

# **Application Descriptions**

# **HVAC General Functional Blocks**

# **HVAC Schedulers**

#### Summary

This document specifies 'scheduler' Functional Blocks, as they are used in the HVAC application domain.

(HVAC) Schedulers are used to control a HVAC System/Plant in dependence of time (& date).

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# **Document updates**

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# References

[01]	Chapter 3/7/2	"Datapoint Types"
[02]	Chapter 7/1/1	"System Clock""
[03]	Chapter 7/10/1	"HVAC Sensor Functional Blocks"
[04]	Chapter 7/10/2	"HVAC HMI Functional Blocks"
[05]	Chapter 7/10/3	"HVAC Actuator Functional Blocks"
[06]	Chapter 7/10/4	"HVAC Common Functional Blocks"
[07]	Chapter 7/10/9	"Property Identifiers"
[80]	Chapter 7/10/10	HVAC Interface Object Type Identifier"
[09]	Part 7/11	"Hot Water Heating - Introduction"
[10]	Part 7/12	"Direct Electric Heating"
[11]	Part 7/13	"Terminal Unit Functional Blocks"
[12]	Part 7/14	"Ventilation & Air Conditioning and Cold Water"
[13]	Part 10/1	"Logical Tag Extended"

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#### 1 Introduction

## 1.1 Scope

This document is part of the KNX HVAC Application Interworking Standard. It contains the Specification of Functional Blocks (FBs) used for time dependent HVAC Control.

This version of the document contains Functional Block specifications for

- the time dependent HVAC Control, HVAC Mode driven (FB 'HVAC Mode Scheduler' HVACS),
- time dependent Domestic Hot Water Control (FB 'DHW Mode Scheduler' DHWS),
- the time dependent DHW Circulation Pump Control (FB 'DHW Circulation Pump Scheduler'),
   and
- the time dependent HVAC Control, temperature driven (FB 'Absolute Room Temperature Setpoint Scheduler' ARTSS).

## 1.2 Objectives

This document includes the information necessary to build interoperable HVAC HWH products using the KNX Bus. Runtime process Interworking between HVAC control devices at the application level is the focus.

Data-interfaces for time schedule parameter settings are not in the focus and therefore, are not part of this document.

In addition, this document specifies the specific mechanisms for zoning and runtime process data distribution used in HVAC for an 'easy installation' system (LTE-HEE Mode [13]).

This is a technical specification with informative material provided as needed to convey key concepts. The approach taken here is a top-down view of interoperability. The HVAC system model is based on the decomposition of the distributed HVAC application by means of FBs, i.e. black-box description of FBs including data-interface and relationship to other FBs.

Every FB may be part of a complex device (e.g. a boiler & heating controller) containing more than one FB. Because of this modular approach, there is no attempt in this specification to describe or dictate the internal construction of a FB or to describe specific device types.

This document only includes details of the transport protocol as needed to specify interoperability and easy installation mechanisms. The document does not specifically cover implementation aspects, but guidelines are included where appropriate.

This part of the KNX HVAC specification is mainly but not completely independent of the underlying protocol since specific mechanisms for "easy configuration" and runtime data distribution must be available on the network.

Completely protocol dependent parts of the Schedulers Specification such as data encoding and Datapoint-types, object address tables, group address tables etc. are not part of this document.

## 1.3 Dependence on Configuration Modes

The main focus of this document is the specification of the **Basic FBs** and the **LTE specific parts**.

The document provides all necessary information needed:

- for a complete implementation of the FBs in LTE-Mode
- for the implementation of mandatory objects used for runtime Interworking in Standard Mode (Basic FB)

#### 1.3.1 Runtime Interworking

Mode dependent (S-Mode, Ctrl-Mode, PB-Mode) implementation of optional runtime Interworking objects is not specified in this document, e.g. E-Mode Channel definitions.

