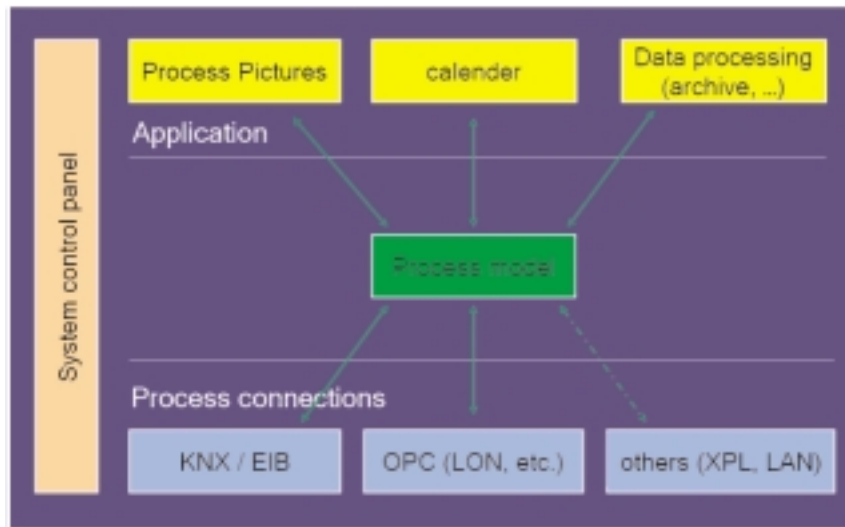
Fig. A

With the modular JUNG Facility-Pilot software system, a total solution for building management technology has been developed which opens up the topic of visualisation to a broad spectrum of users and moreover contains pioneering developmental steps as regards additional functionality such as access via the Internet. It is therefore not purely visualisation software but a comprehensive program which considerably simplifies operation with KNX and its connection with other bus systems.

This also fits in with the complete philosophy of the system which makes it possible to set up displays for process characteristics or archives for value characteristics and events without programming; even controller functions can be configured via drag & drop. And for specialists, there is also the possibility of visualisation programming if there are special requirements which are not covered by the system as standard. The complete programming environment for BASIC scripts is a prerequisite for this.

KNX installations in private residential buildings can likewise be enhanced with the system as in the commercial sector since specific modules help to convert almost every technical requirement both quickly and economically – from the fault indication system to the entire technical building management system, culminating in the analysis of consumption data.

The navigation of the different modules is very easy due to the clear structured system control panel (Fig. B). This system control panel provides a fast overview of the whole system with the individual modules, documents and project management. The Facility-Pilot brings flexibility, greater user convenience and easy handling to bus system management. The visualisation and control assist the user with interactive help and extensive documentation.
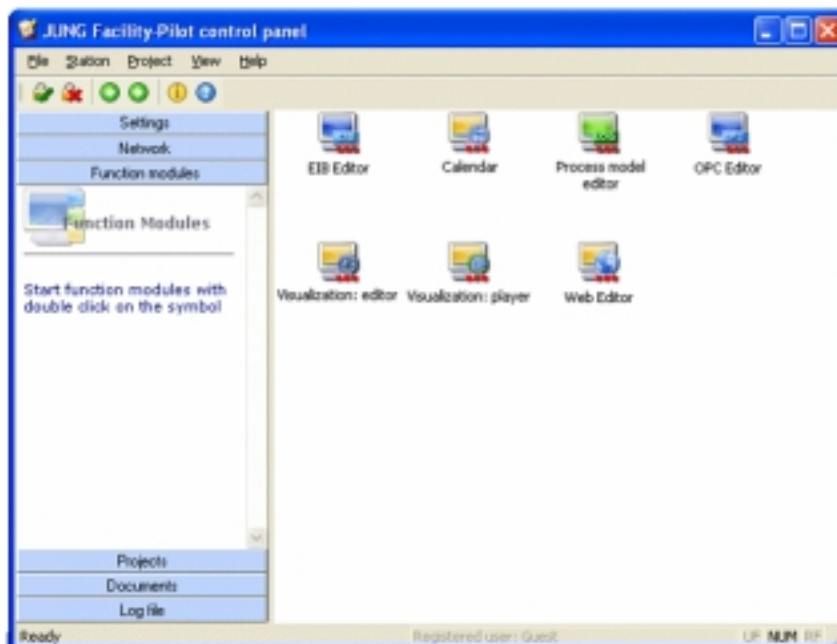
Fig. B

5 Visualization / Facility Management

When developing the system, attention was directed at economic efficiency since logic modules or year time switches can be comitted in many installations as the Facility-Pilot takes over these functions. The simple operation pays off quickly for the user. Tools and assistants support the project engineers in their work while the end user has a high level of user friendliness and flexibility for his KNX installation. The technology remains discreetly hidden in the background.
Internet connection via integrated web-server will increase this convenience still further.

The visualisation is able to run on WINDOWS systems from WINDOWS 98SE to WINDOWS XP (with the exception of Windows NT). Your operating environment always retains the XP style.

EIB editor – the ETS interface

The main task of the EIB editor is to create the connection between the Facility-Pilot and the KNX. This editor can be used for a quick, convenient import of data from the ETS projects into the Facility-Pilot. For connection to KNX, the system uses the EIBA Falcon driver. No additional software is needed. The KNX group addresses can be allocated either automatically by drag & drop or manually.
Start group functions make it easy for the user to stipulate differentiated start behaviour of the system (Fig. C).
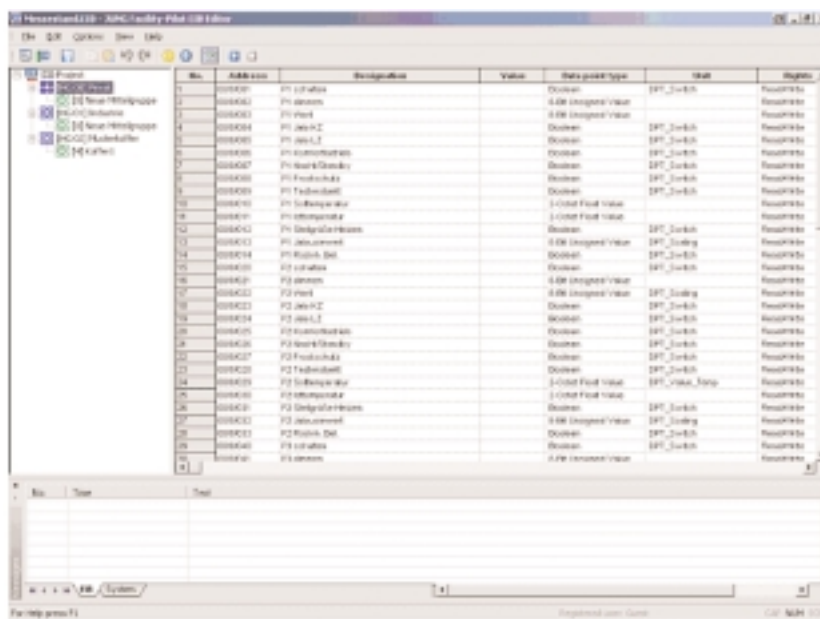
Fig. C

In addition, the EIB editor works as a diagnosis tool in the system. For example, it assumes evaluation of the KNX telegrams and shows them in plain text. This gives the user perfect control of the bus system. I.e. it is not necessary to switch over between ETS and Facility Pilot to test or record data points, everything can be done within the EIB editor module.

OPC editor – the open interface

An OPC client which analyses which OPC servers are installed in the system (there can be several) is available as an option in the Facility-Pilot package. The client reads out the data from the OPC servers and makes it available to the process model. It can execute this in parallel with the EIB Editor.
Additional data from other processes e.g. LON or M-Bus can thus be linked with a KNX installation and visualised in a simple way.
Planners and installers know that these requirements are found with increasing frequency in projects.
In practice, this can appear as follows: in parallel to the KNX process connection, an OPC server communicates with the LON devices located in the building and makes the data available via its software interface. The data is processed in the process model.
A link can now be implemented between the process variables.
The "forwarding function" (gateway function) is used for this purpose so that data is sent from LON to KNX and vice versa.
An additional gateway can thus be omitted since it already exists in the system.
A link to the Ethernet is also possible. The setpoint temperature or other parameters from control and instrumentation technology can for example be brought on the KNX.

Process model – comfort and safety with perfect workflows

The process model summarises the device data from the EIB editor or other physical connections and generates complete work-flows from individual functions. It is also possible to combine different sequences, e.g. blind control adjusted to the time of day and light conditions.
These functions (Fig. F) can also be adjusted to simulate the presence of people in the building when it is unoccupied.
The system thus also offers additional security. This aspect is reinforced if the KNX alarm system is integrated and controlled via the Facility-Pilot.
The process model requires a logical view of the project, offering for example mathematical and time-based functions, or also scenarios and workflows for lighting control and monitoring functions. The user can easily draw up his own rules for the management of his facility.

