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The ABB i-bus® Light Controllers, LR/S x.16.1 (x = 2 or 4) are KNX modular installation devices in ProM Design for installation in the distribution board on 35 mm mounting rails. The connection to the ABB i-bus® is implemented via a bus connection terminal on the device shoulders.

The LR/S can control dimmable electronic ballast or transformers with 1-10 V interface via 2 or 4 outputs depending on the device .

For every output a floating switching contact (16 A) for direct switch on and off of the ballasts is available. The switching relays are particularly suitable for switching fluorescent lamp loads (AX) to DIN EN 60 669.

Manual switch ON and OFF of the individual outputs is possible in manual control independently of the bus or auxiliary voltages. The operating element on the switching relay directly indicates the switch status.

A separate Light Sensor LF/U 2.1 can be separately connected on the Light Controller for each output. The Light Sensor measures brightness in closed rooms. The Light Controller undertakes constant light control for each output (control circuit) with this brightness value. It is possible to use several Light Sensors for a single output. The Light Controller and the connected Light Sensor are supplied with power via the KNX and do not require an additional power supply.

Technical data

Supply	Operating voltage	21...30 V DC, made available by the bus	
	Current consumption KNX	2.16.1	4.16.1
	Maximum	8.5 mA	10 mA
	Power consumption via KNX	Max. 250 mW	
Outputs control circuit	LR/S type	2.16.1	4.16.1
	Number of control outputs 1-10 V (passive)	2	4
	Max. current per control output	100 mA	100 mA
	Max. number of ballast (2 mA/ballast) ¹⁾	50	50
	Max. cable length, with max. load (100 mA)	70 m with conductor cross-section 0.8 mm ² 100 m with conductor cross-section 1.5 mm ²	
Sensor input	LF/U 2.1 ²⁾		
	Number of inputs	2 with LR/S 2.16.1 or 4 with LR/S 4.16.	
	Max. cable length per sensor	100 m, Ø 0.8 mm, P-YCYM or J-Y(ST)Y cable (SELV), e.g. shielded KNX bus cable	
Brightness detection	Lighting control operating range	Optimised for 500 Lux. 200 ...1200 Lux for rooms with average furnishing level (reflection 0.5) max. 860 Lux in a very brightly furnished room (reflection 0.7) max. 3000 Lux in a very darkly furnished room (reflection 0.2) The Lux values are measured values on the work surface (reference surface) ³⁾	
	Optimum installation height	2-3 m	
	Outputs load circuit rated values	LR/S type	2.16.1
Number of load outputs (floating)		2	4
U _n rated voltage		250/440 V AC (50/60 Hz)	
I _n rated current		16 A-AC1 or 10 AX	
Leakage loss per device at max. load		2.6 W	5.2 W

Load circuit (relay) switching currents	AC1 operation (cos φ = 0.8) DIN EN 60 947-4-1	16 A / 230 V	
	Fluorescent lighting load AX to DIN EN 60 669-1	10 AX/250 V (140 μF) ⁴⁾	
	AC3 operation (cos φ = 0.6) DIN EN 60 947-4-1	8 A / 230 V	
	Minimum switching performance	100 mA/12 V 100 mA/24 V	
	DC current switching capacity (ohmic load)	10 A/24 V =	
Load circuit (relay) service life	Lamp loads	See lamp load table	
	Mechanical endurance	> 3 x 10 ⁶	
	Electrical endurance to	DIN IEC 60 947-4-1	
Load circuit (relay) switching times⁵⁾	AC1 (240 V/cosφ = 0.8)	> 10 ⁵	
	AC5a (240 V/cosφ = 0.45)	> 3 x 10 ⁴	
	LR/S type	2.16.1	4.16.1
	Max. relay position change per output and minute if all relays are switched simultaneously. The position changes should be distributed over a minute.	60	30
Connections: ABB i-bus®	Max. relay position change per output and minute if only one relay is switched	120	120
	KNX bus connection terminal	0.8 mm Ø, single core	
Connections: - Control circuit - Light sensor LF/U 2.1	Screw terminal with slotted screw	0.2...2.5 mm ² stranded 0.2...4 mm ² single core	
	sleeves without/with plastic	0.25...2.5/0.25...4 mm ²	
	TWIN sleeves	0.5...2.5 mm ²	
	Tightening torque	Max. 0.6 Nm	
Connections: load circuit	Screw terminal with universal head (PZ 1)	0.2...4 mm ² stranded, 2 x (0.2-2.5 mm ²) 0.2...6 mm ² single core, 2 x (0.2-4 mm ²)	
	sleeves without/with plastic	0.25...2.5/0.25...4 mm ²	
	TWIN sleeves	0.5...2.5 mm ²	
	Tightening torque	Max. 0.8 Nm	
Operating and display elements	Red LED and KNX button	For assignment of the physical address	
	Switch position display	Relay operator	
Enclosure	IP 20	to DIN EN 60 529	
Safety class	II	to DIN EN 61 140/IEC 536	
Isolation category	Overvoltage category	III to DIN EN 60 664-1	
	Pollution degree	2 to DIN EN 60 664-1	
KNX safety extra low voltage	SELV 24 V DC		
Temperature range	Operation	-5 °C...+45 °C	
	Storage	-25 °C...+55 °C	
	Transport	-25 °C...+70 °C	
Environmental conditions	Humidity	Max. 93 %, moisture condensation should be excluded	
Design	Modular installation device (MDRC)	ProM	
	LR/S type	2.16.1	4.16.1
	Dimensions (H x W x D)	90 x W x 64.5	
	Width W in mm	72	108
	Mounting width (modules at 18 mm)	4	6
Weight	in kg	0.200	0.330
Installation	On 35 mm mounting rail	DIN EN 60 715	
Mounting position	as required		
Housing, colour	Plastic housing, grey		
Approvals	KNX to EN 50 090-2-2	Certification	
CE mark	in accordance with the EMC guideline and low voltage guideline		