The following table (example) shows the mode dependencies concerning runtime Interworking

			STANDARD MODE	EXTENDE: MODE		
		Basic FB	S-Mode	Standard Mode Interface	LTE-Mode	
Inputs	Inp1	NA	NA	NA	M	
	Inp2	NA	NA	NA	О	
	Inp3	(GO <sub>b</sub> )		(GO)	О	
Outputs	Outp1	NA	NA	NA	M	
	- Outp1-1	$GO_b$	GO	GO	NA	
	- Outp1-2	$GO_b$	GO	GO	NA	
	Outp2	$GO_b$	GO	GO	M	

- Inp1: is mandatory M in LTE-Mode but the information is not available NA in the Basic FB and all other modes because the Datapoint Type (DPT) is <u>today</u> not available in Standard Mode and there are no products on the market with this functionality.
- Inp2: is optional O in LTE-Mode but the information is not available NA in the Basic FB and all other modes because the DPT is <u>today</u> not available in Standard Mode and there are no products on the market with this functionality.
- Inp3: is optional O in LTE-Mode and an optional Group Object in the Basic FB  $(GO_b)$ . The Datapoint is optionally supported as Group Object in the LTE Standard Mode Interface (GO). For all other modes the implementation is not defined. This is indicated by an empty field.
- Outp1: is mandatory M in LTE-Mode and has a structured DPT or a DPT with extended features which is today not available in Standard Mode. In the Basic FB the information of Outp1 is split up into Outp1-1 and Outp1-2 (separate Datapoints with standard DPT).

  Outp1-1 and Outp1-2 are mandatory Group Objects GO in the Basic FB and are therefore mandatory in all modes.

Outp2: is mandatory in all modes

#### 1.3.2 Parameters and Diagnostic Data

#### LTE implementation:

- Parameters and Diagnostic Data of a FB shall be implemented as Properties of the corresponding Interface Object which are accessed using individual addressing.
- These Properties are addressed via the standard Interface Object Type (IO Type) for this FB. This IO Type is also used for Datapoint addressing in the LTE runtime Interworking model
- Standard DPT or HVAC specific DPT with extended features are used where appropriate.

#### Other modes:

- Parameters and Diagnostic Data can in principle be implemented as memory mapped Datapoints or Group Objects or Properties of an Interface Object using individual addressing. This document does not lay down how to implement Parameters and Diagnostic Data in S, LT-R, LT-S, Ctrl, Pb and A-Mode.
- In case of **Memory Mapped** Datapoints the DPT may be manufacturer specific
- In case of **Group Objects** standard DPT shall be used instead of HVAC specific (extended) DPT. The description of these Group Objects shall be part of the mode-dependent specification (e.g. Channel definition).
- In case of **Properties**, the implementation of HVAC specific DPT with extended features may be a problem (depending on the available microcontroller resources). The manufacturer has the choice:
  - ⇒ to use the LTE style Property implementation as specified in this document (with the DPT and IO Type for LTE implementations) **IO Type**<sup>used</sup> = **IO Type**<sup>HVAC-LTE</sup>
  - ⇒ to implement these Properties using standard DPT only.
     In this case, the same Property ID but a different IO Type shall be used since the DPT of a Property shall be unambiguous for each IO Type.

     Simple IOT mapping rule: IO Type<sup>used</sup> = IO Type<sup>standardDPT</sup> = IO Type<sup>HVAC-LTE</sup> + 10000d (e.g. HVACS<sup>HVAC-LTE</sup> = 110 => HVACS<sup>standardDPT</sup> = 10110)
  - ⇒ It is allowed to implement in a device both Interface Object Types IO Type<sup>HVAC-LTE</sup> and IO Type<sup>standardDPT</sup>. The implementation of parameters and diagnostic data of one given FB shall however be complete. It is thus not allowed to implement part of the Datapoints of a FB in IO Type<sup>standardDPT</sup> and the remaining in IO Type<sup>HVACLTE</sup>.

	Implementation of Parameter and Diagnostic Data								
	Proper	ty based	Group Object	Memory mapped					
	HVAC-LTE style	Standard DPT							
IO Type	IO Type <sup>HVAC-LTE</sup> e.g. HVACS=110	$\begin{aligned} &\text{IO Type}^{\text{HVAC-LTE}} + 10000 \\ &\text{e.g. HVACS=10110} \end{aligned}$							
Property ID	Property ID x	=> same Property ID x							
	if standard DPT	=> same standard DPT	=> same standard DPT	company specific					
DPT	if HVAC-LTE specific*) e.g. 201.100	=> mapped standard DPT, e.g. 20.103	=> mapped standard DPT, e.g. 20.103						

In this document only the **HVAC-LTE style** of Parameters and Diagnostic Data is specified for IO Type<sup>HVAC-LTE</sup>.