5 Visualization / Facility Management

To this end, "virtual devices" are created on the screen, archives are defined, e-mail notifications and alarm warnings are preset.
If over the weekend a previously defined temperature is exceeded for example in office rooms with Facility-Pilot monitoring, the system issues a corresponding e-mail notification. Individual process data can be recorded systematically and value progressions exported to Excel spreadsheets or displayed directly as graphs or tables (Fig. D and E). In addition the process variables can be linked with other programs via DDE.
These can then be used to check the energy bills.
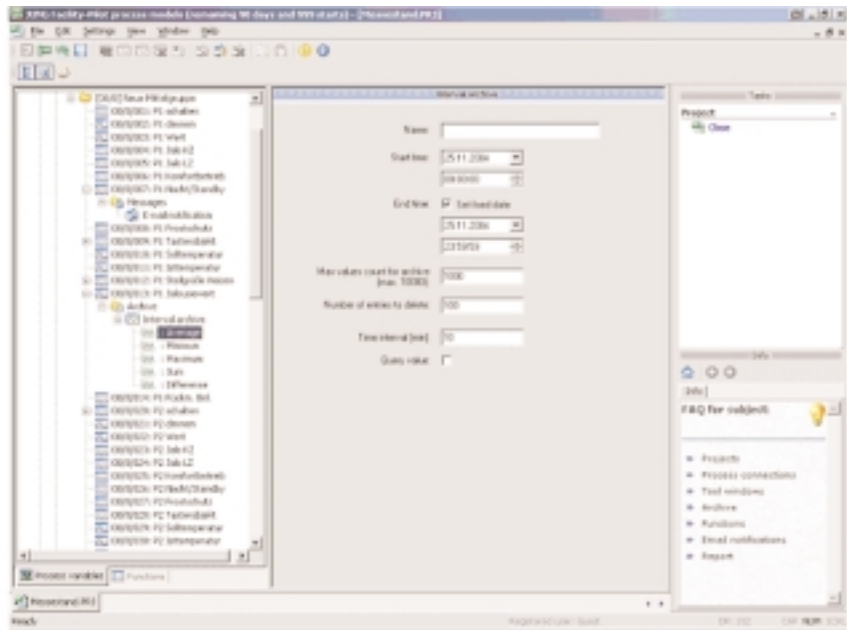
Fig. D   Data processing

Values that are calculated and recorded by the process can be represented in the Visualisation Editor. Curve diagrams can also be displayed in the worksheet. The visualisation package contains the option of viewing and testing archives directly. Values are represented in table format and graphically in a diagram.
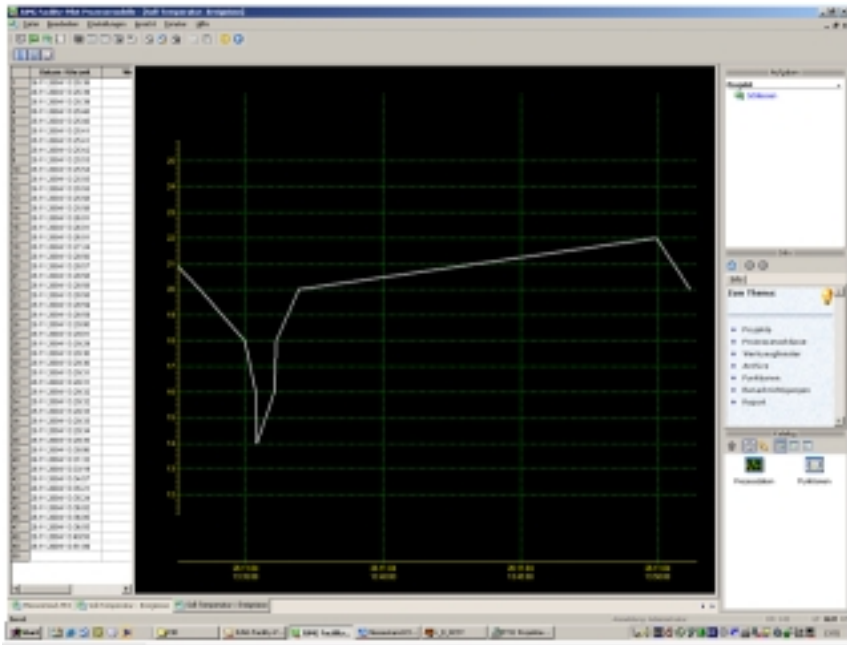
Fig. E   Data recording

5 Visualization / Facility Management

The functions within the process model

The available logic functions which are created in the process model are amongst others "AND", "OR" and "XOR". A KNX installation can be significantly enhanced through these functions. In addition to the basic functions such as 'AND' and 'OR', there is a whole range of additional functions in the system which underline its capability. When a visualisation is logically connected, you can clearly see what effect it has (Fig. F). The following functions are the more advanced ones to realize even very complex applications:

- **Scene:** A scene is a collection of commands. When it is started, these commands are sent on the bus in no chronological order in contrast to the sequence function.
- **Sequence:** In addition to the basic functions, there is the "Sequence" function, which could be described as a smart scene. I.e. a command is only executed when a specific condition is enabled. Specific loads are switched on at the press of a button, as defined in the process model. A presence simulation can thus easily be implemented.
  A time stamp can likewise be inserted which can be assigned to each switch or lighting fitting. With this function, it is possible to indicate the last time that someone operated a device or entered a room.
- **Forwarding:** This gateway function is a very important function if you have two different process connections for example.
  If you wish to use or display a value from the heating system (OPC) in the KNX installation, you have a source value which is routed to a target value (gateway functionality). A bridge is thus created in a simple way between the process connections.
- **Status function:** The status variable takes the last reported value and simulates KNX status objects if specific KNX devices for instance do not have these status objects at their disposal.
- **Gate function** which can be implemented with the IF/THEN function: The If / Then function is used to calculate the values of process variables depending on other process variables and conditions.
  E.g. it can be used to configure a priority control: The value of a switch will only be sent to an actuator, when the control of the actuator by the switch has been allowed. The allowance may depend on another binary process variable.
- **Mathematic functions:** Here any basic calculation can be used within a formula. The syntax of the formula is similar to the Excel one.
- **Time delay:** For example, we switch the light on in the toilet and the fan is activated with a time delay. No further installation is required. The user has the option of setting times as required without ETS programming.
- **Automatic guard:** If you take an area of a refrigeration plant which has to be monitored, temperatures between 3° and 5° can be defined e.g. for the cold store and values of > -8° for the deep-freeze room. The visualisation takes over the task of monitoring (watchdog function) this operating state and issues an alarm when the temperature rises above or falls below the required temperatures. Specific monitoring periods can also be selected. In the event of an alarm, this is issued acoustically but it can also be routed as an e-mail (→ SMS on a mobile phone) or via fax. Alarms are verified on a list. All alarms are displayed there as "acknowledged" and "not acknowledged".
- **Counter:** If you wish to know for example how often the burner of the heating system cycles, its starting and stopping pulses are taken as the basis. You then count how long the burner is active for. The hours and minutes of the operating time can be displayed with the help of the counter as well as the average switching time. The counter elements can be used as upwards or downwards counter.

Summarized, you can say that the system offers a number of basic functions and is equipped moreover with higher value functions such as the counter or If / Then function which could be put together from basic functions but have already been implemented without any programming work. Further modules, which do not need to be built together from basic functions, are conceivable and planned, not as a basic function but as function modules. Frequently used functions are integrated in the visualisation as virtual devices.
The process model is extended for this purpose.
In general, there are no limits for these functions or basic scripts. The only limit is the configuration of the PC where the Facility Pilot is installed.

Fig. F

5 **Visualization / Facility Management**
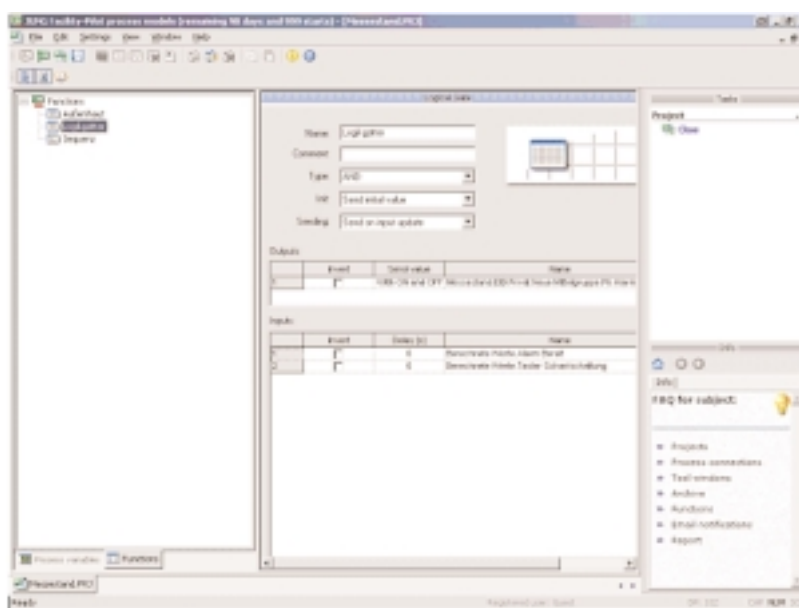
Visualisation Editor

The visualisation editor presents the whole bus system as a model on the screen. The user has virtual access to devices and can make settings which apply to the bus system. The layout of the corresponding building can be shown for clear, convenient operation, and symbols for lighting, blinds or central heating can be allocated individually from an icon library. The visualisation is based on individual work sheets which can be stored in unlimited numbers in the system.