Lamp loads, switching powers for lamp circuit

Lamps	Incandescent lamp load	2300 W
Fluorescent lamps T5 / T8	Uncorrected	2300 W
	Parallel compensated	1500 W
	DUO circuit	1500 W
Low-volt halogen lamps	Inductive transformer	1200 W
	Electronic transformer	1500 W
	Halogen lamp 230 V	2300 W
Dulux lamp	Uncorrected	1100 W
	Parallel compensated	1100 W
Mercury-vapour lamp	Uncorrected	2000 W
	Parallel compensated	2000 W
Switching capacity (switching contact)⁶⁾	Max. peak inrush-current I_p (150 μ s)	400 A
	Max. peak inrush-current I_p (250 μ s)	320 A
	Max. peak inrush-current I_p (600 μ s)	200 A
Number of electronic ballast (T5/T8, single element)¹⁾	18 W (ABB EVG 1 x 58 CF)	23
	24 W (ABB EVG-T5 1 x 24 CY)	23
	36 W (ABB EVG 1 x 36 CF)	14
	58 W (ABB EVG 1 x 58 CF)	11
	80 W (Helvar EL 1 x 80 SC)	10

¹⁾ The control current of 1-10 V devices determine the number of connectable ballast devices. Typical devices are between 0.4...4 mA.

²⁾ Note: LF/U 1.1 not suitable

³⁾ Rooms are lit up differently by the incidental daylight and the artificial lighting of the lamps, and not all surfaces in the rooms (walls, floor, furniture, etc.) reflect the light which falls on them in the same manner. Accordingly, even though there is an exactly calibrated constant lighting control in daily operation, deviations to the set target value may occur. These deviations may be up to +/- 100lx should the current ambient conditions in the room, and accordingly the reflection properties of the surfaces (paper, persons, reorganized or new furniture), differ significantly from the original ambient conditions at the time of calibration. Deviations may also occur if the Light Sensor is influenced by direct or reflected light falling on it which is not influenced or only slightly influenced by the surfaces in the detection range of the Light Sensor.

⁴⁾ The maximum inrush-current peak (see table "Lamp loads") may not be exceeded

⁵⁾ The specifications only apply after the device has been connected to the bus voltage for min. 30 seconds.
Typical delay of the relay is approx. 20 ms.

⁶⁾ For multiple element lamps or other types, the number of electronic ballast devices must be determined using the peak inrush current of the electronic ballast. See the example: Planning and application

Caution

The connection of a 230 V mains voltage supply to one of the 1-10 V outputs or sensor inputs leads to the destruction of the 1-10 V end stage or the corresponding sensor input.

Control and load ends are electrically isolated from the KNX. The individual relays are potential free (floating). When connecting the control line it is important to consider that the control outputs each feature a common reference ground with one another.

Several electronic ballast with a 1-10 V interface can be controlled by one output of the Light Controller. The number of dimmable ballast per output is limited both by the switching and the control powers of the Light Controller. For calculation example see: Planning and application.