In the FB Datapoint overview those Parameters and Diagnostic Data with HVAC-LTE specific (extended) DPT are marked "\*)"

The mapping of HVAC specific DPT to standard DPT is generic and described in the document [01].

# 1.4 Abbreviations

#### **Abbreviation Description**

#### **General:**

cs company specific
CP Circulation Pump
DPT Datapoint Type

FB FB

IO Interface Object

IR InfoReport (LTE AL-Service)

LTE Logical Tag Extended Mode, see [13] Volume 10-1, LTE Specification

NA not allowed / not available
DEH Direct Electrical Heating
DHW Domestic Hot Water
HWH Hot Water Heating
TU Terminal Units

VAC Ventilation, Air Condition and Cold Water

FBs:

ARTSS Absolute Room Temperature Setpoint Scheduler

DHWCPS DHW Circulation Pump Scheduler DHWCPC DHW Circulation Pump Controller

DHWS DHW Mode Scheduler
DHWSM DHW Setpoint Manager
HVACS HVAC Mode Scheduler

RSMHD Room Setpoint Manager HVAC Mode Driven RSMTD Room Setpoint Manager Temperature Driven

SCLO System Clock

# 2 FB ,HVAC Mode Scheduler" (HVACS)

## 2.1 Aims and objectives

The FB 'HVAC Mode Scheduler' is used in simple applications / plants, where no supervisor (BMS) is available. This means there is no FB 'Programme to HVAC Mode Converter' in the same zone (logical tag).

The FB 'HVAC Mode Scheduler' is providing the *HVACMode*, the *HVACModeNex*t and the *EnableComfort*. These signals are provided for the FB 'Room Setpoint Manager (HVAC Mode Driven)' RSMHD.

HVAC Mode Scheduler information typically is related with a single device or small number of devices within a single apartment/floor or room. Therefore, in an 'easy installation' plant with LTE-HEE Mode devices, scheduler dependent HVAC process data (HVAC Mode) is distributed within geographical zones like apartment\_x.room\_y. In a Standard Mode system, scheduler dependent process data is distributed with Standard Mode Group Objects.

A device may consist of several time channels, this means this FB may be realised more than once in a device, each block belonging to another binding group or zone.

The device with the FB HVACS needs an internal clock. This internal clock may be the 'local clock' related to the FB 'System Clock'. If FB 'System Clock' is not available or implemented, the FB HVACS itself may use (optional) inputs for time and date reception as input for the devices internal/local clock.

#### 2.2 Functional Specifications

The HVAC Mode Scheduling Programme is characterised by "switching points". A "switching point" is defined by output value(s) and a date and/or time value. The output value(s) has/have to be sent if the local clock matches the switching points date & time value.

The following output signals are provided by the HVACS:

- HVACMode All 3 signals are information from a scheduling programme and
- HVACModeNext provided for the room setpoint manager (HVAC Mode driven).
- EnableComfort

If SCLO is not implemented in a device, the following inputs may be used in the same way as with SCLO in slave mode, they are intended as synchronisation input to the device's internal/local clock.

- System Clock System Clock Input (Date & Time)
- Time Time Input, Standard Mode only
- Date date Input, Standard Mode only

#### **Parameters:**

The Time Schedule or "internal programme" (switching points with their output value(s)) is given by parameters. These parameter(s) are manufacturer specific.

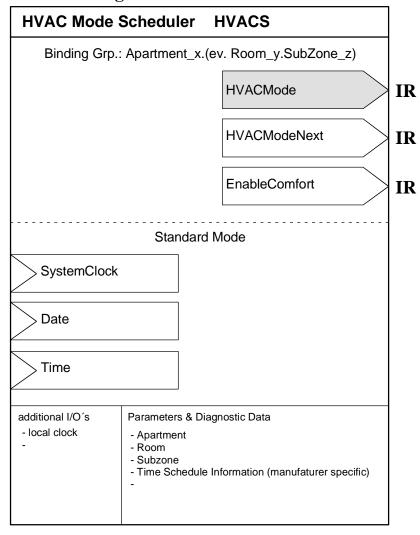
Time Schedules in a bus device may be changed by a management station or a complex bus device (with sophisticated user interface/MMI). That means, change of time schedule parameters is not only an action during configuration phase of an installation, but also during runtime.

