

Application Descriptions

Lighting

Lighting Sensors

Supplement 1 LTE-Mode Extensions

Summary

This document specifies the Functional Blocks for sensors in the Lighting Application Domain.

Version 01.00.02 is a KNX Approved Standard.

This document is part of the KNX Specifications v2.1.

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Document updates

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7/20/1 S1	2013.10.22	Publication as Chapter 7/20/1 Supplement 1 "Lighting Sensors – LTE-
v01.00.00		Mode Extensions"
01.00.02	2013.10.29	Editorial updates for the publication of KNX Specifications 2.1.

References

[01] Chapter 7/20/1 "Lighting Sensors"

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Abbreviations

COV	Change Of Value
IBS	FB Indoor Brightness Sensor
ILS	FB Indoor Luminance Sensor
IR	LTE-Mode InfoReport service
LDSB	FB Light Dimming Sensor Basic
LDAB	FB Light Dimming Actuator Basic
LSAB	FB Light Switching Actuator Basic
LSSB	FB Light Switching Sensor Basic
LTE-Mode	Logical Tag Extended easy mode

1 FB Light Switching Sensor Basic (LSSB)

1.1 Aims and objectives

The definitions in this document for FB Light Switching Sensor Basic (LSSB) are an add-on to the existing FB Specification in [01] to describe the LTE-Mode runtime interface and LTE-Mode specific parameters of FB LSSB.

The FB LSSB is used in the Application Domain Lighting to notify light switching commands to:

- switching and dimming actuators (traditional direct sensor actuator communication)
- or to provide light switching sensor data to a Lighting Controller (sensor controller actuator communication)

The Inputs and Outputs of FB LSSB are specified in this document but not the Human Machine Interface (HMI). Consequently, the manufacturers of the button or switch have the possibility to implement their design and their operation methods.

1.2 Functional specification

1.2.1 Overview

The FB Light Switching Sensor Basic

- provides hardwired inputs or local push-button/HMI functionality to trigger output messages to control the On/Off status
 - of FB Light Switching Actuator Basic (LSAB)
 - or FB Light Dimming Actuator Basic (LDAB)
- receives status feedback messages from light switching/dimming actuators according to the FB specification in [01]

Binding of LSSB and LSAB / LDAB FBs is based on LTE-Mode zoning concepts. Control and status feedback information are exchanged according to LTE-Mode mechanisms in a common LightingGroup.

In the LTE-Mode runtime system LightingGroup is mapped to existing LTE-Mode Geographical zones.

Runtime process communication of LSSB is disabled if LTE-Mode LightingGroup is 'OutOfService'

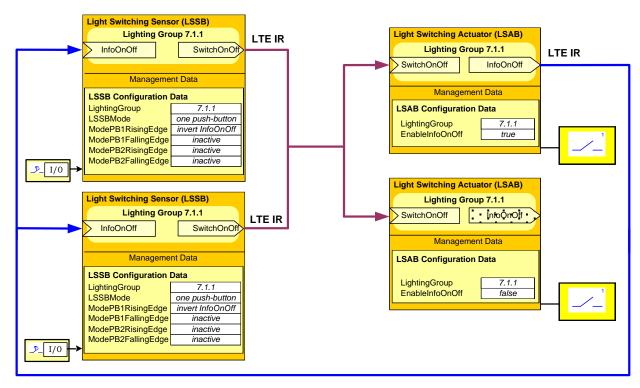


Figure 1 – LSSB with single push-button interface (toggle mode)

This example shows the binding of two parallel light switching sensors LSSB with two parallel light switching actuators LSAB in the same LightingGroup.

Both LSSB are configured to invert the output SwitchOnOff on each transmission according to the received InfoOnOff feedback information (toggle mode). Runtime process data SwitchOnOff is provided by both LSSB and received by both LSAB.

Actuator feedback information InfoOnOff is provided by one LSAB actuator (configured as group-speaker) to support toggle functionality in the LSSB.

NOTE 1 Since both actuators are controlled together, InfoOnOff could in principle be provided by both LSAB. On/Off value of both actuator feedback messages would normally be identical (=> last wins principle on the input in the LSSB). Redundant InfoOnOff messages create unnecessary traffic and should be avoided.

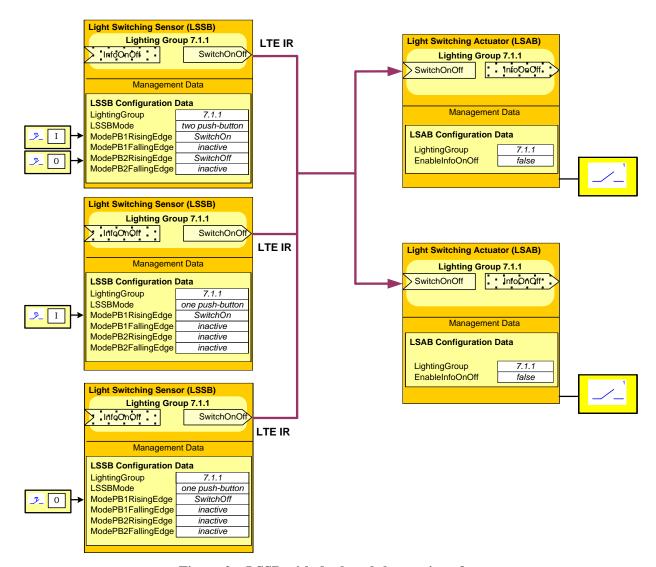


Figure 2 – LSSB with dual push-button interface

This example shows the binding of 3 parallel LSSB with two parallel light switching actuators LSAB in the same LightingGroup (7.1.1):

- one LSSB with dual push-button interface
- one LSSB with single push-button interface sending SwitchOn only
- one LSSB with single push-button interface sending SwitchOff only

None of the LSSB requires InfoOnOff feedback information to implement a toggle function of SwitchOnOff output.

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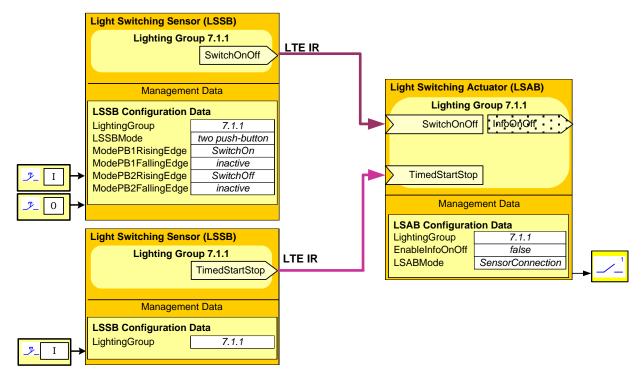


Figure 3 – Autonomous switch-off function via TimedStartStop signal

Figure 3 illustrates the runtime mechanism between LSSB and LSAB to trigger an autonomous switch off function on the LSAB. LSSB may provide an optional, dedicated trigger signal TimedStartStop to implement e.g. a 'staircase-function'. TimedStartStop is distributed using LTE-Mode InfoReport mechanisms.

Input TimedStartStop on the LSAB will temporarily switch the actuator in the On-state for a defined time. Afterwards LSAB executes an autonomous switch-off function. A manufacturer-specific pre-warning action may be performed.

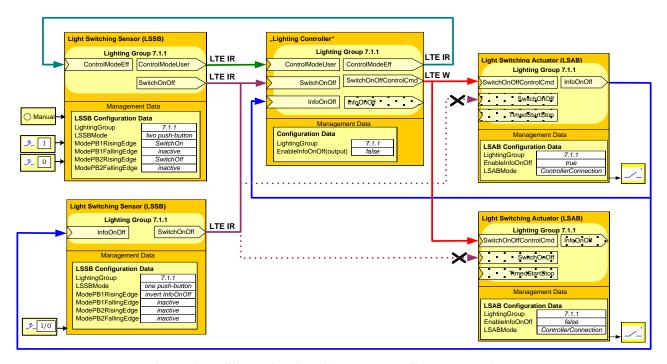


Figure 4 – LSSB - Lighting Controller – LSAB connection

Figure 4 illustrates a light switching application by a Lighting Controller. The LTE-Mode Lighting application model does not define a dedicated 'Lighting Controller' FB. The design and runtime interface of the Lighting Controller is manufacturer specific. However in the runtime system, the Lighting Controller shall emulate a Lighting Actuator 'proxy LSAB' as the counterpart for the Lighting Sensors.

FB LSSB is connected to a Lighting Controller to notify direct control commands SwitchOnOff requested by the room occupant (manual lighting control).

In addition LSSB may provide the optional signal ControlModeUser representing a request by the user to change from manual to automatic lighting control mode (and vice versa). The Lighting Controller provides the current lighting control mode ControlModeEff (automatic/manual) as optional feedback information for the LSSB.

The Lighting Controller determines the current On/Off setpoint of the lighting actuator according to control commands from LSSB and other criteria (e.g. scheduler, room occupancy etc.). Lighting Controller uses the specific SwitchOnOffControlCmd message to control the On/Off state of the light switching actuator LSAB.

NOTE 2 SwitchOnOff input of the LSAB is used for direct sensor- actuator communication only and deactivated (automatically or via configuration) if LSAB is connected to a Lighting Controller.

1.3 Functional Block diagram

FB Light Switching	Sensor Ba	asic (LSSB)	421		
Inputs			Outputs		
Binding Grp.: Ligh	ntingGroup (Geographical)	•		
IR: LSAB.InfoOnOff			IR: SwitchOnOff		
IR: LDAB.InfoOnOff			IR: ControlModeUser		
IR: LSAB.ControlModeEff			IR: TimedStartStop		
IR: LDAB.ControlModeEff					
additional I/Os			Parameters		
- One or two on board push-buttons	LightingGroup (Geographica				
or inputs to wire external switches/push-			LSSBMode		
buttons			ModePB1RisingEdge		
			ModePB1FallingEdge		
			ModePB2RisingEdge		
			ModePB2FallingEdge		
mandatory	option	nal IR: LTE-	Mode		
····a···aasary	96	InfoRepo			
		ппоттор	···		

Figure 5 – Functional Block Diagram for FB Light Switching Sensor Basic

1.4 Datapoints

Datapoint	Description	Datapoint Type	LSSB PID
Outputs			
SwitchOnOff	Control signal to switch the light on (=1) or off (=0)	DPT_Switch (1.001)	PID 61
ControlModeUser	Command to request automatic or manual light control by local operation 0: automatic light control 1: manual light control 2 to 255 reserved for future extensions	DPT_LightControl- Mode (20.604)	PID 64
TimedStartStop	Trigger to activate a timed switch on and autonomous switch off function by the actuator	DPT_Start (1.010)	PID 65
Inputs			
LSAB.InfoOnOff LDAB.InfoOnOff	Feedback information from the actuator (LSAB or LDAB) to indicate the binary state of the light: on (=1) or off (=0)	DPT_Switch (1.001)	LSAB PID 51 LDAB PID 51
LSAB.ControlModeEff LDAB.ControlModeEff	Feedback information from a Lighting Controller to indicate whether automatic or manual light control mode is currently active 0: automatic light control 1: manual light control 2 to 255 reserved for future extensions	DPT_LightControl- Mode (20.604)	LSAB PID 54 LDAB PID 54

Parameters			
LightingGroup (3 Properties)	LTE-Mode Geographical Zone - Building zone like Floor, Apartment - Room within the Building zone - Subzone within the Room	- DPT_Ucount- Value8_Z (202.002) - DPT_Ucount- Value8_Z (202.002) - DPT_Ucount- Value8_Z (202.002)	PID 101-103
LSSBMode	Defines the basic behaviour of LSSB: 1: one push button/binary input mode; additional features controlled by ModePB1Rising/FallingEdge 2: two push buttons/binary inputs mode; additional features controlled by ModePB1Rising/FallingEdge and ModePB2Rising/FallingEdge	DPT_SwitchPBModel (20.605)	PID 120
ModePB1RisingEdge	Defines behaviour of SwitchOnOff for a rising edge of push button 1 0: inactive (no message sent) 1: SwitchOff message sent 2: SwitchOn message sent 3: inverse value of InfoOnOff is sent	DPT_PBAction (20.606)	PID 121
ModePB1FallingEdge	Defines behaviour of SwitchOnOff for a falling edge of push button 1 0: inactive (no message sent) 1: SwitchOff message sent 2: SwitchOn message sent 3: inverse value of InfoOnOff is sent	DPT_PBAction (20.606)	PID 122
ModePB2RisingEdge	Defines behaviour of SwitchOnOff for a rising edge of push button 2 0: inactive (no message sent) 1: SwitchOff message sent 2: SwitchOn message sent 3: inverse value of InfoOnOff is sent	DPT_PBAction (20.606)	PID 123
ModePB2FallingEdge	Defines behaviour of SwitchOnOff for a falling edge of push button 2 0: inactive (no message sent) 1: SwitchOff message sent 2: SwitchOn message sent 3: inverse value of InfoOnOff is sent	DPT_PBAction (20.606)	PID 124

Table 1 - LTE-Mode specific Properties

		Support
Parameter	LightingGroup	М

Table 2 - Standard Properties of Interface Object

		Support
Parameter	LSSBMode	0
	ModePB1RisingEdge	0
	ModePB1FallingEdge	0
	ModePB2RisingEdge	0
	ModePB2FallingEdge	0
Diagnostic Data		

 $Configuration \ of \ LSSB \ functionality \ via \ parameters \ LSSBMode \ and \ ModePB1Rising/FallingEdge \ and \ ModePB2Rising/FallingEdge.$

Table 3 - LSSB configuration

	Parameter settings						
LSSB functionality 1)	LSSBMode	ModePB1 RisingEdge	ModePB1 FallingEdge	ModePB2 RisingEdge	ModePB2 FallingEdge		
single button, toggle mode	= 1	= 3	= 0	= 0	= 0		
single button, send Switch On	= 1	= 2	= 0	= 0	= 0		
single button, send Switch Off	= 1	= 1	= 0	= 0	= 0		
dual button,PB1 send Switch OnPB2 send Switch Off	= 2	= 2	= 0	= 1	= 0		
 dual button, with ²⁾ PB1 toggle mode PB2 toggle mode 	=2	= 3	= 0	= 3	= 0		

¹⁾ In all examples SwitchOnOff message is triggered by PB rising edge

²⁾ This configuration could only make sense if the 2 PBs are separated in a larger distance from each other and are connected over a common interface.