User programs	Number of Communication objects	Max. number of group addresses	Max. number of associations
Control Dim 2f 1-10V/1	62	254	255
Control Dim 4f 1-10V/1	118	254	255

Note

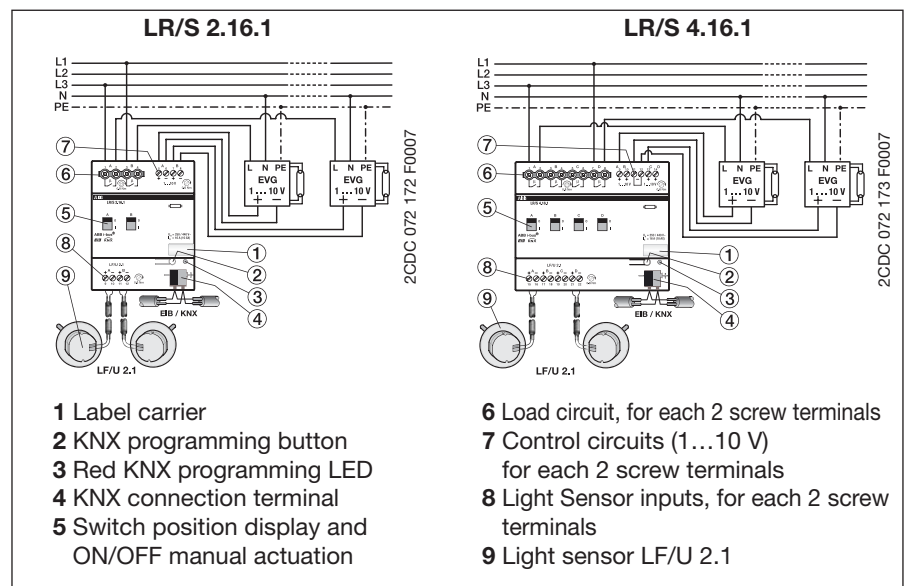
For a detailed description of the application program see “Light controller LR/S x.16.1 and light sensor LF/U 2.1” product manual. It is available free-of-charge at www.ABB.de/KNX.

The programming requires EIB Software Tool ETS2 V1.3 or higher. If ETS3 is used a “.VD3” or higher type file must be imported.

The application program for the ETS2/ETS3 can be found at ABB/EIB Lighting Devices/Illumination and Light Sensors/Control Dim xf 1-10V/1, (x = 2 or 4, number of outputs).

The devices do not support the closing function of a project or the KNX devices in the ETS. If you inhibit access to all devices of the project with a *BA password* (ETS2) or a *BCU code* (ETS3), it has no effect on this device. Data can still be read and programmed.

Circuit diagram



Caution

All-pole disconnection must be observed in order to avoid dangerous touch voltages which originate from feedback from differing phase conductors.

Important

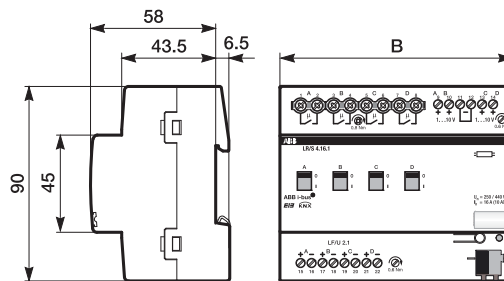
An open 1-10 V control line produces the maximum ballast brightness. A short circuited control line generates the minimum dimming value. The minimum dimming value is also set if the control cable polarity is reversed. In all three cases dimming of the lighting is not possible.

Note

An open Light Sensor cable (max. cable resistance) means the same as a dark room for the Light Controller. The 1-10 V output is controlled with maximum brightness during control. The same behaviour is also exhibited with a short circuit and if the sensor cable polarity is reversed.

The sensor value can be read via the object *Sensor value* (No. 32, 57, 82 or 107) of the corresponding output. This value corresponds with the measured value on the sensor input, the Light Sensor detects the light luminance within its detection range. The value does not comply with the lighting intensity in Lux measured with a Lux meter underneath the Light Sensor. In all three fault scenarios (open circuit, short circuit and incorrect polarity) the value read via the object *Sensor value* is equal to 0. This value corresponds with the value of absolute darkness.

Dimension drawing



	LR/S 2.16.1	LR/S 4.16.1
B	72 mm 4 space units	108 mm 6 space units

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Notes