The background of the visualisation can be created with DXF, JPG, BMP, WMF or EMF formats. Thus you can offer the customer a unique visualisation which is tailor-made for his personal taste or is based on the CD/CI concept of a company.

Next to the main presentation area, the right-hand side of the screen shows a working and help section which the user can set up according to his individual needs (Fig. G).

It is very simple to work with the editor and is made even easier with functions such as undo, redo, zoom, rulers, guidelines and grid as well as several editing levels. The system is organised in three levels (planes) – the static, the dynamic and the link level, which can be shown and hidden again depending on the particular work phase.

The visualisation system is rounded off by an extensive interactive help function which the user can call up at any time.
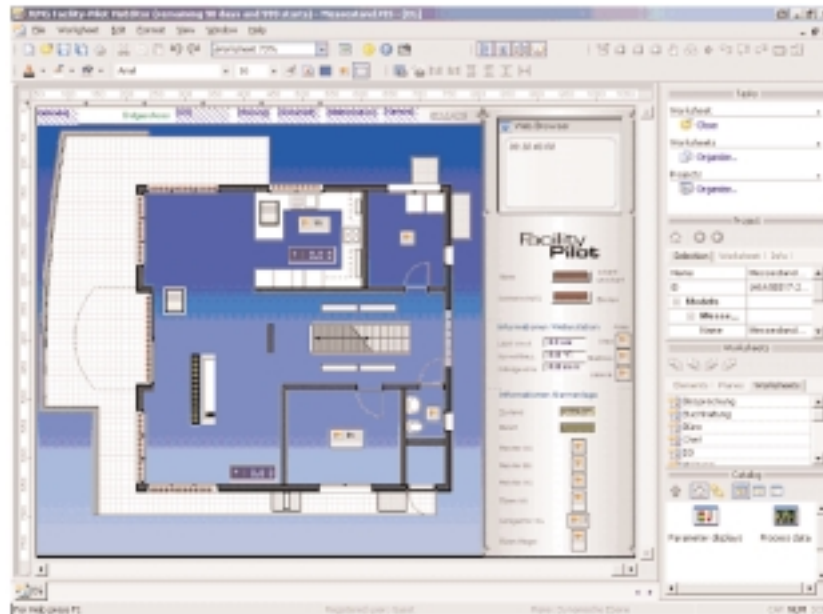
Fig. G

The visualization editor creates a report of the visualization project, the worksheets in the project, their properties and their connections to process variables. For each worksheet an image of the whole worksheet is displayed and list of the contained display elements along with their position etc.

The calendar program

The yearly calendar program is an own module for creating and configuring automatic time switch functions can be configured via drag & drop. An unlimited number of calendars can be created.

The process model to which the time program should refer is selected first of all. Then various daily programs are created for example which are given corresponding commands. In contrast to classic clocks, the system does not operate channel-specifically i.e. it is not necessary to create a unique program for each channel.

In addition, to the powerful and complex yearly calendar, a weekly timer can be implemented into the visualisation project, i. e. the customer can open the timer within the player mode and change the settings. Because it is a regular display element, similar to any lamp or push-button symbol, you can you can use as much weekly timer as necessary.

5 Visualization / Facility Management

Control via Internet by the web editor

The application to access the system via Internet or PDA with regular web browsers can be achieved by the web editor module.
A user administration is created so that the areas to be protected by the Facility-Pilot are secured against unauthorised access.
For security purposes, individual components of the system can only be made accessible to predefined user groups.
The web editor allows to define and edit web projects without any HTML knowledge (Fig. H). A simple HTML visualisation can be configured with just a few clicks. A web server has been integrated into the web editor module which can dynamically generate standard HTML pages according to properties of devices and browsers. Sets of HTML pages are organised as "books" and can be assigned to users.
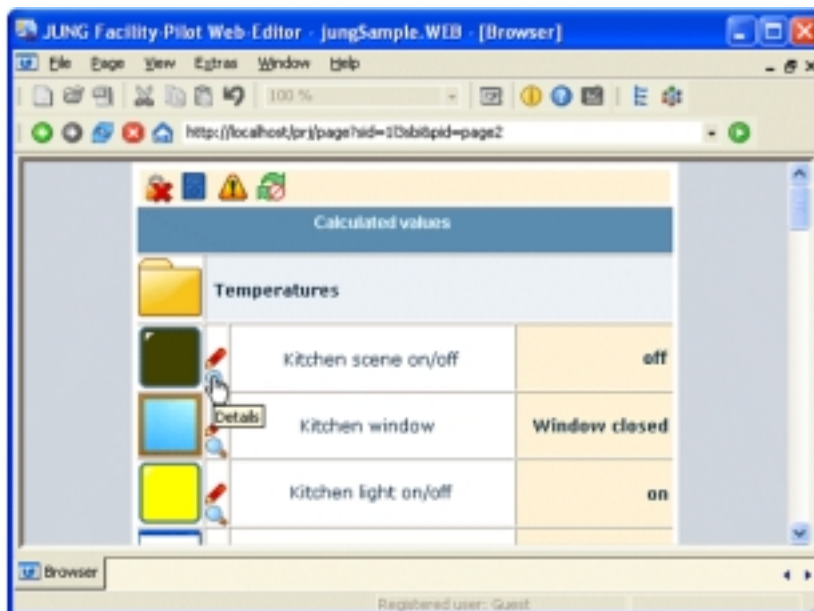
Fig. H

Network application

The network features of the Facility Pilot software are used to connect several PC's with Facility Pilot installations over a TCP/IP – network.
Each PC with the Facility Pilot software installed is called a Facility Pilot station or just "station" for short.
Visualisation players of several Facility Pilot stations can be connected with a process model within a remote Facility Pilot station.
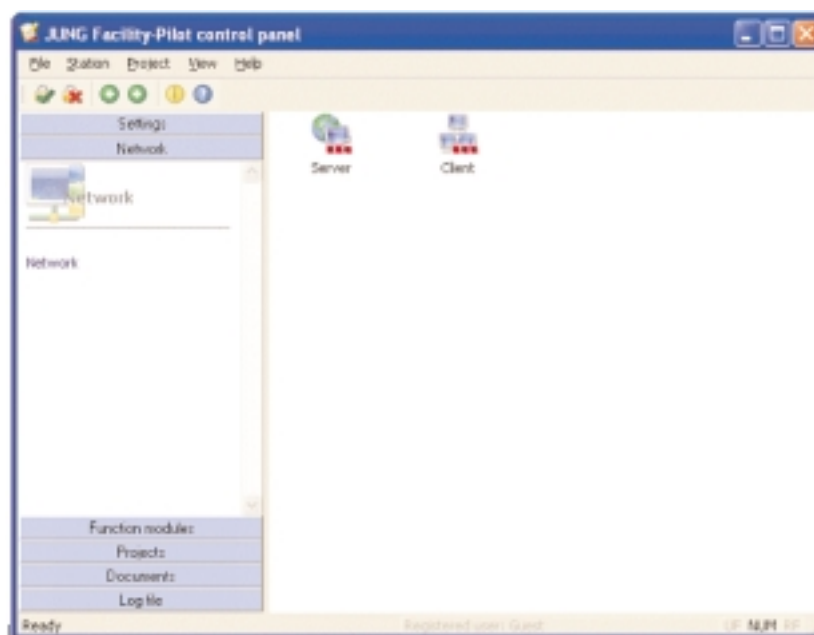
Fig. I

5 Visualization / Facility Management

The network architecture follows a client/server-model (Fig. I), with one station as the server and the other stations as clients.

The server is connected to the technical process. Clients query process states from the server, to change process states they send commands to the server.

A typical application of this new network features is the connection of several touch panels with a server.

The network protocol is based on TCP/IP and requires authentication with a user name and a password.

Multiple client stations can be connected via TCP/IP to one server station. The maximum number of clients depends on the capabilities of the server, hardware and operating system. In some cases it may be preferable to use a WINDOWS server version.

In most cases, network traffic caused by the Jung Facility-Pilot software will be quite low, since not much more than changes to the process states and keep-alive telegrams will be transmitted, In particular no graphics need to be transmitted, since the visualisation project is running at the client.

XPL editor for audio applications

There is an increasing desire to combine home and building automation with streaming of digital music. For instance lighting and music control can be integrated in scenes, which can be selected at the push of a button from anywhere in the building.

One of the best systems for audio streaming over IP networks is the Squeezebox-system from the company Slim Devices, Inc. (Fig. J).