1.5 Detailed specification of the Datapoints

1.5.1 Output SwitchOnOff

FB:	LSSB		LTE-	Mode	e Server Output Nar	ne: Swi	tchOnO	ff Mandatory Optional				
Desc	ription:											
					sents control comma tingGroup.	nds to char	nge the	On/	Off state	of light sw	ritching/d	imming
DPT:	OPT: Name DPT_Sv				vitch	DPT ID	1.001		Datatype format B ₁			
Field				Des	scription		Sup.	Ra	ange	Unit	COV	Default
b				LSS	s field shall indicate whether BB requests to switch the light (1) or off (0)			{0	, 1}	-	-	-
Com	nunicat	io	n:	_			-	· -		-		
Bind	ing Gro	uŗ) :									
Clas	S				Туре			De	efault			
Geo	graphica	ıl		\boxtimes	BuildingZone.Room	n.Subzone		cs	(see par	ameter Li	ghtingGr	oup)
App	ication S	Sp.	ecific									
Una	ssigned				Broadcast Configurable							
DP /	Address	:			IO Type(ID): 421 (LSSB) Prop			roperty II	erty ID: 61			
	-Mode-S	er	vices	;	COV ☑ MinRepTime: sec Heartbeat:			oeat:	min			
(eve	-				Output per default communicating			E	Binding G	Froup Wild	card allo	wed 🖂
	Report -Mode F	٥,		\boxtimes	Tx Prio: High 🗌			Normal [\boxtimes	Low		
Resp	oonse po output sh upported	olli al	ng of	ys	Transm after Powerup: Stored Value					ilue 🗌		
	perty-Se lividual):	Read only		Read/V	Vrite)]		
Exce	ption Ha	an	dling							Save a	at Power	down
Spec	ial Featu	ır	es:									
pc - LT	 Depending on the parameters ModePB1Rising/FallingEdge and ModePB2Rising/FallingEdge it is possible that only one value of the range is transmitted LTE-Mode wildcard features can be used to control e.g. all lighting actuators within the same Room or within the same Room. 											
	within the same BuildingZone No spontaneous transmission of a default value after power-return. Transmission shall be triggered by											

user interaction only

1.5.2 Output ControlModeUser

FB:	LSSB	LTE- Name		Server Output	ControlMod	deUser		M	andatory	Opt	ional 🛚
Desc	ription:							<u> </u>			
				provides a command			manual	light	control by	/ local op	peration.
				his command is mai			chroniza	. Cor	ntrolMode	l lear val	ues of
	Input ControlModeEff may be used as feedback information to synchronize ControlModeUser values of multiple LSSB in the same zone.										
DPT:				ghtControlMode	DPT ID	20.604	Dat	atvpe	format	N ₈	
Field	1 1 1 1 1 1 1 1 1			scription	1 1	Sup.	Range		Unit	COV	Default
Contr	olMode			s field shall indicate	whether	м		1)	-	-	cs
			auto	omatic light control (0) or		ŕ				
				nual light control (1)							
			req	uested by the room	occupant.						
			Val	ues 2 to 255 are res	anyod for						
				re extensions	erved for						
Comr	nunicatio	on:	I rata	TO OXIONOIONO		<u> </u>		<u>.</u>			
	ing Grou										
Class				Туре			Defaul	t			
	raphical		\boxtimes	BuildingZone.Rooi	m.Subzone		cs (see	e para	ameter Li	ghtingGr	oup)
Appli	cation Sp	ecific									
	signed				Configurable						
	ddress:			IO Type(ID):	421 (LSSE		Prope	_		64	
	Mode-Se	rvices			Will top Time.			<u> min</u>			
(ever				Output per default		ting 🖂					
	eport		\boxtimes	Tx Prio:	High		Norr	nal 🛭	₫	Low	
	-Mode Re		·h o								
	onse poll it shall alv			Transm after Powe	erup: ²⁾ Store	ed Value	Ac	t Valu	ıe 🔲 D	efault Va	alue 🛛
	orted)	ways	C								
	erty-Serv	/ice		_	-						
	vidual ac			Read only		Read/W	/rite	Ш			
Exception Handling:								Save a	at Power	down	
									•		
	ial Featu										
1) It sh	nall be po	ssible	that c	only one value of the	e range is tra	nsmitte	d, e.g. to	trig	ger 'auton	natic con	trol' only
²⁾ It sh	2) It shall be possible that a default/stored value is transmitted spontaneously after power-return or that										

LSSB does not send an initial ControlModeUser message after power-return.

1.5.3 Output TimedStartStop

FB: LSSB LTE-Mod Name:	e Server Output	TimedStart	tStop		Mandatory	Opt	ional 🛚
Description:							
Output TimedStartStop tri	ggers a timed switch	on and aut	onomou	is switch of	ff function by	the actu	uator.
DPT : Name DPT_St		DPT ID	1.010		ype format	B ₁	
	scription		Sup.	Range	Unit	COV	Default
	1: triggers the star timed switch on nomous switch function0: switch off imme stop the timer	and auto- off	M	{0, 1}	-	-	cs
Communication:							
Binding Group:							
Class	Туре			Default			
Geographical 🖂	BuildingZone.Roor	m.Subzone		cs (see p	arameter Li	ghtingGr	oup)
Application Specific							
Unassigned		Configurable					
DP Address:	IO Type(ID):	421 (LSSE		Property		65	
LTE-Mode-Services		MinRepTim		sec	Heart		<u>min</u>
(event):	Output per default		ting 🖂		Group Wild		_
InfoReport 🖂	Tx Prio:	High 🗌		Norma	al 🖂	Low	
(LTE-Mode Read- Response polling of the output shall always be supported)	Transm after Powe	erup: Stored	d Value	☐ Act \	/alue □ □	efault Va	alue 🗌
Property-Service (individual access):	Read only		Read/V	Vrite			
Exception Handling:					Save	at Power	down
Special Features:							
1) It shall be possible that only one value of the range is transmitted, e.g. to trigger 'start' only							
No spontaneous transmis user interaction only	sion of a default valu	e after pow	er-returr	n. Transmi	ssion shall b	e trigger	ed by

1.5.4 Input InfoOnOff

FB:	LSSB			Client Input InfoOnOff Mandatory ☐ Optional ☒					onal 🛚			
		Nan	ne:		_							
Descri	•									. (1.0.4	<u></u>	
				receive the On/O	ff St	atus of the c	orresp	ondi	ng switch	ning (LSA	B) or dim	ımıng
				same zone.				1		. () - (1. (
				ed solely for visua	aliza	ation purpose	es, for	ımpı	ementing	tne togg	gie functio	nality of
				other purposes.		DOT ID			<u> </u>			
DPT:	Name	ט	PT_Sv			DPT ID 1	1.001		Datatype		B ₁	.
Field				Description						Sup.	Unit	Default
b					ndicates the switching status of the lighting M Off							
					actuator On (1) or Off (0) In case of dimming actuator:							
					ıng	actuator:						
				- 0: light off								
				- 1: light on or di	mm	1ea > 0 %					-	
	unicatio											
Class	ng Grou	ıp:		Tuna				Dot	foult			
	raphical		\square	Type Default								
	cation Sp	ooifi		BuildingZone.Room.Subzone cs (see parameter LightingGroup)								
	signed	Jecini	-	Broadcast		onfigurable [
	ddress:		Ш	Dioaucasi		417 (LSAB)						
				IO Type(ID):		418 (LDAB)		Pr	operty ID):	51	
	Mode-Se	ervice	9	InfoReport Sniff	er	on Binding G	Proup:			-		
(even				Timeout:				Mir	,			
InfoRe			\boxtimes	Titileout.				IVIII	l			
	Mode-Se	ervice	9									
(pollii			_	Read Wildcard /	Re	sp Sniffer on	ı Bindir	ng G	roup:			
	Response									-		
	after Po		•	Defau	lt V	alue 🛚					tored Val	
	tion Har										werdown	
If this DP is not received (communication failure or configuration mistake) and the toggle functionality is												
activated, then output SwitchOnOff will still toggle												
Special Features:												
	If multiple actuators are operated in the same zone, each actuator may send its own InfoOnOff message. Since all actuators in the same zone are controlled together, subsequent InfoOnOff feedback messages											
								eque	nt InfoO	nOff feed	back mes	ssages
				ast wins principle								
However it is highly recommended to configure one actuator in the zone as InfoOnOff Group Speaker												

1.5.5 Input ControlModeEff

FB: LSSB LTE-	Mode	Client Input Nam	ne:	ControlMo	deE	ff Ma	andatory	Opti	onal 🛚
Description:			-			•			
Input ControlModeEff control is currently ac This information can of multiple LSSB in th	tive i	n the zone. ed solely for visual	ization pu	poses, or				_	_
		htControlMode	DPT ID			Datatype	format	N ₈	
Field		Description	Description Sup. Unit Default						
b		control (0) or man	This field shall indicate whether automatic light control (0) or manual light control (1) is currently cs						cs
		values 2 to 255 a	re reserve	d for future	ext	ensions	<u> </u>		
Communication:									
Binding Group:		-				f- 11			
Class			Type Default BuildingZone.Room.Subzone cs (see parameter LightingGroup)						
Geographical	<u> </u>	BuildingZone.Roo	m.Subzor	ie	cs	(see para	meter Li	ghtingGro	oup)
Application Specific	<u>Ļ</u>		0 "						
Unassigned	Ш	Broadcast	Configu						
DP Address:		IO Type(ID):	417 (LS 418 (LD		Pi	roperty ID		54	
LTE-Mode-Service	е	InfoReport Sniffe	r on Bindi	ng Group:		-	-		
(event): InfoReport	\boxtimes	Timeout:			Mi	n			
LTE-Mode-Service (polling): Read – Response		Read Wildcard / F	Resp Sniffe	er on Bindi	ng G	Group:			
Value after Powerup):	Default	Value 🛚				S	tored Val	ue 🗌
Exception Handling	:					Sa	ve at Po	werdown	
Special Features:									
ControlModeEff feedback from a Lighting Controller is represented in the LTE-Mode runtime system as an InfoReport from an LSAB or LDAB. From the perspective of the LSSB the Lighting Controller behaves like a lighting actuator proxy to emulate traditional direct sensor – actuator communication.									

1.5.6 Parameter-set LightingGroup

LightingGroup is implemented using the LTE-Mode Geographical zone concept. It consists of 3 properties belonging together.