For LTE-HEE mode implementation, zoning parameters are included in this document.

#### 2.3 Constraints

Apartment.Room(.Subzone) is a structured/compound zoning address, each part with its own  $Z_8$  Status. If one part of the this compound zoning address is 'Out of Service' all parts are Out of Service.

# 2.4 Functional Block diagram



# 2.5 Datapoints

Data Point	Description	Data Point Type	DPT ID
Outputs			
HVACMode	Actual HVAC mode; input to RSMHD  – LTE-Mode  – Standard Mode	DPT_HVACMode_Z DPT_HVACMode	201.100 20.102
HVACModeNext	Next HVAC mode plus time to next status input to RSMHD	DPT_HVACModeNext	206.100
EnableComfort	allow RSMHD to go to Comfort	DPT_Enable	1.003
Inputs			
SystemClock	System Clock as input for the device's local clock; available only in Standard Mode	DPT_DateTime	19.001
Date	alternative to SystemClock; only in Standard Mode	DPT_Date	10.001
Time	alternative to SystemClock; only in Standard Mode	DPT_Time	11.001
Parameters			
Apartment	LTE zone: Apartment number	DPT_UcountValue8_Z	202.002
Room	LTE zone: Room number	DPT_UcountValue8_Z	202.002
Subzone	LTE zone: Subzone number	DPT_UcountValue8_Z	202.002
Diagnostic Data			

Table 2-1: HVACS - Overview on runtime Interworking and parameter properties

			STANDARD MODE	EXTE: Mo	
		Basic FB	S-Mode	Standard Mode Interface	LTE-Mode
Outputs	HVACMode	$GO_b$	GO	GO	M
	HVACModeNext	NA 1)	NA	NA	О
	EnableComfort	(GO <sub>b</sub> )	(GO)	(GO)	О
Inputs	SystemClock	(GO <sub>b</sub> )	(GO)	(GO)	NA
	Date	(GO <sub>b</sub> )	(GO)	(GO)	NA
	Time	(GO <sub>b</sub> )	(GO)	(GO)	NA

<sup>&</sup>lt;sup>1)</sup> optional in LTE-Mode; the information is NA in the Basic FB and all other modes because the Datapoint Type is today not yet available in Standard Mode. Splitting of DPT is not possible because of necessary data consistency

Table 2–2: HVACS Runtime Interworking - dependence on Configuration Modes

		Support
Parameter	Apartment	M
	Room	О
	Subzone	О

**Table 2–3: HVACS LTE specific Properties** 

	Support
Parameter	

Table 2-4: HVACS Properties of Interface Objects (or memory mapped DP)

# 2.5.1 Detailed specification of the Datapoints

## 2.5.1.1 Output: HVACMode

#### **Standard Mode:**

DP Name:	HVACMode			Abbr.:		Manda	atory		
FB Name:	HVACS								
Description									
see LTE-HEE	Mode								
		ssion, a simple da	atatype (wit	hout Z <sub>8</sub> sta	atus/comma	and field) is	used.		
Datapoint Ty									
DPT_Name:	DPT_HVAC	CMode							
DPT Format:	N <sub>8</sub>				DPT_ID:	20.1	02		
Field	Description				Supp.	Range	Unit	Default	
HVACMode	see LTE-HI	EE Mode				14 <sup>1)</sup>		CS	
Access Type									
♦ Output									
this $\rightarrow M$		this $\rightarrow$ 1							
Spontaneo	us 🛛 C	COV:	Δ-Value:	2)	MinRepTim	ne:	10se	С	
-	C	Cyclic 🖂	Period:	15 min	-		-		
Request									
Communicati	on Type								
♦ Group Ob	ect Datapoint	t				Mandat	ory:		
Default Gro	oup Address:								
Dynamics									
Power dow	n: Save:								
Power up:	Value:	No initialisat	tion:		Default valu	ie:			
		Saved value	e: 🗌		Actual valu	e:		$\leq$	
	Transmi	it on bus:		⊠ 3)					
<b>Exception Ha</b>	ndling								
Special Featu									
	uto' is not allo								
		dition: local time o					g point.		
3) actual valu	a is sant as s	oon as local time	is valid (no	t "corrunte	d" no fault	)			