Audio streams are transmitted over Ethernet or wireless (IEEE 802.11) networks from a server with the open-source SlimServer software to Squeezebox music players, and in turn controlled by the Facility Pilot XPL editor.

Supported audio streams are for instance Internet Radio, MP3, WAV, WMA and Ogg Vorbis.

We strongly recommend not to install the SlimServer software at the PC running the Facility Pilot system, since the SlimServer could impair the proper operation of the automation system.

The XPL editor of the Facility Pilot system controls the SlimServer and in turn the Squeezebox music players via the XPL data protocol, which is standardised by the XPL project.

Among other possibilities, using the XPL editor, push buttons and dimming functions can be used to control volume, playlists etc., or messages can be displayed at the music player's display. For the indication of tracks or playlists KNX front end devices as FD RCD, colour touch panel, etc. can be used.

Fig. J

1
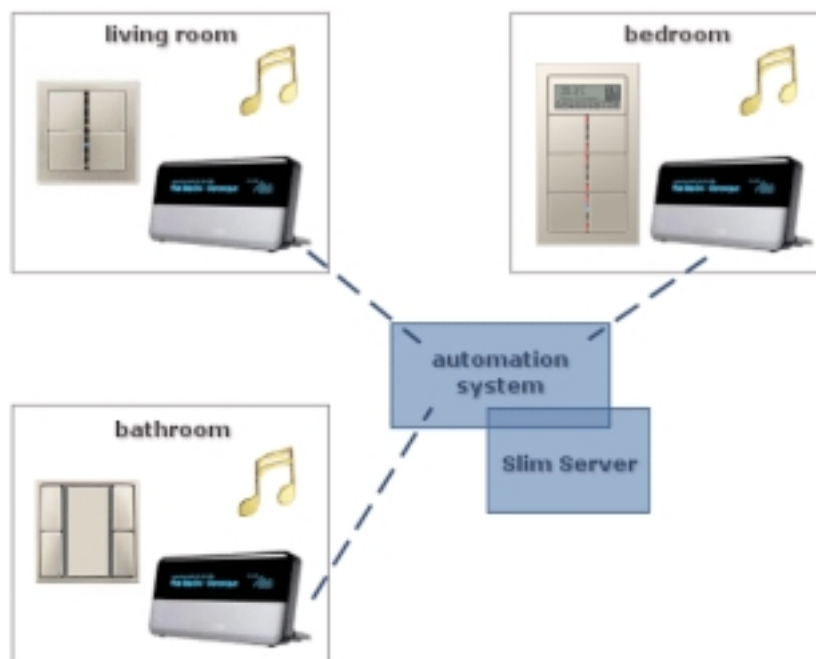
2

	Ref.-No.
KNX Flat Panel PC 15"	**PCT 15 FAP V (German version)**
	PCT 15 FAP V-GB (English version)

3

The combination of this flat touch screen and the Facility Pilot (FAP) makes it easy to control all the functions of the FAP, simply by touching the 15" TFT screen with the tip of your finger.
The housing is fitted with a high-quality aluminium frame which enables it to be installed flush with the wall.
The special flush-box is absolutely required !

4

Technical data

Screen size:	15"
Resolution:	1024 x 768 pixel
Language:	German or English
• Aluminium frame	
• Flush mounted with touch control	
• Incl. FAP – Full version (pre-installed)	
• Noiseless, without rotating parts	
Operating system:	Windows XP embedded
Processor:	800 MHz Intel Pentium M
RAM memory:	1 GB
Hard disk:	Compact Flash-memory card, 2 GB
External connections:	• 4 x USB 2.0
	• 1 x Sound Line–out
	• 1 x 10/100 Mbit Fast Ethernet
	• 1 x VGA for connection of a external monitor
	• 1 x Mouse PS/2
	• 1 x keyboard PS/2
Power:	AC 230 V ~
Frame size:	420 x 340 mm (W x H)
Depth:	60 mm

4
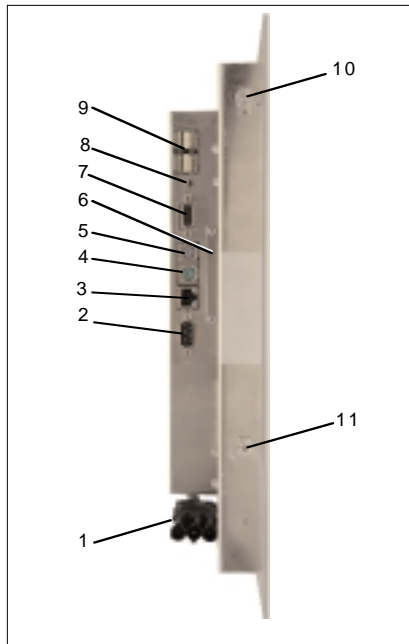
Flat-Panel PC

1 Connection for power supply AC 230 V ~
2 RS 232
3 10/100 Mbit Fast Ethernet
4 PS/2 Mouse
5 PS/2 keyboard
6 Cover for CompactFlash card 2 GB
7 VGA
8 Sound Line – out
9 4 x USB 2.0
10 2 x upper connection pin
11 2 x lower connection pin

5 **Hardware description**

Commissioning
The Flat Panel PC is pre-configured.
The **writing access** for drive "C" is locked.
For client-specific settings (Passwords, user, etc) the **locking** must be deactivated.
Activate the **locking** after finishing the settings.

Please refer to the manual of the Flat Panel PC to follow on the commissioning.

Facility Pilot
The Facility-Pilot is installed on drive "D" of the Flat Panel PC.
If the project is generated on a different drive than drive "D" of the system integrator PC, it will cause problems when the visualisation is imported to the Flat Panel PC. E.g. the folder with the imported images can not be found. A folder "images" will be automatically created, when a new project will be started. Images which will be used in a project have to be saved in this folder.
The visualisation automatically loads all images out of these folder. It will be assured, that all images of a project will be found.
No subfolder will be provided in the image folder.

1

2

	Ref.-No.
Flush-box	**PCT 15 EBG**

Metal box for flush mounting the KNX Flat Panel PC Art.-Nr.: PCT 15 FAP V
Dimensions 320 x 400 x 100 mm (W x H x D)

4 Assembling

Mounting in hollow wall

Dimension for cut-out: Width: 400 mm / Height: 318 mm.
Connect the flush box with the clamps (2).
Clamps for wall thickness of approx. 10 – 30 mm.
Fixing clamps for solid walls are not required.
Push the required cables through the provided gaskets into the flush box.
Close all unused cable ducts with gaskets.

Mounting in solid walls

Connect the 4 fixing claws for solid walls (1) with the enclosed screws to the flush box.
Push the required cables through the provided gaskets into the flush box.
Close all unused cable ducts with gaskets.
Close all holes with duct tape.
Intruding cement or plaster can cause damage to the housing or mechanical parts.
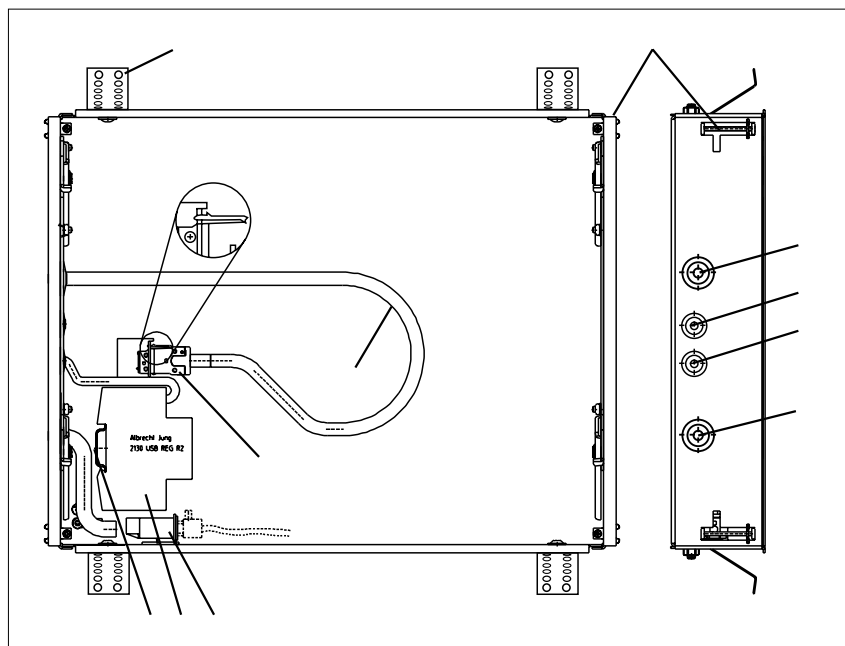
1 4 x fixing clamps for solid walls
   (not pre-assembled)
2 4 x clamps (for hollow wall mounting)
3 Cable duct for 10/100 Mbit fast Ethernet
4 Cable duct for USB connection
5 Cable duct for KNX Bus connection
6 Cable duct for power supply AC 230 V ~
7 Connection for power supply
8 USB data interface (optional)
9 Rail for REG devices
10 Cat. 6 RJ 45 Modular Jack (optional)
11 Bending radius (11) for LAN cable
   according to cable manufacturer

System Accessories

1
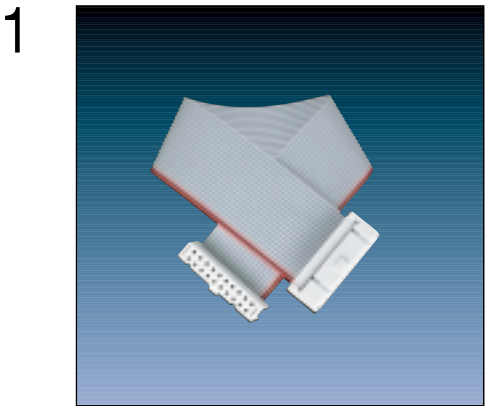
2

Ref.-No.