1.5.6.1 Parameter BuildingZone

FB: LSSB Property	Name (Server):	ightingGroup	.Building	Zone	Mandatory	/ X Opt	ional 🗌
Description:	(<u> </u>			,,		
Part of LightingGroup par	ameter set mapped to	LTE-Mode C	Geograph	nical z	one:		
-> BuildingEntity (Floor, A	partment, Building se	ction etc.)					
DPT : Name DPT_U	countValue8_Z	DPT ID 2	202.002	Data	atype format	U_8Z_8	
Field	Description	3	Sup.	Range	Unit	Default	
CounterValue	Number of the Build	ingZone		М	1 to 126		CS
Status						Bitset	
- OutOfService	zone active /inactive			0	true/false		CS
- all other flags	not supported, fixed	to '0'		NA			
Command						Enum	
- NormalWrite				M			
- SetOSV & ResetOSV	set zone inactive / a	ctive		0			
- all other commands	not supported			NA			
Communication:							
DP Address:	IO Type(ID):	421 (LSSB)			rty ID:	101	
(in the server)	Start-Index:	1			elements	1	
Property access:	Read only	R	lead/Writ	е	\boxtimes		
Protection	Read level		V	Vrite I	evel		
Exception Handling:	Value after Powerup:	Stored Val	lue 🛛 A	ct Va	lue 🗌 Defa	ault Value	
Special Features:							
LSSB LTE-Mode runtime interface is deactivated if zone is 'OutOfService'. If parameter BuildingZone is							
'OutOfService' also the corresponding Room and Subzone parameters are 'OutOfService' (common flag)							

1.5.6.2 Parameter Room

FB:	LSSB	Propert	rty Name (Server): LightingGroup.Room Mandato				Mandator	y 🛛 Opt	ional 🗌
Desc	ription:	3	-				-		
Part c	of Lighting@	roup par	ameter set mapped to	LTE-Mode (Geogra	phical z	zone:		
-> Ro	om within E	BuildingZ	one						
DPT:	Name	DPT_U	countValue8_Z	DPT ID 2	202.002	2 Dat	atype format	U_8Z_8	
Field			Description			Sup.	Range	Unit	Default
Count	terValue		Room number			М	1 to 63		CS
Status	3							bitset	
- Out	OfService		zone active /inactive)		0	true/false		CS
- all o	ther flags		not supported, fixed	to '0'		NA			
Comn	nand							enum	
- Norr	nalWrite					М			
- SetC	OSV & Res	etOSV	set zone inactive / a	ctive		0			
- all o	ther comma	ands	not supported			NA			
Comr	nunicatior	1 :			-			=	
DP A	Address:		IO Type(ID):	421 (LSSB)		Prope	rty ID:	102	
(in t	he server)		Start-Index:	1		N° of	elements	1	
Pro	perty acce	ss:	Read only	R	Read/W	rite	\boxtimes		
Prof	tection		Read level			Write	level		
Exce	otion Hand	lling:	Value after Powerup:	Stored Va	ılue 🛚	Act Va	lue 🔲 De	fault Value	e 🗌
Special Features:									
LSSB	LTE-Mode	runtime	interface is deactivate	ed if zone is '	OutOfS	Service'	. If paramete	r Buildingz	Zone is
'OutOfService' also the corresponding Room and Subzone parameters are 'OutOfService' (common flag)									

1.5.6.3 Parameter Subzone

FB: LSSB	Propert	y Name (<u>Server</u>):	Name (Server): LightingGroup.Subzone Mandatory ⊠ Optional □					
Description:	-					-		
		ameter set mapped t	o LTE-Mod	e Geogra	aphical z	zone:		
-> Subzone with	_	<u> </u>						
DPT: Name	DPT_U	countValue8_Z	DPT ID	202.002		atype format	U_8Z_8	
Field		Description			Sup.	Range	Unit	Default
CounterValue		Subzone number			М	1 to 15		CS
Status							bitset	
- OutOfService		zone active /inactive	Э		0	true/false		CS
- all other flags		not supported, fixed	l to '0'		NA			
Command							enum	
 NormalWrite 					M			
- SetOSV & Res	setOSV	set zone inactive / a	active		0			
- all other comm	nands	not supported			NA			
Communicatio	n:					-		
DP Address:		IO Type(ID):	421 (LSS	B)	Prope	rty ID:	103	
(in the server)	Start-Index:	1		N° of	elements	1	
Property acce	ess:	Read only		Read/W	/rite	\boxtimes		
Protection		Read level			Write	level		
Exception Han	dling:	Value after Powerup	: Stored '	Value 🛚	Act Va	lue 🗌 De	fault Value	э 🗌
Special Feature	es:							
LSSB LTE-Mod	e runtime	interface is deactivat	ed if zone i	s 'OutOf	Service'	. If paramete	r Building	Zone is
'OutOfService' also the corresponding Room and Subzone parameters are 'OutOfService' (common flag)								

1.5.7 Parameter LSSBMode

FB:	LSSE	3	Property	/ Name (<u>Server</u>):	LSSBMod	e	M	landatory	Opt	ional 🔀
Desc	ription	ի :					-			
				basic behavior of the						
				eter is meaningful if	convention	al push-butt	ons/switc	ches are c	connecte	d to the
light c	dimmin	ig ser	nsor.							
			supported							
- light switching (toggle mode) with one push-button										
- light switching with two push-button: one button used to switch on the light; the other button used to										
SW	itch of	f the	light							
DPT:	Na	me	DPT_Sw	ritchPBModel	DPT ID	20.605	Datatype	e format	N ₈	
Field		Des	cription				Sup.	Range	Unit	Default
		1: one push button/binary input mode; additional cs Cs							Cs	
				controlled by Model						
		2:		buttons/binary inpu						
				controlled by Model		FallingEdge				
			and Mod	ePB2Rising/Fallingl	Edge					
Com	nunic	ation	1							
DP.	Addre	ss:		IO Type(ID):	421 (LSSI	B) P	roperty ID	D :	120	
(in t	he sei	rver)		Start-Index:	1	N	° of elem	ents	1	
Pro	perty a	acce	ss:	Read only		Read/Write				
Pro	tection	n		Read level		V	/rite level			
Exce	ption I	Hand	lling: \	/alue after Powerup	: Stored \	√alue ⊠ Ac	t Value [Defa	ult Value	<u> </u>
Spec	ial Fea	ature	s:							

1.5.8 Parameter ModePB1RisingEdge

FB:	LS	SB	Property I	Name (<u>Server</u>):	ModePB1RisingEdge Mandatory [у 🔲 Ор	tional 🛚
Desc	ripti	on:	-	<u>-</u>						
This p	ara	meter	specifies the	behavior of Switc	hOnOff outp	ut on det	tection c	of a rising ed	ge at pus	h button
input	1									
DPT:	١	lame	DPT_PBA	ction	DPT ID	20.606	Data	atype format	N ₈	
Field		Desc	ription				Sup.	Range	Unit	Default
		0:	no SwitchO	nOff message sent				cs		CS
				f = Off message is						
				f = On message is						
		3:	SwitchOnOt	f = inverse value o	f InfoOnOff	is sent				
Com	nun	icatio	n:			-	•	•	-	
DP .	Add	ress:		IO Type(ID):	421 (LSS	B)	Proper	rty ID:	121	
(in t	he s	server)	Start-Index:	1		N° of e	elements	1	
Pro	pert	у ассе	ess:	Read only		Read/W	√rite	\boxtimes		
Pro	tect	ion		Read level			Write I	evel		
Exce	otio	n Han	dling: Va	alue after Powerup	Stored V	′alue 🛚	Act Valu	ue 🗌 Def	ault Value	<u> </u>
			·	·	·	·	·			<u>'</u>
Spec	ial F	eature	es:							

1.5.9 Parameter ModePB1FallingEdge

FB:	LSSB	Property	/ Name (<u>Server</u>):	ModePB1	FallingEd	lge	Mandator	y 🔲 Opt	ional 🛚
Descr	iption:			-			-		
This pa	arameter	specifies th	ne behaviour of Swit	chOnOff ou	itput on d	letectior	of a falling	edge at pu	ısh
button	input 1								
DPT:	Name	DPT_PE	Action	DPT ID	20.606	Dat	atype format	N ₈	
Field	eld Description					Sup.	Range	Unit	Default
	0:		OnOff message sen				cs		cs
	1:		Off = Off message is						
	2:		Off = On message is						
	3:	SwitchOn(Off = inverse value o	of InfoOnOff	is sent				
Comm	nunicatio	n:							
DP A	\ddress:		IO Type(ID):	421 (LSS	B)	Prope	rty ID:	122	
(in th	ne server	·)	Start-Index:	1		N° of e	elements	1	
Prop	erty acc	ess:	Read only		Read/W	rite	\boxtimes		
Prote	ection		Read level			Write	evel		
Excep	tion Han	dling: \	/alue after Powerup	: Stored	Value ⊠	Act Va	lue 🗌 🛮 Def	ault Value	
Specia	al Featur	es:							
				_		•			

1.5.10 Parameter ModePB2RisingEdge

ED.	LCCD	Duamant	· Nama (Camian).	MadaDD0	Diaina Edan		ا معامده ا		tional M
	LSSB	Property	/ Name (<u>Server</u>):	ModePBZ	RisingEdge	IV	landatory	Opt	tional 🖂
Descri	iption:								
This pa	arameter	specifies th	ne behavior of Switc	hOnOff out	put on detec	ction of a	rising edg	e at pus	h button
input 2		•						•	
DPT:	Name	DPT_PB	Action	DPT ID	20.606	Datatyp	e format	N ₈	
Field	Desc	ription	Sup. Range Unit Defau						
	0:	no Switch(witchOnOff message sent cs cs						
	1:	SwitchOn(Off = Off message is	sent					
	2:	SwitchOn(Off = On message is	sent					
	3:	SwitchOn(Off = inverse value o	f InfoOnOff	is sent *)				
Communication:									
DP A	ddress:		IO Type(ID):	421 (LSS	B) P	roperty II):	123	
(in th	ne server)	Start-Index:	1	N	° of elem	ents	1	
Prop	erty acce	ess:	Read only		Read/Write	· 🛚			
Prote	ection		Read level		V	/rite level			
Excep	tion Han	dling: \	/alue after Powerup	Stored '	Value 🛛 Ad	ct Value [Defa	ult Value	e 🗌
Specia	al Feature	es:							
The va	lue of this	paramete	r is only meaningful	if 2 buttons	s are used to	switch c	n/off the I	ight; i.e.	
LSSBMode = 2: two push buttons/binary inputs									
*) this	configurat	tion could	only make sense if the	ne 2 PBs a	re separated	l in a larg	er distand	e from e	each
other and are connected over a common interface									

${\bf 1.5.11\ Parameter\ ModePB2FallingEdge}$

FB:	LSSB	Property	/ Name (<u>Server</u>):): ModePB2FallingEdge				ional 🛚	
Desc	ription:	,					-		
		specifies th	ne behavior of Switch	nOnOff out	put on de	tection	of a falling ed	dge at pus	sh button
input	2								
DPT:	Name	DPT_PB	Action	DPT ID	20.606	Data	atype format	: N ₈	
Field	Descripti	on				Sup.	Range	Unit	Default
	0: no SwitchOnOff message sent						cs		CS
	1: Swi	tchOnOff :	= Off message is ser	nt					ļ
	2: Swi	tchOnOff :	= On message is ser	nt					
	3: Swi	tchOnOff :	= inverse value of Inf	oOnOff is	sent *)				
Communication:									
DP.	Address:		IO Type(ID):	421 (LSSI	B)	Prope	rty ID:	124	
(in t	he server)		Start-Index:	1		N° of e	elements	1	
Pro	perty acce	ss:	Read only		Read/W	rite	\boxtimes		
Prof	tection		Read level			Write I	evel		
Exce	ption Hand	lling: \	/alue after Powerup:	Stored \	√alue ⊠	Act Va	lue Def	fault Value	e 🔲
	ial Feature								
The v	alue of this	paramete	er is only meaningful	if 2 buttons	are used	d to swit	ch on/off the	light; i.e.	
LSSB	LSSBMode = 2: two push buttons/binary inputs								
*) this	configurat	ion could	only make sense if th	ne 2 PBs ar	e separa	ted in a	larger distar	nce from e	ach
other	other and are connected over a common interface								

2 FB Light Dimming Sensor Basic (LDSB)

2.1 Aims and objectives

The definitions in this document for FB Light Dimming Sensor Basic (LDSB) are an add-on to the existing FB Specification in [01] to describe the LTE-Mode runtime interface and LTE-Mode specific parameters of FB LDSB.

It specifies the functionality of FB LDSB, for example contained in a switch or a push button, to increase or decrease the brightness of a lamp or to switch the lamp on/off.

The FB LDSB is used in the Application Domain Lighting to notify light control commands to:

- control dimming actuators (traditional direct sensor actuator communication)
- or to provide light dimming sensor data to a Lighting Controller (sensor controller actuator communication)

The inputs and outputs of FB LDSB are specified in this document but not the Human Machine Interface (HMI). Consequently, the manufacturers of the button or switch have the possibility to implement their design and their operation methods.

2.2 Functional specification

2.2.1 Overview

The FB Light Dimming Sensor Basic

- provides hardwired inputs or local button/HMI functionality to trigger output messages to control
 - the switching/dimming status of FB Light Dimming Actuator Basic (LDAB)
 - or the On/Off status of FB Light Switching Actuator Basic (LSAB)
- receives status feedback messages from light switching/dimming actuators according to the FB specification in [01]

Binding of LDSB with FBs LSAB / LDAB is based on LTE-Mode zoning concepts. Control and status feedback information are exchanged according to LTE-Mode mechanisms in a common LightingGroup.

In the LTE-Mode runtime system LightingGroup is mapped to existing LTE-Mode Geographical zones.

Runtime process communication of LDSB is disabled if LTE-Mode LightingGroup is 'OutOfService'

Three mechanisms are provided in the LDSB model to implement the dimming function between LDSB and LDAB:

- the setpoint value of the dimmer is increased and decreased starting from the current value via combined start/stop and increase/decrease command attributes in the RelSetvalueControl output
- the setpoint value of the dimmer is increased and decreased in relative steps starting from the current value via step increase/decrease attributes in the RelSetvalueControl output
- the setpoint value of the dimmer is directly controlled through the output AbsSetvalueControl.

All models can be combined in a LDSB implementation.

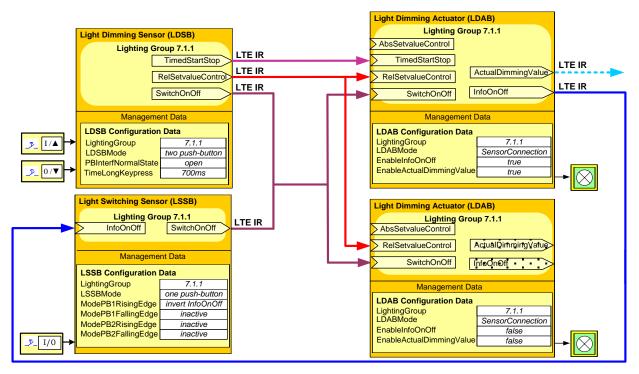


Figure 6 – Example of direct sensor - actuator binding

Figure 6 illustrates the binding of parallel Light Switching/Dimming Sensors LSSB/LDSB with two parallel Light Dimming Actuators LDAB in the same LightingGroup.

LDSB is configured to be operated via 2 push-buttons or binary inputs.

- one push-button / binary input to switch the lamp On and increase the dimming setpoint value
- one push-button / binary input to switch the lamp Off and decrease the dimming setpoint value

Both LSSB and LDSB control the light On/Off state via SwitchOnOff command. RelSevalueControl is provided by the LDSB to start/stop dimming up/down. SwitchOnOff and RelSetvalueControl commands are sent using LTE-Mode InfoReport Service and are received by both LDAB in the same LightingGroup.

LDSB may provide an optional, dedicated trigger signal TimedStartStop to implement e.g. a 'staircase-function' in the actuator. TimedStartStop is distributed using LTE-Mode InfoReport mechanisms.

Input TimedStartStop on the LDAB will temporarily switch the actuator in the On-state for a defined time. Afterwards LDAB executes an autonomous switch-off function.

Actuator feedback information InfoOnOff could in principle be provided by both LDAB to support e.g. the toggle functionality in the LSSB. However, in the example above InfoOnOff is provided by LDAB only (configured as Group Speaker).

NOTE 3 Since both actuators are controlled together, On/Off value of both actuator feedback messages would normally be identical (=> last wins principle on the input in the LSSB). Redundant InfoOnOff messages create unnecessary traffic and should be avoided.

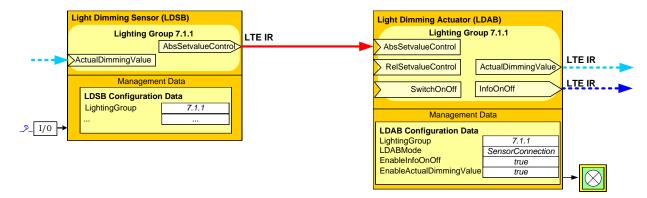


Figure 7 – Direct control of the absolute dimming value

Figure 7 illustrates the runtime interworking mechanisms between a LDSB and a LDAB with the purpose to directly control the absolute dimming value (% value) of the actuator.

Control command AbsSetvalueControl is provided by the LDSB using LTE-Mode InfoReport Service and received by the LDAB in the same LightingGroup.

LDAB may provide feedback information ActualDimmingValue representing the current lighting level (% value) of the actuator. This information may be useful on the LDSB for visualization for any other purpose.

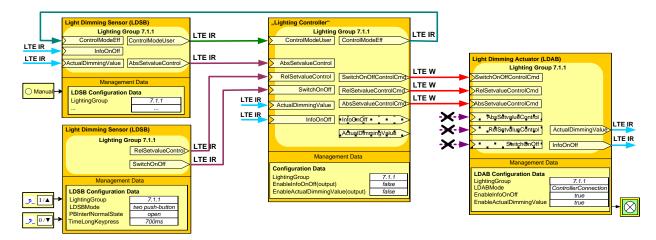


Figure 8 – LDSB - Lighting Controller – LDAB connection

Figure 8 illustrates a light dimming application by a Lighting Controller. The LTE-Mode Lighting application model does not define a dedicated 'Lighting Controller' FB. The design and runtime interface of the Lighting Controller is manufacturer specific. However in the runtime system, the Lighting Controller shall emulate a Lighting Actuator "proxy LDAB" as the counterpart for the Lighting Sensors LDSB.

FB LDSB is connected to a Lighting Controller to notify control commands SwitchOnOff, RelSetvalueControl, AbsSetvalueControl requested by the room occupant (manual lighting control).

Inputs SwitchOnOff, RelSetvalueControl and AbsSetvalueControl on the Lighting Controller are usually processed with the same priority (last wins principle).

In addition LDSB may provide the optional signal ControlModeUser representing a request by the user to change from manual to automatic lighting control mode (and vice versa). The Lighting Controller provides the current lighting control mode ControlModeEff (automatic/manual) as optional feedback information for the LDSB.

The Lighting Controller determines the resulting control command to change the setpoint of the connected LDAB according to control commands from the LDSB and other criteria (e.g. scheduler, room occupancy etc.).

2.3 Functional Block diagram

FB Light Dimmin	g Sensor Basic (LDSB)	420
Inputs		Outputs
Binding Grp.: Li	ightingGroup (Geographical)	•
IR: LSAB.InfoOnOff		IR: SwitchOnOff
IR: LDAB.InfoOnOff		IR: RelSetValueControl
IR: LDAB.ActualDimmingValue		IR: AbsSetvalueControl
IR: LSAB.ControlModeEff		IR: ControlModeUser
IR: LDAB.ControlModeEff		IR: TimedStartStop
		·
additional I/Os		Parameters
- One or two on board push buttons		LightingGroup (Geographical)
or inputs to wire external switches/push		LDSBMode
buttons		AbsSetvalue
		PBInterfNormalState
		TimeLongKeypress
		
mandatory	optional IR: LTE-	Mode InfoReport

Figure 9 – Functional Block Diagram for FB Light Dimming Sensor Basic

2.4 Datapoints

Datapoint	Description	Datapoint Type	LDSB PID
Outputs			
SwitchOnOff	Control signal to switch the light on (=1) or off (=0)	DPT_Switch (1.001)	PID 61
RelSetvalueControl	Control signal: to increase/decrease the setpoint of the dimming actuator starting from the current dimming level and to stop dimming	DPT_Control Dimming (3.007)	PID 62
AbsSetvalueControl	Signal to directly control the setpoint of the dimming actuator	DPT_Scaling (5.001)	PID 63
ControlModeUser	Command to request automatic or manual light control by local operation - 0: automatic light control - 1: manual light control - 2 to 255 reserved for future extensions	DPT_LightControl- Mode (20.604)	PID 64
TimedStartStop	Trigger to activate a timed switch on and autonomous switch off function by the actuator	DPT_Start (1.010)	PID 65

Datapoint	Description	Datapoint Type	LDSB PID
Inputs			
LSAB.InfoOnOff LDAB.InfoOnOff	Feedback information from the actuator (LSAB or LDAB) to indicate the binary state of the light: on (=1) or - off (=0)	DPT_Switch (1.001)	LSAB PID 51 LDAB PID 51
LSAB.ControlModeEff LDAB.ControlModeEff	Feedback information from a Lighting Controller to indicate whether automatic or manual light control mode is currently active - 0: automatic light control - 1: manual light control - 2 to 255 reserved for future extensions	DPT_LightControl- Mode (20.604)	LSAB PID 54 LDAB PID 54
LDAB.ActualDimming- Value	Feedback information from the actuator to indicate the actual dimming	DPT_Scaling (5.001)	LDAB PID 52
Parameters			
LightingGroup (3 Properties)	LTE-Mode Geographical Zone - Building zone like Floor, Apartment - Room within the Building zone - Subzone within the Room	- DPT_Ucount- Value8_Z (202.002) - DPT_Ucount- Value8_Z (202.002) - DPT_Ucount- Value8_Z (202.002)	PID 101-103
LDSBMode	Defines the basic behaviour of LDSB: 1: one push button/binary input; SwitchOnOff inverts on each transmission 2: one push button/binary input, On / DimUp message sent 3: one push button/binary input, Off / DimDown message sent 4: two push buttons/binary inputs mode	DPT_DimmPBModel (20.607)	PID 120
PBInterfNormalState	Defines normally open/closed behaviour of push button interface - 0: open - 1: closed	DPT_OpenClose (1.009)	PID121
TimeLongKeypress	Time to detect long key press 0,3 s to 7 s 100 ms resolution	DPT_TimePeriod100 msec (7.004)	PID122
AbsSetvalue	Default value for the output AbsSetvalueControl	DPT_Scaling (5.001)	PID 123

Table 4 - LTE-Mode specific Properties

		Support
Parameter	LightingGroup	М

Table 5 - Standard Properties of Interface Object

		Support
Parameter	LDSBMode	0
	PBInterfNormalState	0
	TimeLongKeypress	0
	AbsSetvalue	0
Diagnostic Data		

2.5 Detailed specification of the Datapoints

2.5.1 Output SwitchOnOff

FB:	LDSB	LTE-Mode	e Server Output Nar	me: Sv	vitchOn(Off	Mandatory		ional 🗌
Description:									
Outpu	ıt SwitchC	OnOff repre	sents control comma	nds to char	nge the (On/Off stat	e of light sw	itching/d	imming
actua	tors in the	same Ligh	tingGroup.						
DPT:	Name		vitch	DPT ID	1.001	Dataty	pe format	B ₁	
Field	Descr	ription			Sup.	Range	Unit	COV	Default
b	This f	ield shall ind	dicate whether the LI	{0, 1}	-	-	-		
requests to switch the light on (1) or off (0)									
Comr	nunicatio	on:							
Bind	ing Grou	p:							
Class			Туре			Default			
	graphical		BuildingZone.Room	n.Subzone		cs (see p	oarameter Li	ghtingG	roup)
	ication Sp	ecific							
	ssigned			Configurable					
	Address:		IO Type(ID):	420 (LDSE		Property		61	
	-Mode-Se	ervices		MinRepTim		sec	Hearth		<u> min</u>
(eve	•	~	Output per default of		ting 🖂		Group Wild		_
	Report	. 🛛	Tx Prio:	High		Norma	ıl 🖂	Low	
	-Mode R								
	onse pol		Transm after Power	rup: Stored	l Value [☐ Act V	′alue □ D	efault Va	alue 🗌
	output sha			.,		_	_		
	upported) perty-Ser								
	vidual ac		Read only		Read/W	/rite			
Exce	otion Har	ndling:					Save a	at Power	down
	ial Featu								
			meter LDSBMode it i						
			tures can be used to	control e.g	ı. all light	ting actuat	ors within th	e same	Room or
		ame Buildin				_			
	spontan		nission of a default va	alue after p	ower-ret	urn. Trans	mission sha	III be trig	gered by

2.5.2 Output RelSetvalueControl

FB: LDS	SB	LTE-N	lode	Server Output	Name:	RelS	etvalue	Control	Man	datory	⊠ Opt	tional 🗌
Description	on:	-				-			-			
Description Output Reactuator. F LDSB and - the set combin - c field - StepC - StepC This is - the set value v RelSet - c field - StepC - StepC	Output RelSetvalueControl provides information to increase/decrease the setpoint of the dimming actuator. RelSetvalueControl supports two mechanisms to implement the dimming function between LDSB and LDAB:											
									5 5			
									0.40.0/	I / /	205.0/	
DPT : N Field	lame	Descript		ntrol_Dimming	ן טף	T ID	3.007 Rang		atype fo	Unit	B ₁ U ₃ COV	Default
C				ection: up (1) / do	wn (0)	M	{0, 1}			-	-	-
StepCode				mmands and nu		M		to 111b	1	-	-	_
				s respectively are					•			
		encoded										
Communi	icati	on:										
Binding (Grou	ıp:										
Class				Туре				Default				
Geograph	nical		\boxtimes	BuildingZone.R	oom.Sub	zone		cs (see	parame	eter Lig	htingGr	oup)
Application	on S	pecific [
Unassign				Broadcast		urable						
DP Addre	ess:			IO Type(ID):		(LDSB)		Proper			52	
LTE-Mod	le-Se	ervices		COV 🛛	MinRe	epTime:		se		Heartb		min
(event):		_		Output per defa	ult comm	unicati	ng 🖂	Bindir	ng Grou	p Wildo	card allo	owed 🛚
InfoRepo			\boxtimes	Tx Prio:	Hig	h 🗌		Norn	nal 🛚		Low	
(LTE-Mod												
Response				Transm after Po	owerup: S	Stored '	Value	□ Act	Value	□ De	efault Va	alue 🗌
the outpu		•	'S									
be suppo												
Property (individu				Read only	\boxtimes	F	Read/V	Vrite				
Exception	า Ha	ndling:								Save a	t Power	rdown
Special F	eatu	res:										
				meter LDSBMod				one val	ue of th	e field	c is tran	smitted.
				ommands to dim tures can be use				ting actu	ators w	ithin the	e same	Room or
		ame Bu				. 3	3	J 74				-
- No spo	ntar	eous tra	ansm	nission of a defau	ılt value a	after po	wer-re	turn. Tra	nsmissi	on sha	ll be trig	gered by
user in	terac	ction onl	y									