Ribbon cable, 20-poles

for connection of control units and panels

length 300 mm	**2450.300**
length 500 mm	**2450.500**

1
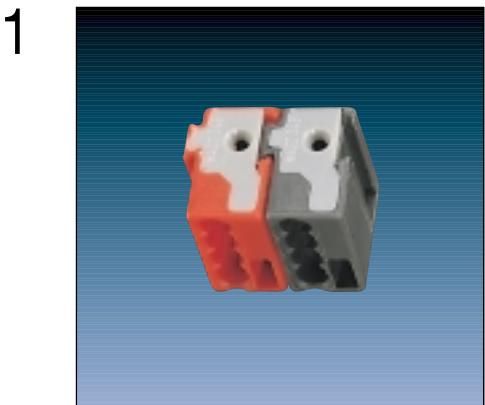
2

Ref.-No.

KNX Bus connection block

2 poles, 4 connection points	**2050 RT SW**
ETS-product family:	System accessories
Product type:	Connection block
Plug-in connections (screwless) 2 x 4 0.6 ... 0.8 mm single core	

1

2
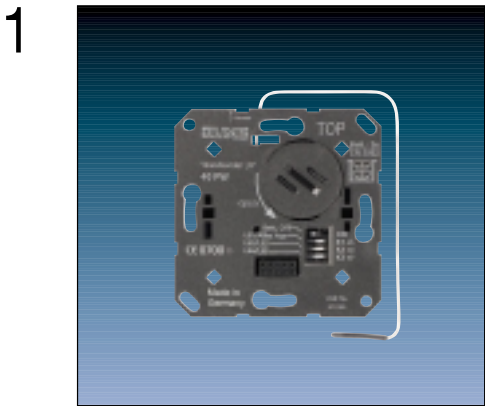
	Ref.-No.
Radio-controlled	
wall-mounted transmitter	**40 FW**

3

Installation into standard wall box or with surface cap.

Range: 100 m (free field).

Battery-operated with two lithium button cells (CR2032) which are included.

Battery life: approx. 3 years.

The wall-mounted transmitter is operated in combination with standard push-button sensors (1-gang, 2-gang or 4-gang) of the KNX range.

After the push-button sensor is pressed, the transmitter sends a radio telegram which is understood and evaluated by all the receivers of the Radio Management system and the KNX-Radio gateways (ref.-no. 2700 AP, ..2094 F..).

Possible modes: on/off, dimming, light scene, central off (to be selected by microswitches).

The number of radio channels is dependent on the push-button sensor in use e.g. 1-gang push-button sensor = 1-channel radio-controlled wall-mounted transmitter. Each set of facing push-buttons belongs to one channel.

Accessories

CD 2074 NABS WW	A 2074 NABS WW	ES 2074 NABS
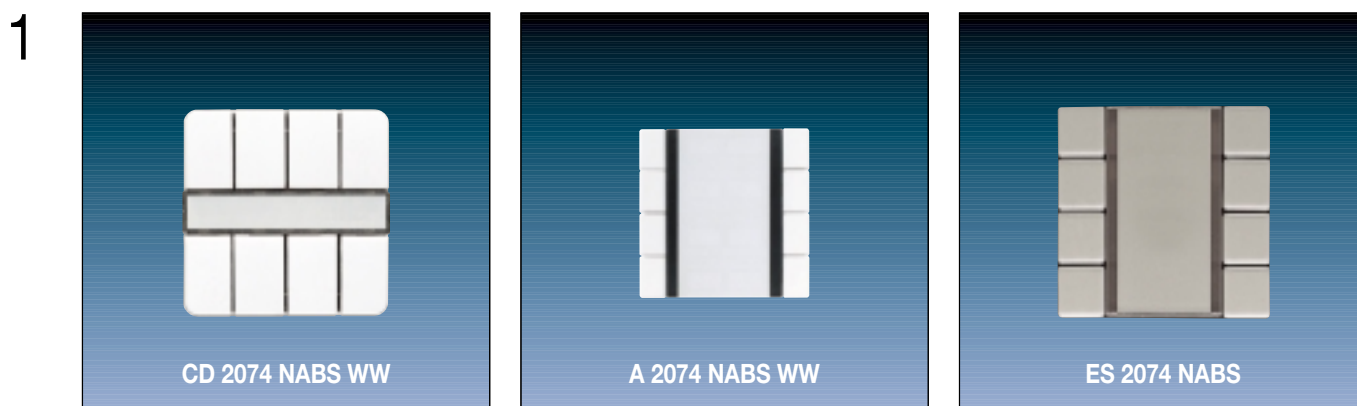
2

	Ref.-No.
Push-button sensor for radio-controlled	
wall-mounted transmitter 40 FW	
for ranges CD 500 + CD plus	
1-gang (1-channel transmission)	**CD 2071 NABS..**
2-gang (2-channel transmission)	**CD 2072 NABS..**
4-gang (4-channel transmission)	**CD 2074 NABS..**
for ranges LS 990 + LS plus	
1-gang (1-channel transmission)	**LS 2071 NABS..**
2-gang (2-channel transmission)	**LS 2072 NABS..**
4-gang (4-channel transmission)	**LS 2074 NABS..**
for ranges Stainless Steel + LS plus	
1-gang (1-channel transmission)	**ES 2071 NABS**
2-gang (2-channel transmission)	**ES 2072 NABS**
4-gang (4-channel transmission)	**ES 2074 NABS**
for ranges Aluminium + LS plus	
1-gang (1-channel transmission)	**AL 2071 NABS**
2-gang (2-channel transmission)	**AL 2072 NABS**
4-gang (4-channel transmission)	**AL 2074 NABS**
for ranges Anthracite + LS plus	
1-gang (1-channel transmission)	**AL 2071 NABS AN**
2-gang (2-channel transmission)	**AL 2072 NABS AN**
4-gang (4-channel transmission)	**AL 2074 NABS AN**
for ranges Gold + LS plus	
1-gang (1-channel transmission)	**GO 2071 NABS**
2-gang (2-channel transmission)	**GO 2072 NABS**
4-gang (4-channel transmission)	**GO 2074 NABS**
Chrome + LS plus	
1-gang (1-channel transmission)	**GCR 2071 NABS**
2-gang (2-channel transmission)	**GCR 2072 NABS**
4-gang (4-channel transmission)	**GCR 2074 NABS**

1

CD 42 F WW	LS 42 F WW	ES 42 F

2

Ref.-No.

"Flat" radio-controlled
wall-mounted transmitter

for ranges AS / A 500 + A plus			for ranges CD 500 + CD plus		
1-channel	ivory	**A 41 F**	1-channel	ivory	**CD 41 F**
	white	**A 41 F WW**		white	**CD 41 F WW**
	aluminium	**A 41 F AL**	2-channel	ivory	**CD 42 F**
2-channel	ivory	**A 42 F**		white	**CD 42 F WW**
	white	**A 42 F WW**	4-channel	ivory	**CD 44 F**
	aluminium	**A 42 F AL**		white	**CD 44 F WW**
4-channel	ivory	**A 44 F**			
	white	**A 44 F WW**			
	aluminium	**A 44 F AL**			

for ranges LS 990 + LS plus			for ranges Stainless Steel + LS plus		
1-channel	ivory	**LS 41 F**	1-channel	stainless steel	**ES 41 F**
	white	**LS 41 F WW**	2-channel	stainless steel	**ES 42 F**
	light grey	**LS 41 F LG**	4-channel	stainless steel	**ES 44 F**
	black	**LS 41 F SW**	**for ranges Aluminium + LS plus**		
2-channel	ivory	**LS 42 F**	1-channel	aluminium (lacquered	**AL 41 F**
	white	**LS 42 F WW**	2-channel	aluminium (lacquered	**AL 42 F**
	light grey	**LS 42 F LG**	4-channel	aluminium (lacquered	**AL 44 F**
	black	**LS 42 F SW**			
4-channel	ivory	**LS 44 F**			
	white	**LS 44 F WW**			
	light grey	**LS 44 F LG**			
	black	**LS 44 F SW**			

3

The "Flat" radio-controlled wall-mounted transmitter sends a radio telegram after a push-button sensor is pressed.
The telegram is understood and evaluated by all the radio receivers of the Radio Management system.
Possible modes: on/off, dimming, light scene, central off (to be selected by microswitches).
Range: approx. 30 m (free field).
Battery operation with two lithium button cells (CR 2016) which are included.
Battery life: approx. 3 years.
Installation is carried out with the appropriate frame directly onto a level surface (plaster, wood, glass, mirror or flush box) using adhesive or screws.