2.5.3 Output AbsSetvalueControl

FB: LDSB	LTE-Mode	Server Output Nan	ne:	AbsSet	tvalu	eControl	Man	datory [Opt	ional 🛚
Description:	-			-						
The algorithm configuration p	to calculate arameter A		ut is	not stand	lardis	sed. It may	be pı	redefine	ed by the	e
		gured to send dim do ontrol is deactivated o						n it is re	ecomme	nded
DPT: Name					001		ype fo	rmat	U ₈	
Field	Descriptio	<u> </u>		Sup.	Ra	nge	,	Unit	COV	Default
SetValue	Dimming a	actuator setpoint in %		M	[0 9	% to 100 %	ώ]	%	cs	-
Communication	on:				-					
Binding Grou	ıp:									
Class		Туре				Default				
Geographical		BuildingZone.Room	.Sub	zone		cs (see p	arame	eter Lig	htingGr	oup)
Application Sp	pecific									
Unassigned				gurable 🗌						
DP Address:		IO Type(ID):		(LDSB)		Property			3	
LTE-Mode-Se	ervices	_		epTime:		sec		Heartb		min
(event):		Output per default of	omn	nunicating				p Wildo	card allo	wed 🛚
InfoReport		Tx Prio:	Hiç	gh 🗌		Norma	al 🖂		Low	
(LTE-Mode R Response po the output sha be supported	lling of all always)	Transm after Power	up:	Stored Va	alue	☐ Act \	/alue	□ De	efault Va	alue 🗌
Property-Se (individual a	rvice ccess):	Read only		Re	ad/V	Vrite				
Exception Ha	ndling:							Save a	t Power	down
Special Featu										
within the s	ame Buildin	tures can be used to gZone		Ū	Ū	Ū				

 No spontaneous transmission of a default value after power-return. Transmission shall be triggered by user interaction only

2.5.4 Output ControlModeUser

FB:	LDSB	LTE-Mode	Server Output Nar	ne:	ControlMod	eUser	Mandato	ory 🔲 Opt	ional 🛚
Desc	ription:			_					
		ntrolModel	Jser provides a comr	nand to	request/rele	ease man	ual light co	ontrol by lo	cal
opera									
			his command is man						
			be used as feedbac	k inform	nation to syn	chronize	ControlMo	odeUser va	lues of
multip	le LDSB	in the same	zone						
DPT:	Name	DPT_Lig	htControlMode	DPT I	D 20.604	Datat	ype forma	at N ₈	
Field	Descr			Sup.	Range		Unit	COV	Default
b			dicate whether	M	- 0, 1	1)	-	-	cs
		natic light co			- 2 to 25	5: reserve	ed		
			rol (1) is requested						
		room occu	pant						
	nunicatio								
Bind	ing Grou	p:							
Class	-		Туре			Default			
	graphical		BuildingZone.Room	າ.Subzo	ne	cs (see j	parameter	r LightingG	roup)
	lication S	pecific							
	ssigned		Broadcast C	Configur					
	Address:		IO Type(ID):	420 (L		Property		64	
	-Mode-Se	rvices		MinRep [*]		sec		artbeat:	min
(eve			Output per default of		nicating 🖂			ildcard allo	wed 🛚
	Report	\boxtimes	Tx Prio:	High		Norma	al 🛛	Low	
	-Mode Re								
	onse pol		Transm after Powe	run ^{. 2)} S	Stored Value	Act \	/alue 🖂	Default Va	alue 🕅
	output sha	ıll always	Transmatter rowe	iup. C	norca value	/ 🔼 / 101	value	Doladit V	
	upported)								
	erty-Ser		Read only		Read/W	/rite	П		
_	vidual ac		, –						. –
Exce	ption Har	ndling:					Sav	e at Powe	rdown
	ial Featu								
11.5		ossible that	only one value of the	e range	is transmitte	ed, e.g. to	trigger 'a	utomatic co	ontrol
2) It c	,			!			. l		41 4
11.5			a default/stored valu					ower-return	or that
LL	OB does	not send at	n initial ControlModel	user me	essage after	power-re	turn.		

2.5.5 Output TimedStartStop

FB:	LDSB	LTE-N	lode	Server Output Na	me: Time	edStartS	Stop M	landatory	Opt	ional 🛚
Desc	ription:				·		-			
Outpu	ut TimedS	StartStop	o triç	gers a timed switch	on and auto	onomous	s switch off for	unction by	the actu	uator.
DPT:	Name	DPT	_Sta	art	DPT ID	1.010	Datatype	e format	B ₁	
Field				cription		Sup.	Range	Unit	COV	Default
b				1 triggers the start of		M	{0, 1} 1)	-	-	CS
				ed switch on and auto	onomous					
			_	ch off function						
				0: switch off immedia	ately and					
			stop	the timer						
	municatio									
Clas	ling Groເ	ıp:		Tuno			Default			
	s graphical	<u> </u>	\overline{A}	Type BuildingZone.Roon	- Cubzono			romotor Li	abtinaC	roup)
	lication S		4	bullulrigzone.Roon	1.30020116		cs (see pa	iametei Li	griunge	roup)
	ssigned	pecilic [=	Broadcast C	onfigurable					
	Address:	L		IO Type(ID):	420 (LDSE		Property ID)· (35	
	-Mode-Se	rvices			MinRepTime		sec	Hearth		min
(eve		FI VICES		Output per default			Binding G			
	Report	Б	abla	Tx Prio:	High	ung 🖂	Normal 2		Low	
	-Mode R	_		TXT 110.	ı ııgıı 🗀		140mmar <u>P</u>		LOW	
	onse pol			- " -	•		¬			. —
the c	output sha	all alway	'S	Transm after Powe	rup: Stored	ı value L	Act Value	ue 🔲 Do	efault Va	alue 🔲
be s	upported)									
	perty-Ser			Read only		Read/W	/rite			
	ividual ad			, 1				10		. —
Exce	ption Hai	ndling:						Save a	at Power	down
	ial Featu			1 1 641		•••				
/ It Sh	iaii be pos	ssidie tr	nat o	only one value of the	range is tra	nsmitted	ı, e.g. to trigg	ger 'start' (only o trigger	ad by
	nteraction		HIISS	sion of a default value	e allei powe	er-return	. Hansinissi	on snail b	e ingger	eu by
user	meracilor	i Offig								

2.5.6 Input InfoOnOff

Same as for the LSSB, see 1.5.4

2.5.7 Input ControlModeEff

Same as for the LSSB, see 1.5.5

2.5.8 Input ActualDimmingValue

FB:	LDSB	LTE-	-Mode	e Client Input Name	: Actua	alDimmino	gValu	e Mand	atory 🗌] Option	al 🛛
Description: Input ActualDimmingValue is used to receive the actual dimming level of the dimming actuator in the											
Input A	ActualDim	nming	Value	e is used to receive the	ne actual d	dimming l	evel c	of the dim	ming ac	tuator in	the
same :											
	,	_		sed solely for visualiz							
DPT:	Name	DP	T_Sc		DPT ID	5.001		Datatype f		U ₈	
Field				Description					Sup.	Unit	Default
Actual				Dimming level in %					M	%	CS
	nunicatio										
	ng Grou	p:					•				
Class				Туре			Defa				
	graphical			BuildingZone.Room	n.Subzone)	cs (s	see paran	neter Lig	ghtingGro	oup)
	cation Sp	ecific	<u> </u>								
	signed		Ш	Broadcast	Configura						
	ddress:			IO Type(ID):	418 (LD/			perty ID:		52	
	Mode-Se	rvice		InfoReport Sniffer	on Bindin	g Group:					
(even	•			Timeout:			Min				
InfoR	_		\boxtimes								
	Mode-Se	rvice		D 134711 1/D	0 '''	D: "	_				
(polli				Read Wildcard / Re	sp Sniffer	on Bindii	ng Gr	oup: -	-		
	- Respo			5 (10)					0.	137.1	
	after Po			Default V	alue 🖂			T _		ored Val	<u>ue </u>
Excep	tion Han	ndling	<u> </u>					Sav	e at Pov	werdown	
	al Featur										
If multiple dimming actuators are operated in the same zone, each actuator may send its own											
ActualDimmingValue message. Since dimming speed and dimming curve of different actuators may not be identical, subsequent ActualDimmingValue feedback messages from different actuators would usually											
						message	s from	n different	actuato	rs would	usually
	not be identical => last wins principle on the LDSB input Therefore it is highly recommended to configure one actuator in the LightingGroup as										
					e one actu	lator in th	ie Ligi	htingGrou	ıp as		
Actual	Dimming	Value	Grou	ıp Speaker							

2.5.9 Parameter-set LightingGroup

LightingGroup is implemented using the LTE-Mode Geographical zone concept. It consists of 3 properties belonging together.

2.5.9.1 Parameter BuildingZone

	nungzone								
FB: LDSB Property	Name (<u>Server</u>):	LightingGrou	ıp.Buildi	ingZ	one	Mandator	y 🛛 Opt	ional 🗌	
Description:									
Part of LightingGroup parameter set mapped to LTE-Mode Geographical zone:									
-> BuildingEntity (Floor, Apartment, Building section etc.)									
DPT: Name DPT_UcountValue8_Z DPT ID 202.002 Datatype format U ₈ Z ₈									
Field Description Sup. Range Unit Default									
CounterValue	Number of the Buil	dingZone		N	1	1 to 126		CS	
Status		=:					bitset		
- OutOfService	zone active /inactiv	/e		С)	true/false		cs	
- all other flags	not supported, fixe	d to '0'		N	A				
Command							enum		
- NormalWrite				M	1				
- SetOSV & ResetOSV	set zone inactive /	active		С)				
- all other commands	not supported			N/	A				
Communication:									
DP Address:	IO Type(ID):	420 (LDSB)				erty ID:	101		
(in the server)	Start-Index:	1		N	° of	elements	1		
Property access:	Read only		Read/V	Vrite		\boxtimes			
Protection	Read level			W	rite	level			
Exception Handling:	Exception Handling: Value after Powerup: Stored Value Act Value Default Value								
Special Features:									
LDSB LTE-Mode runtime interface is deactivated if zone is 'OutOfService'. If parameter BuildingZone is									
'OutOfService' also the co	rresponding Room	and Subzone	e param	eters	s ar	e 'OutOfServ	rice' (comr	non flag)	

2.5.9.2 Parameter Room

FB:	LDSB	Propert	Name (Server): LightingGroup.Room Mandatory ☑ Opt							ional 🗌
Desci	iption:	-	-							
Part o	f Lighting@	roup par	ameter set mapped to	LTE-Mode	Geogra	aph	ical	zone:		
-> Ro	om within E	3uildingZ	one							
DPT:	Name	DPT_U	countValue8_Z	DPT ID	202.00	2	Da	tatype format	U_8Z_8	
Field			Description			Sı	uр.	Range	Unit	Default
Count	erValue		Room number			N	N	1 to 63		CS
Status	3								bitset	
- Out	OfService		zone active /inactive			(C	true/false		CS
- all of	her flags		not supported, fixed	to '0'		Ν	IA			
Comn	nand								enum	
	nalWrite					N	M			
	SV & Res		set zone inactive / a	ctive			C			
- all o	her comm	ands	not supported			N	IA			
Comr	nunication	า:								
	Address:		IO Type(ID):	420 (LDSE	3)			erty ID:	102	
(in t	he server)		Start-Index:	1		Ν	l° of	elements	1	
Pro	erty acce	ess:	Read only		Read/V	Vrite	9	\boxtimes		
Prot	ection		Read level			V	Vrite	level		
Exce	Exception Handling: Value after Powerup: Stored Value ☐ Act Value ☐ Default Value ☐									
Speci	Special Features:									
LDSB	LTE-Mode	e runtime	interface is deactivate	ed if zone is	s 'OutOf	Ser	vice	'. If paramete	r Building	Zone is
'OutO	fService' a	Iso the co	orresponding Room a	nd Subzone	e param	etei	rs ar	e 'OutOfServ	rice' (comm	non flag)

2.5.9.3 Parameter Subzone

FB: LDSB	Propert	rty Name (Server): LightingGroup.Su			bzon	е	Mandator	y 🛛 Opt	ional 🗌
Description:									
Part of LightingGroup parameter set mapped to LTE-Mode Geographical zone:									
-> Subzone within BuildingZone.Room									
	DPT: Name DPT_UcountValue8_Z DPT ID 202.002 Datatype format U ₈ Z ₈								
Field	Field Description				Sup	ο.	Range	Unit	Default
CounterValue		Subzone number			M		1 to 15		CS
Status								bitset	
- OutOfService		zone active /inactive			0		true/false		cs
- all other flags		not supported, fixed	d to '0'		NA	١.			
Command								enum	
- NormalWrite					M				
- SetOSV & ResetOSV		set zone inactive / active			0				
- all other commands		not supported			NA	١.			
Communication:									
DP Address:		IO Type(ID):	420 (LDSB)		Property ID:		103		
(in the server)		Start-Index:	1 N° of elements			elements	1		
Property access:		Read only	Read/W				\boxtimes		
Protection		Read level		Write level					
Exception Handling: Value after Powerup: Stored Value ☐ Act Value ☐ Default Value ☐							e 🗌		
Special Features:									
LDSB LTE-Mod	e runtime	interface is deactiva	ted if zone i	s 'OutO	fServ	ice'.	If paramete	r Building	Zone is
'OutOfService' also the corresponding Room and Subzone parameters are 'OutOfService' (common flag)									

2.5.10 Parameter LDSBMode

FB:	LDSB	Property	/ Name (<u>Server</u>):	LDSBMode			Ma	ndatory [Opt	ional 🛚
Description:										
This parameter selects the <u>basic</u> behavior of the LDSB in regards to the push-button interface used for light switching and relative dimming. This parameter is meaningful if conventional push-buttons/switches are connected to the light dimming sensor.										
	Four modes are supported:									
 1 push-button: to cover complete light switching (inverted SwitchOnOff, toggle mode) and dimming function 										
			ality is limited to sen							
			ality is limited to sen							
			on used to switch or	n and dim up	the light	t; the	other bu	utton use	d to swi	tch off
an	d dim dowi	n the light								
Thin "			aver averaged I DCF) f ati a alit	. for obo	مديام	ما احمد مما اح	مالئلم م	اممد المس	atat
			over extended LDSE							
	AbsSetvalueControl is implemented, this would be configured through manufacturer specific means.									
DPT:	Name		_DimmPBModel DPT ID 20.607 Datatype format N ₈						Defect	
						Default				
	1: one push button/binary input, inverse of SwitchOnOff sent 2: one push button/binary input, On / DimUp message sent 1 to 4 cs									CS
3: one push button/binary input, Off / DimDown message										
sent										
4: two push buttons/binary inputs mode										
Communication:										
• • • •		IO Type(ID):	420 (LDSB) Propert							
•	(in the server) Start-Index: 1 N° of elements 1									
	Property access: Read only Read/Write									
Protection Read level Write level										
Exce	Exception Handling: Value after Powerup: Stored Value ☐ Act Value ☐ Default Value ☐									
Spec	ial Feature	s:								

2.5.11 Parameter PBInterfNormalState

FB:	LDSB	Proper	ty Name (<u>Server</u>):	PBInterfNormalState			Mandatory	/ 🗌 Opt	ional 🛚
Description:									
Defines normally open/closed behaviour of the physical push button interface									
DPT:	Name	DPT_O	penClose	DPT ID	1.009	Data	type format	B ₁	
Field		Description			Sup.	Range	Unit	Default	
b			- 0: normally open				{0, 1}		CS
			- 1: normally closed						
Communication:									
DP Address:		IO Type(ID):	420 (LDSB)		Property ID:		121		
(in the server)		Start-Index:	1 N° of 6		lements	1			
Property access:		Read only] Read/Write			\boxtimes			
Protection		Read level			Write level				
Exce	ption Hand	lling:	Value after Powerup:	Stored \	Value 🛚	Act Valu	ue 🗌 Def	ault Value	<u> </u>
Special Features:									
	•								•

2.5.12 Parameter TimeLongKeypress

FB:	LDSB	Property	y Name (<u>Server</u>):	TimeLor	ngKeypress	Mandatory	/ 🗌 Opt	ional 🛚	
Desc	ription:	-	-			-			
Time to detect long key press 0,3 s to 7 s to change LDSB from switching to dimming operation									
DPT:	Name	DPT_Ti	mePeriod100 msec	DPT ID	7.004	Datatype format	U ₁₆		
Field		Description	า		Sup.	Range	Unit	Default	
Time indic			ation with 100 ms res	solution		300 to 7000	ms	CS	
Comr	municati	on:							
DP .	Address		IO Type(ID):	420 (LDSB)		Property ID:	122		
(in t	he serve	er)	Start-Index:	1		1			
Pro	perty acc	cess:	Read only		Read/W	rite 🛛			
Pro	tection		Read level			Write level			
Exce	ption Ha	ndling:	Value after Powerup:	Store	d Value 🖂	Act Value Def	ault Value	• 🗌	
-									
Special Features:									

2.5.13 Parameter AbsSetvalue

FB:	LDSB	Property	/ Name (<u>Server</u>):	AbsSetval	y 🔲 Opt	ional 🛚				
Desc	ription:									
This p	oarameter o	defines the	e default value for the	output Ab	sSe	tvalueC	ontrol			
DPT:	Name	DPT_Sc	aling	DPT ID	5.0	001	Datatype format	U ₈		
Field		Description	on			Sup.	Range	Unit	Default	
Value			imming level to be tra		ria 💮		0 % to 100 %	%	CS	
		AbsSetva	alueControl message	!						
Comr	nunication	ո։								
DP A	Address:		IO Type(ID):	420 (LDSE			roperty ID:	123		
(in t	he server)		Start-Index:	1	N° of elements			1		
Pro	perty acce	ess:	Read only		Rea	ad/Write				
Prof	tection		Read level			V	/rite level			
Exce	ption Hand	dling: \	/alue after Powerup:	Stored \	/alu	e 🛛 Ad	t Value 🗌 Def	ault Value	-	
Speci	Special Features:								_	

3 FB Indoor Brightness Sensor (IBS)

3.1 Aims and objectives

The definitions in this document for FB Indoor Brightness Sensor (IBS) are an add-on to the existing FB Specification in [01] to describe the LTE-Mode runtime interface and LTE-Mode specific parameters of FB IBS. The FB IBS shall measure the luminance at a certain location and communicate the sensor value (Lux) to the KNX system, e.g. to a Lighting Controller.

3.2 Functional specification

3.2.1 Overview

Measurement of the luminance may be based on a built-in or hard-wired brightness sensor.

FB IBS shall provide the measured illuminance value via RoomIllumination process output using LTE-Mode InfoReport Service.

The human eye is capable of seeing an extremely wide range of luminance values (<<0,1 Lux to 100 000 Lux). In the LTE-Mode model RoomIllumination is encoded as DPT_Value_Lux (DPT_ID: 9.004) to cover the full range of values.

Distribution of RoomIllumination is event driven according to a fixed rule or configurable COV criteria. Because of the logarithmic characteristics of the eye to sense luminance, it is recommended to implement an adaptive COV criterion over the entire range of Lux values.

Parameter **COVPercent** represents the rate of change of the measured illumination in percentage to calculate the actual COV in Lux.

EXAMPLE 1

with COVPercent = 5 %

- current RoomIllumination = 10 Lux → COV = 0,5 Lux
- current RoomIllumination = 100 Lux → COV = 5 Lux
- current RoomIllumination = 1 000 Lux →COV = 50 Lux

Parameter **COVLux** represents the <u>minimum</u> change of the measured illumination in Lux to send an update of RoomIllumination.

Both parameters COVLux and COVPercent may be combined to define the COV characteristics over the entire range of values, e.g. in order to avoid frequent updates of RoomIllumination at twilight because of noise of the sensor.

The following figure shows an example to implement the COV characteristics. Detailed mechanisms are however manufacturer specific.

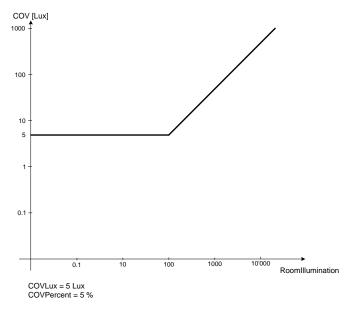


Figure 10 – Example of COV characteristics

If the measured brightness doesn't change more than the actual COV, then the current measured value shall be transmitted periodically with a fixed or configurable heartbeat repetition period (parameter **HeartbeatRepetitionTime**).

There shall be however a minimum wait time between updates of output signal RoomIllumination to avoid excessive bus load. The wait time is either fixed or configurable (parameter **MinRepetitionTime**).

Binding of FB IBS is based on LTE-Mode zoning concepts. Sensor information is provided according to LTE-Mode mechanisms in a LightingGroup.

In the LTE-Mode runtime system LightingGroup is mapped to existing LTE-Mode Geographical zones.

Runtime process communication of IBS is disabled if LTE-Mode LightingGroup is 'OutOfService'

3.3 Functional Block diagram

	FB Indoor Bright	ness Sensor (IBS)	409
Inputs	Binding Grp.: Ligh	tingGroup (Geographical)	Outputs
			IR: RoomIllumination
additional I/Os			Parameters
 Illuminance sensor 			LightingGroup (Geographical)
			COVLux
			COVPercent
			HeartbeatRepetitionTime
			MinRepetitionTime
n	nandatory	optional IR: LTE	-Mode InfoReport

Figure 11 – Functional Block Diagram for FB Indoor Brightness Sensor

3.4 Datapoints

Datapoint	Description	Datapoint Type	IBS PID
Outputs			
RoomIllumination	RoomIllumination output represents the measured luminance	DPT_Value_Lux (9.004)	PID 51
Inputs			
Parameters			
LightingGroup (3 Properties)	LTE-Mode Geographical Zone - Building zone like Floor, Apartment - Room within the Building zone - Subzone within the Room	- DPT_UcountValue8_Z (202.002) - DPT_UcountValue8_Z (202.002) - DPT_UcountValue8_Z (202.002)	PID 101-103
COVLux	COV criterion in Lux to generate updates of output signal Roomlllumination	DPT_Value_Lux (9.004)	PID 110
HeartbeatRepetitionT ime	Heartbeat repetition time in seconds	DPT_TimePeriodSec (7.005)	PID 111
COVPercent	Rate of change of the measured illumination in percentage to calculate the current COV in Lux	DPT_Percent_U8 (5.004)	PID 112
MinRepetitionTime	Minimum time between updates of output signal RoomIllumination	DPT_TimePeriodSec (7.005)	PID 113

Table 6 - LTE-Mode specific Properties

		Support
Parameter	LightingGroup	М

Table 7 - Standard Properties of Interface Object

		Support
Parameter	COVLux	0
	COVPercent	0
	HeartbeatRepetitionTime	0
	MinRepetitionTime	0
Diagnostic Data		

3.5 Detailed specification of the Datapoints

3.5.1 Output RoomIllumination

FB:	IBS	Name:	le Server Output	Roomillum	nination	ion Mandatory 🖂 Optional 📋					
Desc	ription:			-							
Output If the value COV: If the transr	Output RoomIllumination shall represent the measured illumination value in Lux If the calculated illumination changes more than indicated by a COV criterion, then the newly calculated value shall be transmitted spontaneously. COV: see parameters COVLux and COVPercent If the variation of measured illumination is within the COV limit, then the current measured value shall be transmitted periodically with a fixed or configurable heartbeat repetition period (parameter HeartbeatRepetitionTime).										
DPT:		_	alue_Lux	DPT ID	9.004	Datat	ype format	F ₁₆			
Field	u u	De	escription	•	Sup.	Range	Unit	COV	Default		
Value)	Me	easured value in Lux		M	Full range	e Lux	1)	-		
Comi	municatio	n:									
Bind	ling Grou	p:									
Clas	s		Туре			Default					
Geo	graphical	\boxtimes	BuildingZone.Roo	m.Subzone		cs (see	parameter	LightingG	roup)		
App	lication S _l	pecific 🗌									
Una	ssigned		Broadcast	Configurable							
DP A	Address:		IO Type(ID):	409 (IBS)		Property	/ ID:	51			
LTE-	-Mode-Se	rvices	COV 🖾 1)	MinRepTim	ie:	3) sec	Hear	tbeat:	²⁾ min		
(eve			Output per default	communica	ıting 🛚	Binding	Group Wil	dcard allo	wed 🗌		
	Report	\boxtimes	Tx Prio:	High 🗌		Norma	al 🛛	Low			
Resp the c be s	i-Mode Re conse poli output sha upported)	ling of Ill always	Transm after Powe	erup: Store	d Value	☐ Act \	/alue ⊠	Default Va	alue 🗌		
	erty-Servividual ac		Read only		Read/V	Vrite					
	ption Har		•				Save	at Powe	rdown		
							•				
	ial Featui										
1) eith	er fixed C	OV criterio	on or COV is derived	from param	eters Co	OVLux and	d/or COVP	ercent			
²⁾ Hea	artbeat ma	ay be fixed	or configurable via p	oarameter H	eartbeat	tRepetition	Time				
³⁾ Min	RepTime	is either fi	xed or configurable v	ria paramete	er MinRe	epetitionTir	ne				

3.5.2 Parameter-set LightingGroup

LightingGroup is implemented using the LTE-Mode Geographical zone concept. It consists of 3 properties belonging together.