Accessories

1

48 FH	48 KFH	42 FH

2
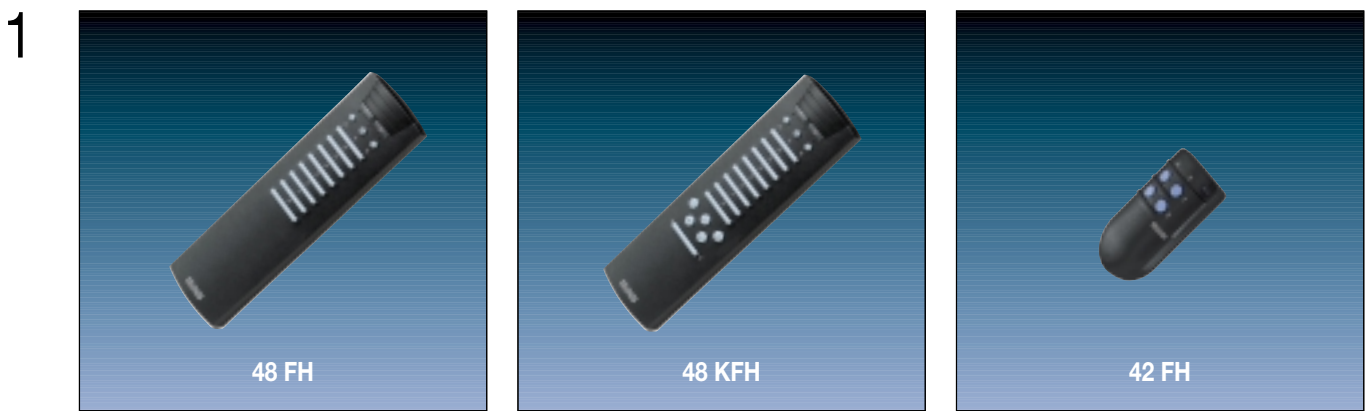
	Ref.-No.
Radio-controlled	
hand-held transmitter	
Standard version, anthracite	**48 FH**
Comfort version, anthracite	**48 KFH**
additional function: 5 light moods, master dimming	
Mini version, anthracite	**42 FH**

3 The hand-held transmitter sends a radio telegram after a push-button operation.
This telegram is understood and evaluated by all the receivers of the Radio Management system.
There are three groups available (A, B, C), each with 8 channel push-buttons (on/off – up/down – dimming)
i.e. 24 radio receivers can be operated individually.
Central control by ALL ON / ALL OFF buttons.
Transmission range: max. 100 m (free field).
The hand-held transmitter is operated with 4 x micro (AAA), alkaline (LR03) batteries (not included).
Battery life: approx. 3 years.

1

2

	Ref.-No.
Wall-fixing	
for 48 FH / 48 KFH	**WH 48**
colour: anthracite	

1

2

	Ref.-No.
Universal radio transmitter	**FUS 22 UP**

3

The radio-controlled universal transmitter serves to extend an existing installation by the wireless transmission of switching commands.
The radio telegramm from the radio-controlled universal transmitter is understood and evaluated by all the radio receivers of the
Radio Management system.
The radio-controlled universal transmitter can be operated as a switch, push-button or shutter transmitter.
The control of the inputs (La, Lb) is carried out with mains voltage (AC 230 V ~).

1

2

	Ref.-No.
Radio-controlled	
multifunction transmitter	**FMS 4 UP**

3

The radio-controlled multifunction transmitter is a battery-operated four-channel radio transmitter for the extension of an existing radio control installation.
At its four inputs the multifunction radio transmitter detects switching states of potential-free installation switches or push-buttons.
It transmits radio telegrams which can be decoded by all radio control receivers.
A 5-digit microswitch facilitates the selection of eight different modes of operation.
A red LED indicates the transmission of radio telegrams (slow unsymmetrical blinking, 4 Hz) or an empty battery "LowBatt" (quick symmetrical blinking, 10 Hz).

Accessories

1

2

	Ref.-No.
Label Tool software	**Download from www.jung.de**
(free of charge)	

3

With the inscription tool all JUNG devices can be easily described. After input of a ref.-no. e.g. CD 2094 NABS WW the corresponding "field" is displayed on the screen. Beside text, symbols or little graphics can be typed in.
The print out is on paper or foils. For the KNX push-buttons foils are recommended, as with paper the status/operation LED's are covered.
The software is easy to handle, and can be downloaded from our webpage www.jung.de.

1

2

	Ref.-No.
Blank plate with snap-on fixing	
CD 500	
for individual cuttings or drillings	
ivory	**594-0**
white	**CD 594-0 WW**
blue	**CD 594-0 BL**
brown	**CD 594-0 BR**
grey	**CD 594-0 GR**
light grey	**CD 594-0 LG**
red	**CD 594-0 RT**
black	**CD 594-0 SW**

1

2

	Ref.-No.
Blank plate with snap-on fixing	
AS 500 + A 500	
for individual cuttings or drillings	
ivory	**A 594-0**
white	**A 594-0 WW**
aluminium	**A 594-0 AL**

Accessories

1

LS 961 B

2
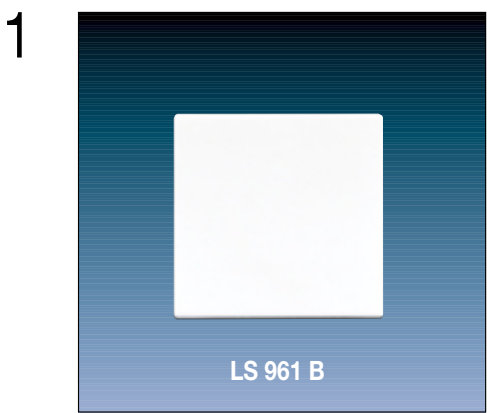
Blank plate	Ref.-No.
LS 990	
ivory	**LS 961 B**
white	**LS 961 B WW**
light grey	**LS 961 B LG**

1

ES 2961 B

AL 2961 B

2
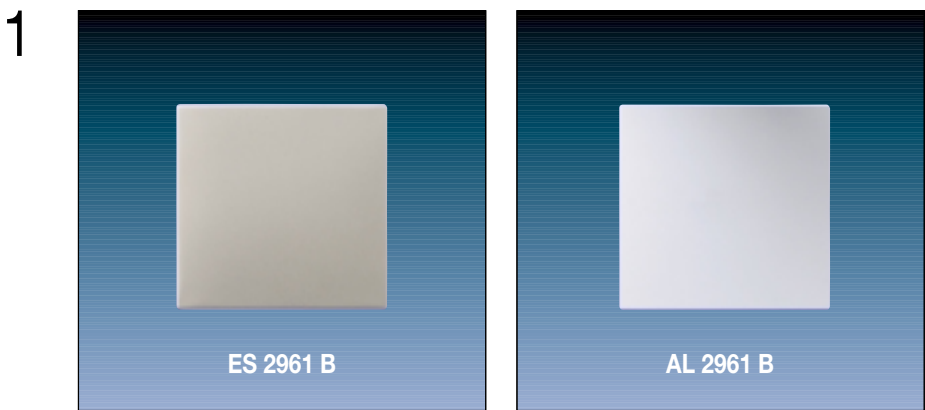
Blank plate	Ref.-No.
Stainless Steel	
stainless steel	**ES 2961 B**
Aluminium	
aluminium	**AL 2961 B**
Anthracite	
anthracite	**AL 2961 B AN**
Gold	
gold coloured	**GO 2961 B**

1

A 581 WW

AS 581 WW

2

		Ref.-No.
Cover frames A 500		
for horizontal and vertical combinations		
white	1-gang	**A 581 WW**
	2-gang	**A 582 WW**
	3-gang	**A 583 WW**
	4-gang	**A 584 WW**
	5-gang	**A 585 WW**
aluminium	1-gang	**A 581 AL**
	2-gang	**A 582 AL**
	3-gang	**A 583 AL**
	4-gang	**A 584 AL**
	5-gang	**A 585 AL**
Cover frames AS 500		
for horizontal and vertical combinations		
ivory	1-gang	**AS 581**
	2-gang	**AS 582**
	3-gang	**AS 583**
	4-gang	**AS 584**
	5-gang	**AS 585**
white	1-gang	**AS 581 WW**
	2-gang	**AS 582 WW**
	3-gang	**AS 583 WW**
	4-gang	**AS 584 WW**
	5-gang	**AS 585 WW**

Accessories
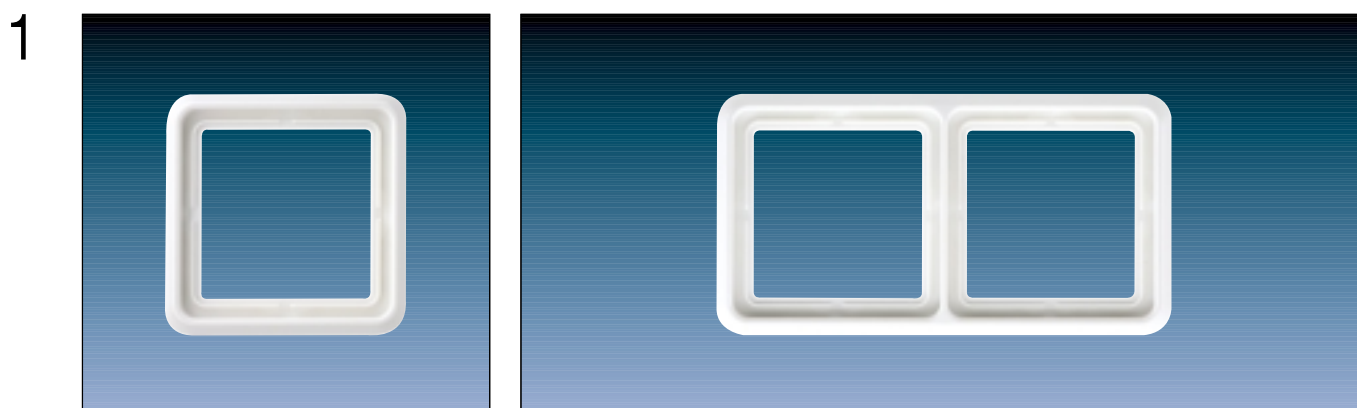
		Ref.-No.
Cover frames CD 500		
for horizontal and vertical combinations		
ivory	1-gang	**CD 581 W**
	2-gang	**CD 582 W**
	3-gang	**CD 583 W**
	4-gang	**CD 584 W**
	5-gang	**CD 585 W**
white	1-gang	**CD 581 WW**
	2-gang	**CD 582 WW**
	3-gang	**CD 583 WW**
	4-gang	**CD 584 WW**
	5-gang	**CD 585 WW**
blue	1-gang	**CD 581 BL**
	2-gang	**CD 582 BL**
	3-gang	**CD 583 BL**
	4-gang	**CD 584 BL**
	5-gang	**CD 585 BL**
brown	1-gang	**CD 581 BR**
	2-gang	**CD 582 BR**
	3-gang	**CD 583 BR**
	4-gang	**CD 584 BR**
	5-gang	**CD 585 BR**
grey	1-gang	**CD 581 GR**
	2-gang	**CD 582 GR**
	3-gang	**CD 583 GR**
	4-gang	**CD 584 GR**
	5-gang	**CD 585 GR**
light grey	1-gang	**CD 581 LG**
	2-gang	**CD 582 LG**
	3-gang	**CD 583 LG**
	4-gang	**CD 584 LG**
	5-gang	**CD 585 LG**
red	1-gang	**CD 581 RT**
	2-gang	**CD 582 RT**
	3-gang	**CD 583 RT**
	4-gang	**CD 584 RT**
	5-gang	**CD 585 RT**
black	1-gang	**CD 581 SW**
	2-gang	**CD 582 SW**
	3-gang	**CD 583 SW**
	4-gang	**CD 584 SW**
	5-gang	**CD 585 SW**

1

LS 981 WW	ES 2981	AL 2981

2
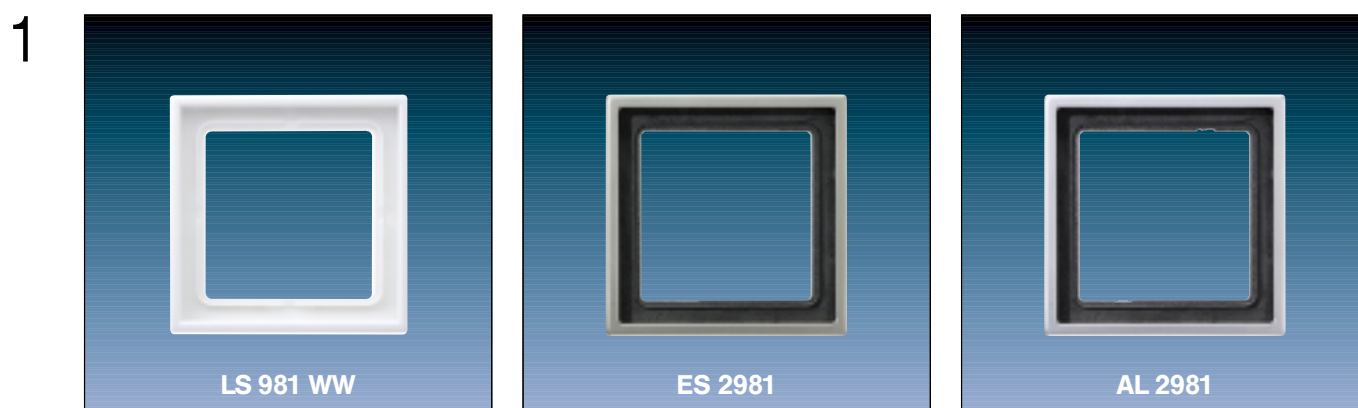
Ref.-No.

Cover frames

for horizontal and vertical combinations

LS 990

ivory	1-gang	**LS 981 W**
	2-gang	**LS 982 W**
	3-gang	**LS 983 W**
	4-gang	**LS 984 W**
	5-gang	**LS 985 W**
white	1-gang	**LS 981 WW**
	2-gang	**LS 982 WW**
	3-gang	**LS 983 WW**
	4-gang	**LS 984 WW**
	5-gang	**LS 985 WW**
light grey	1-gang	**LS 981 LG**
	2-gang	**LS 982 LG**
	3-gang	**LS 983 LG**
	4-gang	**LS 984 LG**
	5-gang	**LS 985 LG**

Stainless Steel

stainless steel	1-gang	**ES 2981**
	2-gang	**ES 2982**
	3-gang	**ES 2983**
	4-gang	**ES 2984**
	5-gang	**ES 2985**

Aluminium

aluminium	1-gang	**AL 2981**
	2-gang	**AL 2982**
	3-gang	**AL 2983**
	4-gang	**AL 2984**
	5-gang	**AL 2985**

Accessories

1

| AL 2981 AN | GO 2981 | GCR 2981 |

2
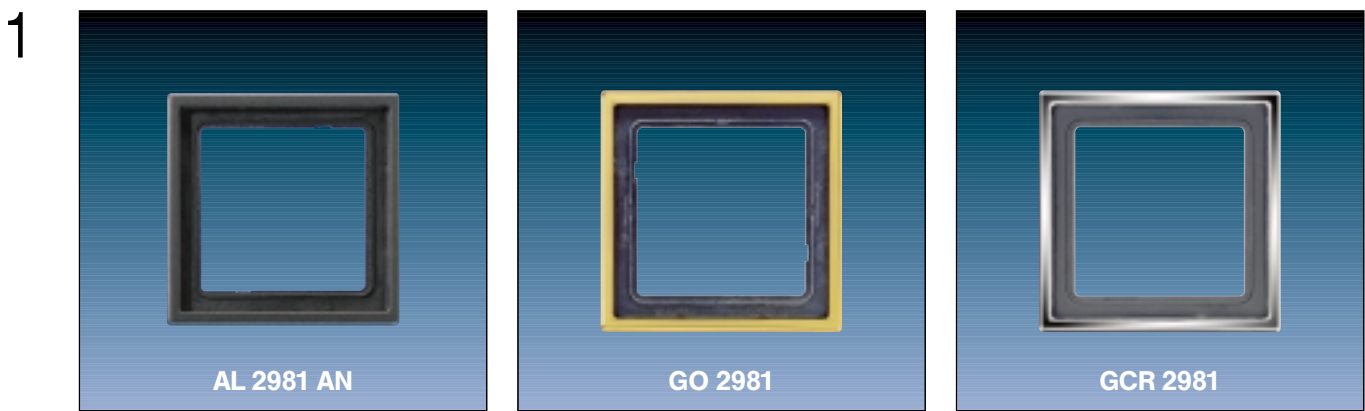
Cover frames
for horizontal and vertical combinations

Ref.-No.