3.5.2.1 Parameter BuildingZone

FB:	IBS	Property	Name (Server):	LightingGroup.Build	dingz	Zone	Mandator	y 🛛 Opt	ional 🗌	
Descri	iption:									
			ameter set mapped t	•	raph	ical	zone:			
-> Build	-> BuildingEntity (Floor, Apartment, Building section etc.)									
DPT:										
Field			Description		Sı	uр.	Range	Unit	Default	
Counte	erValue		Number of the Build	dingZone	N	M	1126		CS	
Status								bitset		
- OutO	fService 1 4 1		zone active /inactive	e	(C	true/false		CS	
- all other flags			not supported, fixed	d to '0'	N	IA_				
Comm								enum		
	alWrite					M				
- SetO	SV & Re	setOSV	set zone inactive / active			C				
- all oth	ner comr	nands	not supported			IA_				
	nunicatio									
DP A	ddress:		IO Type(ID):	409 (IBS)			erty ID:	101		
(in th	ne serve	r)	Start-Index:	1			elements	1		
Prop	erty acc	ess:	Read only] Read/\	N rit ϵ	9	\boxtimes			
Prote	ection		Read level		V	Vrite	level			
Excep	tion Har	ndling:	Value after Powerup	: Stored Value 🛭	A	ct Va	alue 🔲 Def	fault Value	, 🗌	
Specia	al Featui	res:								
IBS LT	E-Mode	runtime in	terface is deactivated	d if zone is 'OutOfS	ervic	ce'. I	f parameter E	BuildingZo	ne is	
'OutOf	Service'	also the co	orresponding Room a	and Subzone paran	netei	rs ar	e 'OutOfServ	ice' (comn	non flag)	

3.5.2.2 Parameter Room

FB: IBS	Propert	y Name (<u>Server</u>):	LightingGr	gGroup.Room Mandatory					ional 🗌		
Description:	_						-				
Part of Lighting(Part of LightingGroup parameter set mapped to LTE-Mode Geographical zone:										
-> Room within BuildingZone											
DPT: Name DPT_UcountValue8_Z DPT ID 202.002 Datatype format U ₈ Z ₈											
Field		Description			Su	ıp.	Range	Unit	Default		
CounterValue		Room number			N	/l	1 to 63		CS		
Status								bitset			
 OutOfService 		zone active /inactive	е		C)	true/false		cs		
- all other flags		not supported, fixed	to '0'		Ν	Α					
Command								enum			
 NormalWrite 					Λ	Λ					
- SetOSV & Res	etOSV	set zone inactive / active			C)					
- all other comm	ands	not supported			Ν	Α					
Communication	n:										
DP Address:		IO Type(ID):	409 (IBS)		Property ID:			102			
(in the server))	Start-Index:	1		Ν	° of	elements	1			
Property acce	ess:	Read only		Read/V	Vrite	;	\boxtimes				
Protection		Read level			V	/rite	level				
Exception Hand	dling:	Value after Powerup	: Stored \	/alue 🛚	Ac	t Va	alue 🔲 Def	fault Value	, 🗌		
Special Feature	Special Features:										
IBS LTE-Mode r	untime in	terface is deactivated	d if zone is '	OutOfSe	ervic	e'. I	f parameter E	BuildingZo	ne is		
'OutOfService' a	also the co	orresponding Room a	and Subzone	e param	eter	s ar	e 'OutOfServi	ice' (comn	non flag)		

3.5.2.3 Parameter Subzone

FB: IBS	S	Propert	y Name (<u>Server</u>):	LightingGro	up.Sub	OZO	ne	Mandator	y 🛛 Opt	ional 🗌
Descript	ion:		_					-		
			ameter set mapped to	LTE-Mode	Geogra	aph	ical	zone:		
-> Subzo	ne withi	n Buildin	gZone.Room							
DPT:										
Field			Description			Sı	uр.	Range	Unit	Default
Counter\	/alue		Subzone number				M	1 to 15		CS
Status									bitset	
- OutOfS	ervice		zone active /inactive)		(C	true/false		CS
- all other flags			not supported, fixed	to '0'		N	IA			
Comman	nd								enum	
- Normal\	Write					ſ	M			
- SetOSV	/ & Res	etOSV	set zone inactive / active				C			
- all other	r comma	ands	not supported			N	IA_			
Commun	nication):								
DP Add	dress:		IO Type(ID):	409 (IBS)		Ρ	rope	erty ID:	103	
(in the	server)		Start-Index:	1		Ν	l° of	elements	1	
Proper	ty acce	ss:	Read only		Read/W	√rite)	\boxtimes		
Protect	tion		Read level			٧	Vrite	level		
Exception	n Hand	lling:	Value after Powerup:	Stored Va	alue 🛚	A	ct Va	alue 🔲 🛮 De	fault Value	-
-										
Special F	Special Features:									
IBS LTE-	-Mode ru	untime in	terface is deactivated	if zone is 'C	utOfSe	ervio	ce'. I	f parameter E	BuildingZo	ne is
'OutOfSe	ervice' a	lso the co	orresponding Room a	nd Subzone	param	ete	rs ar	e 'OutOfServ	ice' (comn	non flag)

3.5.3 Parameter COVLux

FB:	IBS	Prope	rty Name (<u>Server</u>):	COVLux			Mandator	у 🔲 Ор	tional 🛚
Descr	iption:								
COVL	.ux represe	ents the	minimum change of t	he measur	ed illumi	nation i	n Lux to send	d an upda	ite of
Room	Illuminatio	n							
DPT: Name DPT_Value_Lux DPT ID 9.004 Datatype format F ₁₆									
Field			Description			Sup.	Range	Unit	Default
FloatV	/alue		This field shall conta	in the valu	e over	М	cs	Lux	cs
			which the measured						
			change before it is to	ansmitted	on the				
			bus.						
Comn	nunicatio	n:							
	Address:		IO Type(ID):	409 (IBS))		erty ID:	110	
	he server		Start-Index:	1		N° of	elements	1	
Prop	perty acce	ess:	Read only		Read/\	<i>N</i> rite	\boxtimes		
Prot	ection		Read level			Write	level		
Excep	otion Hand	dling:	Value after Powerup	o: Stored	l Value 🛭	Act \	/alue 🗌 🏻 🗈	efault Va	ılue 🗌
	·								
Speci	al Feature	es:							
		•				•			

3.5.4 Parameter COVPercent

FB:	IBS	Proper	ty Name (<u>Server</u>):	COVPerd	cent			Mandator	у 🔲 Ор	tional 🛚	
Desc	ription:	-		-				-			
COV	Percent de	fines the	rate of change in per	rcent of the	current	mea	sui	red illuminati	on to calc	ulate the	
corre	corresponding actual COV in Lux.										
Exan	Example: COV Condition = 5 %; RoomIllumination = 700 Lux => actual COV = 35 Lux										
DPT:	Name	DPT_F	Percent_U8	DPT ID	5.004		Dat	tatype format	: U ₈		
Field			Description			Sup	ο.	Range	Unit	Default	
Value			Rate of change			М		cs	%	CS	
Com	municatio	n:									
DP	Address:		IO Type(ID):	409 (IBS)		Property ID:		112			
(in	the server)	Start-Index:	1		N° of elements			1		
Pro	perty acce	ess:	Read only		Read/	Write)	\boxtimes			
Pro	tection		Read level			Wı	rite	level			
Exce	ption Han	dling:	Value after Powerup	o: Stored	l Value	X A	ct \	√alue 🔲 🏻 🗈	efault Va	lue 🗌	
Spec	Special Features:										

3.5.5 Parameter HeartbeatRepetitionTime

FB:	IBS	Prope	rty Name (<u>Server</u>):	Heartbea	tRepeti	titionTime Mandatory 🔲 Optional 🔀					
Desc	ription:			-			-				
Parar	meter Hear	tbeatRe	petitionTime defines	the heartbe	eat perio	od for ou	tput RoomIII	umination			
DPT:	Name	DPT_1	TimePeriodSec	DPT ID	7.005	Da	tatype forma	t U ₁₆			
Field			Description			Sup.	Range	Unit	Default		
Time	Period		Heartbeat in s			М	cs	S	15 Min		
Com	Communication:										
DP	Address:		IO Type(ID):	409 (IBS)		Property ID:		111			
(in t	the server)	Start-Index:	1		N° of elements		1			
Pro	perty acce	ess:	Read only	Read/Write			\boxtimes				
Pro	tection		Read level			Write	level				
Exce	ption Hand	dling:	Value after Poweru	p: Stored	l Value	Act	Value 🔲 🏻 🗈	Default Va	lue 🗌		
Spec	ial Feature	es:									
			·				·		<u>'</u>		

3.5.6 Parameter MinRepetitionTime

FB:	IBS	Proper	ty Name (<u>Server</u>):	MinRepetitionTim	е	Mandato	ry 🔲 Op	tional 🛚	
Desc	ription:								
	Parameter MinRepetitionTime defines the minimum wait time between two updates of output								
Roon	RoomIllumination								
DPT: Name DPT_TimePeriodSec DPT ID 7.005 Data					tatype forma	t U ₁₆			
Field			Description		Sup.	Range	Unit	Default	
TimePeriod			Wait time in s	М	cs	S	10 s		
Com	municatio	n:							
DP	Address:		IO Type(ID):	409 (IBS)	Prope	Property ID:		113	
(in t	the server		Start-Index:	1	N° of	elements	1		
Pro	perty acce	ess:	Read only] Read/	Write (\boxtimes			
Pro	tection		Read level		Write	level			
Exce	ption Hand	dling:	Value after Poweru	p: Stored Value	Act	Value 🔲 🏻 🛭	Default Va	lue 🗌	
Spec	ial Feature	es:						_	

Lighting

4 FB Indoor Luminance Sensor (ILS)

4.1 Aims and objectives

The definitions in this document for FB Indoor Luminance Sensor (ILS) are an add-on to the existing FB Specification in [01] to describe the LTE-Mode runtime interface and LTE-Mode specific parameters of FB ILS.

The FB ILS shall measure the luminance at a certain location and communicate the sensor value (cd/m²) to the KNX system, e.g. to a Lighting Controller.

4.2 Functional specification

4.2.1 Overview

Measured luminance represents the luminous intensity (cd/m²) in a certain direction. Luminance characterizes the impression of brightness, which an illuminated or a luminous surface effects in the human eye. Luminance is independent from the distance to the observer; that means that the impression of brightness does not change when the distance between observer and observed object changes.

FB ILS shall provide the measured luminance value via IndoorLuminance process output using LTE-Mode InfoReport Service.

The dynamic range of luminance values is extremely wide. Typical luminance value that can be expected are in the range of 1 600 000 000 cd/m² (sun at noon) – 0,001 cd/m² (sky at night). In the LTE-Mode model IndoorLuminance is encoded as DPT_Value_Luminance (14.041) to cover the full range of values.

Distribution of IndoorLuminance is event driven according to a fixed rule or configurable COV criteria. Because of the logarithmic characteristics of the eye to sense luminance, it is recommended to implement an adaptive COV criterion over the entire range of cd/m² values.

Parameter **COVPercent** represents the rate of change of the measured luminance in percent to calculate the actual COV in cd/m².

Example with COVPercent = 10 %

- current IndoorLuminance = $10~000~000~cd/m^2~$ -> $COV = 10~000~000~cd/m^2$
- current IndoorLuminance = $200\ 000\ \text{cd/m}^2$ -> $COV = 20\ 000\ \text{cd/m}^2$

Parameter COV_cd_per_m2 represents the <u>minimum</u> change of the measured luminance in cd/m² to send an update of IndoorLuminance.

Both parameters COV_cd_per_m2 and COVPercent may be combined to define the COV characteristics over the entire range of values, e.g. in order to avoid frequent updates of IndoorLuminance at twilight because of noise of the sensor => same mechanisms as FB IBS.

If the measured luminance doesn't change more than the actual COV, then the current measured value shall be transmitted periodically with a fixed or configurable heartbeat repetition period (parameter **HeartbeatRepetitionTime**).

There shall be however a minimum wait time between updates of output signal IndoorLuminance to avoid excessive bus load. The wait time is either fixed or configurable (parameter **MinRepetitionTime**).

Binding of FB ILS is based on LTE-Mode zoning concepts. Sensor information is provided according to LTE-Mode mechanisms in a LightingGroup.