Anthracite

anthracite	1-gang	**AL 2981 AN**
	2-gang	**AL 2982 AN**
	3-gang	**AL 2983 AN**
	4-gang	**AL 2984 AN**
	5-gang	**AL 2985 AN**

Gold

gold	1-gang	**GO 2981**
	2-gang	**GO 2982**
	3-gang	**GO 2983**
	4-gang	**GO 2984**
	5-gang	**GO 2985**

Chrome

chrome	1-gang	**GCR 2981**
	2-gang	**GCR 2982**
	3-gang	**GCR 2983**
	4-gang	**GCR 2984**
	5-gang	**GCR 2985**

1

| AP 581 AL | AP 581 GCR AL | AP 581 GCR WW |

2

		Ref.-No.
Cover frames A plus		
Frames for horizontal and vertical installation		
Aluminium (lacquered)	1-gang	**AP 581 AL**
	2-gang	**AP 582 AL**
	3-gang	**AP 583 AL**
	4-gang	**AP 584 AL**
	5-gang	**AP 585 AL**
Shiny chrome-aluminium	1-gang	**AP 581 GCR AL**
	2-gang	**AP 582 GCR AL**
	3-gang	**AP 583 GCR AL**
	4-gang	**AP 584 GCR AL**
	5-gang	**AP 585 GCR AL**
Shiny chrome-white	1-gang	**AP 581 GCR WW**
	2-gang	**AP 582 GCR WW**
	3-gang	**AP 583 GCR WW**
	4-gang	**AP 584 GCR WW**
	5-gang	**AP 585 GCR WW**
Anthracite-aluminium	1-gang	**AP 581 ANT AL**
	2-gang	**AP 582 ANT AL**
	3-gang	**AP 583 ANT AL**
	4-gang	**AP 584 ANT AL**
	5-gang	**AP 585 ANT AL**
Blue-aluminium	1-gang	**AP 581 BL AL**
	2-gang	**AP 582 BL AL**
	3-gang	**AP 583 BL AL**
	4-gang	**AP 584 BL AL**
	5-gang	**AP 585 BL AL**

1

AP 581 AL	AP 581 ANT AL	AP 581 BL AL
AP 581 GCR AL	AP 581 AL WW	AP 581 ANT WW

2

Cover frames A plus

Frames for horizontal and vertical installation

		Ref.-No.
aluminium	1-gang	**AP 581 AL**
	2-gang	**AP 582 AL**
	3-gang	**AP 583 AL**
	4-gang	**AP 584 AL**
	5-gang	**AP 585 AL**
anthracite-aluminium	1-gang	**AP 581 ANT AL**
	2-gang	**AP 582 ANT AL**
	3-gang	**AP 583 ANT AL**
	4-gang	**AP 584 ANT AL**
	5-gang	**AP 585 ANT AL**
blue-aluminium	1-gang	**AP 581 BL AL**
	2-gang	**AP 582 BL AL**
	3-gang	**AP 583 BL AL**
	4-gang	**AP 584 BL AL**
	5-gang	**AP 585 BL AL**
chrome-aluminium	1-gang	**AP 581 GCR AL**
	2-gang	**AP 582 GCR AL**
	3-gang	**AP 583 GCR AL**
	4-gang	**AP 584 GCR AL**
	5-gang	**AP 585 GCR AL**
	5-gang	**AP 585 AL WW**

1

AP 581 BL WW | AP 581 GCR WW | AP 581 BF WW

2

		Ref.-No.
Cover frames A plus		
Frames for horizontal and vertical installation		
aluminium-white	1-gang	**AP 581 AL WW**
	2-gang	**AP 582 AL WW**
	3-gang	**AP 583 AL WW**
	4-gang	**AP 584 AL WW**
	5-gang	**AP 585 AL WW**
anthracite-white	1-gang	**AP 581 ANT WW**
	2-gang	**AP 582 ANT WW**
	3-gang	**AP 583 ANT WW**
	4-gang	**AP 584 ANT WW**
	5-gang	**AP 585 ANT WW**
blue-white	1-gang	**AP 581 BL WW**
	2-gang	**AP 582 BL WW**
	3-gang	**AP 583 BL WW**
	4-gang	**AP 584 BL WW**
	5-gang	**AP 585 BL WW**
chrome-white	1-gang	**AP 581 GCR WW**
	2-gang	**AP 582 GCR WW**
	3-gang	**AP 583 GCR WW**
	4-gang	**AP 584 GCR WW**
	5-gang	**AP 585 GCR WW**
white	1-gang	**AP 581 BF WW**
	2-gang	**AP 582 BF WW**
	3-gang	**AP 583 BF WW**
	4-gang	**AP 584 BF WW**
	5-gang	**AP 585 BF WW**

Accessories

LSP 981 GLAS

LSP 981 AL

LSP 981 GCR

LSP 981 ES

LSP 982 AL

2
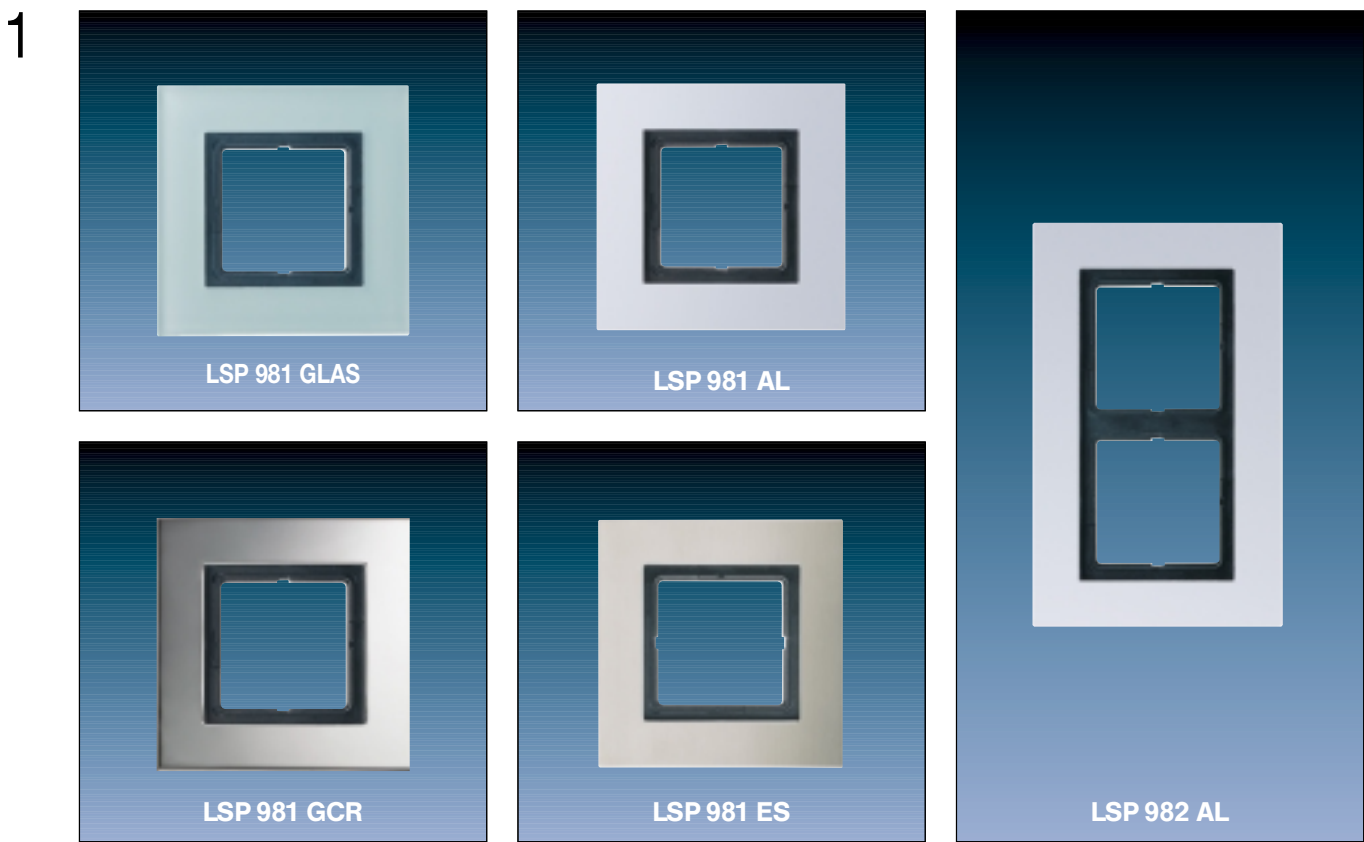
Ref.-No.

Cover frames LS plus

Frames for horizontal and vertical installation

Glass
Single thickness safety glass accord. to DIN 1249
surface satin-coated, back surface lacquered in white

	1-gang	**LSP 981 GLAS**
	2-gang	**LSP 982 GLAS**
	3-gang	**LSP 983 GLAS**
	4-gang	**LSP 984 GLAS**
	5-gang	**LSP 985 GLAS**
Aluminium	1-gang	**LSP 981 AL**
	2-gang	**LSP 982 AL**
	3-gang	**LSP 983 AL**
	4-gang	**LSP 984 AL**
	5-gang	**LSP 985 AL**
Stainless Steel	1-gang	**LSP 981 ES**
	2-gang	**LSP 982 ES**
	3-gang	**LSP 983 ES**
	4-gang	**LSP 984 ES**
	5-gang	**LSP 985 ES**
Shiny chrome	1-gang	**LSP 981 GCR**
	2-gang	**LSP 982 GCR**
	3-gang	**LSP 983 GCR**
	4-gang	**LSP 984 GCR**
	5-gang	**LSP 985 GCR**

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