 $In the \ LTE-Mode \ runtime \ system \ Lighting Group \ is \ mapped \ to \ existing \ LTE-Mode \ Geographical \ zones.$

Runtime process communication of ILS is disabled if LTE-Mode LightingGroup is 'OutOfService'

4.3 Functional Block diagram

	FB Indoor Lumin	ance Sensor (I	LS) 410
Inputs			Outputs
	Binding Grp.: Ligh	tingGroup (Geog	aphical)
			IR: IndoorLuminance
additional I/Os			Parameters
- luminance sensor			LightingGroup (Geographical)
			COV_cd_per_m2
			COVPercent
			HeartbeatRepetitionTime
			MinRepetitionTime
	mandatory	optional	IR: LTE-Mode InfoReport
	-	•	•

Figure 12 – Functional Block Diagram for FB Indoor Luminance Sensor

4.4 Datapoints

Datapoint	Description	Datapoint Type	ILS PID
Outputs			
IndoorLuminance	IndoorLuminance output represents the measured luminance	DPT_Value_Luminance (14.041)	PID 51
Inputs			
Parameters			
LightingGroup (3 Properties)	LTE-Mode Geographical Zone - Building zone like Floor, Apartment - Room within the Building zone - Subzone within the Room	- DPT_UcountValue8_Z (202.002) - DPT_UcountValue8_Z (202.002) - DPT_UcountValue8_Z (202.002)	PID 101- 103
COV_cd_per_m2	COV criterion in cd/m² to generate updates of output signal IndoorLuminance	DPT_Value_Luminance (14.041)	PID 110
HeartbeatRepetition- Time	Heartbeat repetition time in seconds	DPT_TimePeriodSec (7.005)	PID 111
COVPercent	Rate of change of the measured luminance in percentage to calculate the current COV in cd/m ²	DPT_Percent_U8 (5.004)	PID 112
MinRepetitionTime	Minimum time between updates of output signal RoomIllumination	DPT_TimePeriodSec (7.005)	PID 113

Table 8 - LTE-Mode specific Properties

		Support
Parameter	LightingGroup	М

Table 9 - Standard Properties of Interface Object

		Support
Parameter	COV_cd_per_m2	0
	COVPercent	0
	HeartbeatRepetitionTime	0
	MinRepetitionTime	0
Diagnostic Data		

4.5 Detailed specification of the Datapoints

4.5.1 Output IndoorLuminance

FB:	ILS	LTE-M Name:		Server Output	IndoorLur	ninance		Mandat	ory 🖂	Opt	ional 🔲
Descr	iption:										
	Output IndoorLuminance shall represent the measured luminance value in cd/m².										
	If the calculated luminance changes more than indicated by a COV criterion, then the newly calculated										
				spontaneously.							
	COV: see parameters COV_cd_per_m2 and COVPercent										
	If the variation of measured luminance is within the COV limit, then the current measured value shall be										
	transmitted periodically with a fixed or configurable heartbeat repetition period (parameter HeartbeatRepetitionTime).										
					DDTID	44044	<u> </u>			_	
DPT:	Name			lue_Luminance	DPT ID	14.041		ype form		F ₃₂	D - (- 1)
Field				scription		Sup.	Range	Un	it C m²	OV	Default
Value			iviea	asured luminance val	ue	M	Full range	e ca/	m L		-
	nunicatio										
Class	ing Grou	p:		Type			Default				
	graphical	F	\overline{A}	Type BuildingZone.Room	Subzono			paramet	or Ligh	tinaC	roup)
	ication Sp			BuildingZone.Roon	I.Subzone		CS (SEE	paramet	er Ligit	ungo	roup)
	signed	<u>Г</u>	=	Broadcast C	onfigurable	<u> </u>					
	ddress:			IO Type(ID):	410 (ILS)		Property	/ ID:	51		
LTE-	Mode-Se	rvices			MinRepTime: 3) se			c Heartbeat: 2) min			²⁾ min
(ever	nt):			Output per default of	communica	ting 🖂	Binding Group Wildcard allowed				
	eport			Tx Prio:	High 🗌		Norma	al 🛛		Low	
	-Mode Re										
	onse pol			Transm after Power	run: Stored	ا مبياد/ ا	□ Δct \	/alue ⊠	Defa	ult Vs	alue 🗌
	utput sha	ıll alway	S	Transmatter rower	up. Otoroc	ı valac [value 🖂	Doio	idit v	
	ipported)										
	erty-Servidual ac			Read only 🛚		Read/W	/rite				
Excep	otion Har	ndling:						Sa	ive at F	Power	down
	al Featui										
				n or COV is derived					ıd/or C	OVPe	ercent
				or configurable via p							
3) Min	RepTime	is eithe	er fix	ced or configurable vi	a paramete	er MinRe	epetitionTi	me			

4.5.2 Parameter-set LightingGroup

LightingGroup is implemented using the LTE-Mode Geographical zone concept. It consists of 3 properties belonging together.

4.5.2.1 Parameter BuildingZone

FB: ILS Property	Name (Server):	ightingGrou	p.Building	Zone	Mandator	y 🛛 Opt	ional 🗌	
Description:	<u> </u>	9 - 9	1 3			<i>,</i> — - , ·		
Part of LightingGroup pa	ameter set mapped to	LTE-Mode	e Geograp	hical	zone:			
-> BuildingEntity (Floor, A	partment, Building se	ection etc.)						
DPT : Name DPT_UcountValue8_Z DPT ID 202.002 Datatype format U ₈ Z ₈								
Field	Description		5	Sup.	Range	Unit	Default	
CounterValue	Number of the Build	dingZone		M	1 to 126		cs	
Status						bitset		
- OutOfService	zone active /inactive			0	true/false		cs	
- all other flags	not supported, fixed to '0'			NA				
Command						enum		
- NormalWrite				M				
- SetOSV & ResetOSV	set zone inactive / active			0				
- all other commands	not supported			NA				
Communication:	(ID)	110 (11 0)				101		
DP Address:	IO Type(ID):	410 (ILS)			erty ID:	101		
(in the server)	Start-Index:	1			elements	1		
Property access:	Read only		Read/Wri					
Protection	Read level				level			
Exception Handling:	Value after Powerup:	Stored \	/alue 🛚 A	Act Va	alue 🔲 De	fault Value		
	Special Features:							
ILS LTE-Mode runtime in								
'OutOfService' also the c	orresponding Room a	nd Subzon	e paramete	ers ai	e 'OutOfServ	rice' (comr	non flag)	

4.5.2.2 Parameter Room

FB: ILS	Propert	ty Name (<u>Server</u>):	LightingG	roup.Rc	om		Mandato	ory 🛛 Op	tional 🗌	
Description:			-				-			
Part of Lighting	Group par	rameter set mapped	to LTE-Mo	de Geog	grap	hica	al zone:			
-> Room within	BuildingZ	Zone .								
DPT : Name	DPT: Name DPT_UcountValue8_Z DPT ID 202.002 Datatype format U ₈ Z ₈									
Field		Description			Sı	ıρ.	Range	Unit	Default	
CounterValue		Room number			Ν	Λ	1 to 63		CS	
Status								bitset		
- OutOfService		zone active /inactiv	re)	true/false		CS	
- all other flags		not supported, fixed	d to '0'		N	Α				
Command								enum		
- NormalWrite						Л				
- SetOSV & Res		set zone inactive / active)				
- all other comn	nands	not supported				Α				
Communicatio	n:									
DP Address:		IO Type(ID):	410 (ILS)		Property ID:			102		
(in the server	·)	Start-Index:	1		Ν	° of	elements			
Property acc	ess:	Read only		Read/	Writ	e	\boxtimes			
Protection		Read level			W	/rite	level			
Exception Han	dling:	Value after Poweru	p: Stored	l Value [\boxtimes /	Act '	Value 🗌	Default Va	ılue 🗌	
Special Featur	es:									
ILS LTE-Mode	runtime in	terface is deactivate	d if zone is	'OutOf	Serv	ice'.	. If paramete	er Building	Zone is	
'OutOfService'	also the c	orresponding Room	and Subzo	ne para	met	ers	are 'OutOfS	Service' (co	ommon	
flag)										

4.5.2.3 Parameter Subzone

FB: ILS	Proper	ty Name (Server):	√ Name (Server): LightingGroup.Subzone Mandatory ⊠ Optional □							
Description:	·		-				-			
Part of Lighting	Part of LightingGroup parameter set mapped to LTE-Mode Geographical zone:									
-> Subzone wit	hin Buildiı	ngZone.Room								
DPT: Name	DPT_U	JcountValue8_Z	DPT ID	202.00	02	Da	tatype forma	$t U_8Z_8$		
Field		Description			Sı	лр.	Range	Unit	Default	
CounterValue		Subzone number			1	M	1 to 15		CS	
Status								bitset		
- OutOfService		zone active /inactive			(C	true/false		CS	
- all other flags		not supported, fixed	d to '0'		Ν	IA				
Command								enum		
- NormalWrite					ľ	Λl				
- SetOSV & Re		set zone inactive / active			(C				
- all other comm	nands	not supported			N	IΑ				
Communication	n:									
DP Address:		IO Type(ID):	410 (ILS)		F	rope	erty ID:	103		
(in the serve	r)	Start-Index:	1		N	l° of	elements	1		
Property acc	ess:	Read only		Read	/Wri	te	\boxtimes			
Protection		Read level			٧	Vrite	level			
Exception Har	ndling:	Value after Powerup	o: Stored	l Value		Act '	Value 🔲 🏻 🗈	Default Va	lue 🗌	
Special Featur	es:									
ILS LTE-Mode	runtime ir	nterface is deactivate	d if zone is	'OutOf	Ser	vice'	. If paramete	r Building	Zone is	
'OutOfService'	also the c	orresponding Room	and Subzo	ne para	ame	ters	are 'OutOfSe	ervice' (co	mmon	
flag)		_								

$4.5.2.4 \quad Parameter \ COV_cd_per_m2$

FB: ILS	Proper	ty Name (<u>Server</u>):	COV_cd_r	per_m2		Mandator	y 🔲 Opt	ional 🛚	
Description:	<u>-</u>	-				-			
COV_cd_per_m	2 represe	ents the minimum cha	nge of the i	measure	d lumina	nce in cd/m²	to send a	an update	
of IndoorLuminance									
DPT : Name	DPT_V	alue_Luminance	lue_Luminance DPT ID 14.041 Datatype format F ₃₂						
Field		Description			Sup.	Range	Unit	Default	
FloatValue		This field shall contain	in the value	over	M	cs	cd/m ²	CS	
		which the measured							
		change before it is tra							
		bus.							
Communication	<u> 1:</u>								
DP Address:		IO Type(ID):	410 (ILS)		Proper	ty ID:	110		
(in the server)		Start-Index:	1		N° of e	lements	1		
Property acce	ss:	Read only		Read/W	rite	\boxtimes			
Protection		Read level			Write le	evel			
Exception Hand	dling:	Value after Powerup:	Stored \	/alue ⊠	Act Val	ue 🔲 🛮 Def	ault Value		
-									
Special Feature	es:								

4.5.2.5 Parameter COVPercent

FB:	ILS	Proper	ty Name (<u>Server</u>):	COVPerce	ent			Mandatory	/ Opt	tional 🛚	
Desc	ription:	3	-					-			
corres	COVPercent defines the rate of change in percent of the current measured luminance to calculate the corresponding actual COV in cd/m ² . Example: COV Condition = 5 %; IndoorLuminance = 10 000 cd/m ² => actual COV = 500 cd/m ²										
DPT:	PT: Name DPT_Percent_U8 DPT ID 5.004 Datatype format				U ₈						
Field			Description			Su	p.	Range	Unit	Default	
Value			Rate of change			N	1	CS	%	cs	
Com	nunicatior):			-			-			
DP .	Address:		IO Type(ID):	410 (ILS)						112	
(in t	he server)		Start-Index:	1		Ν	° of	elements	1		
Pro	perty acce	ss:	Read only		Read/\	Vrite)	\boxtimes			
Pro	tection		Read level			V	/rite	level			
Exce	ption Hand	lling:	Value after Powerup:	Stored \	/alue 🗵	Ac	t Va	lue 🗌 Def	ault Value	e 🗌	
Spec	Special Features:										
	•			•					•		

4.5.2.6 Parameter HeartbeatRepetitionTime

FB:	ILS	Proper	Property Name (Server): HeartbeatRepetitionTime Mandat			Mandator	y 🗌 Optional 🛛			
Description:										
Parameter HeartbeatRepetitionTime defines the heartbeat period for output IndoorLuminance										
DPT:	Name	DPT_1	imePeriodSec	DPT ID	7.005	Da	tatype format	U ₁₆		
Field			Description			Sup.	Range	Unit	Default	
TimePeriod			Heartbeat in s			М	CS	S	15 Min	
Communication:										
DP Address:			IO Type(ID):	410 (ILS)	0 (ILS) Property ID:			111		
(in the server)			Start-Index:	1	N° of elements			1		
Property access:			Read only	Read/Write 🛛						
Protection			Read level	Write			level			
Exception Handling:			Value after Powerup:	Stored \	/alue 🗵	Act Va	alue 🗌 🛮 Def	ault Value	e 🗌	
-										
Special Features:										

4.5.2.7 Parameter MinRepetitionTime

FB:	ILS	Proper	ty Name (<u>Server</u>):	MinRepetitionTime			Mandator	Mandatory ☐ Optional ☐		
Description:										
Parameter MinRepetitionTime defines the minimum wait time between two updates of output										
IndoorLuminance										
DPT:	Name	DPT_Ti	mePeriodSec	DPT ID 7.005 Datatype format U ₁₆						
Field			Description			Sup.	Range	Unit	Default	
TimePeriod			Wait time in s			М	cs	S	10 s	
Communication:										
DP Address:			IO Type(ID):	410 (ILS)		Prop	erty ID:	113		
(in the server)			Start-Index:	1 N° of el			f elements	elements 1		
Property access:			Read only	Read/Write						
Protection			Read level			Write level				
Exception Handling: Value after Powerup: Stored Value ☐ Act Value ☐ Default Value						e 🗌				
Special Features:										
	•		_	•	•	•			•	