#### LTE-HEE Mode:

FB:	HVACS	LTE Se	rver Output Name:	ver Output Name: HVACMode Mandatory Optional						
	ription:	-		-					-	
	The HVAC mode signal is used by the FB "Room Setpoint Manager (HVAC Mode Driven)" (RSMHD) to									
			AC mode (further de							
		247 the f	ollowing HVAC-Mode	es are used:	Comfo	rt, Staı	ndby, E	conomy	, Building	
Prote										
DPT:	Name	DPT_HV	/ACMode_Z	DPT ID	201.10			format		
Field			Description		Sup.	Rang	е	Unit	COV	Default
	Mode		<b>HVAC Operating Mo</b>		М	[14	<b>1</b> ] 1)	enum.	see 2)	CS
Status			standard Status attri	butes				bitset		
- all fla	ags		not supported		NA	fixed	to '0'			
Comn			standard Command,	write only				enum.		
- all c	ommands		not supported		NA					
Comr	nunication	<b>)</b> :								
	ding Group	o:	_							
Clas			Туре				Defau	ılt		
	eographical		Apartment.Room.S	Apartment.Room.Subzone cs						
	plication Sp	pecific								
	assigned		Broadcast	Configura						
	Address:		IO Type(ID):	110 (HVAC			erty ID		51	
	-Services	·		MinRepTime		10	sec	Hear	tbeat:	15 min
Inf	oReport		Output per default	communicat	ting	Bind	ling Gro	oup Wild	card allov	ved 🖂
(L	ΓΕ Read-R	esponse	Tx Prio:	Tx Prio: High ☐ Normal ⊠				Low		
	lling of the									
	all always b	oe	Transm after Powe	erup <sup>3)</sup> : Store	ed Valu	e 🗌 /	Act Valu	ue 🛛 🏻 [	Default Va	alue 🗌
	pported) perty-Serv	ico								
	ividual acc		Read only		Read/V	Vrite				
Exce	otion Hand					Save	at Power	down		
_	al Feature									
۵)	lue 'Auto' is									
			ondition: local time of						ng point.	
3) ac	3) actual value is sent as soon as local time is valid (not "corrupted", no fault,)									

2.5.1.2 Output: HVACModeNext

Standard Mode: NA LTE-HEE Mode:

FB:	HVACS	LT	E Serv	ver Output Name: HVACModeNext							
Descr	iption:										
Provid	les next H\	/AC	Mode	for FB RSMHD an	d the tim	e delay	(in min	utes) unti	this next	:HVAC r	node
DPT:	Name	DP.	T_HV <i>A</i>	ACModeNext	DPT II	D 206.	.100	Datatype	format	U <sub>16</sub> N <sub>8</sub>	
Field			Descr	ription		Sup.	Range	Э	Unit	COV	Default
Time 1	)		Delay	Time in minutes		М	[0 6	55535] <sup>2)</sup>	min		CS
HVAC	Mode		next F	HVAC Operating M	ode	М	[04	] 2)	enum.	see 3)	CS
Comn	nunication	1:				_			-	-	
Bind	ling Group	):									
Clas	~			Type				Defau	ılt		
	ographical		$\boxtimes$	Apartment.Room.	Subzone	1		CS			
Ар	plication Sp	oeci	fic 🗌								
	assigned			Broadcast	Confi	gurable					
	Address:			IO Type(ID): 110 (HVACS) Property ID: 52							
	-Services	(eve	ent):						15 min		
Info	Report			Output per default communicating Binding Group Wildcard allowed						ved	
	E Read-Re			Tx Prio:	rio: High ☐ Normal ⊠			Low			
sha	ling of the all always be ported)		out	Transm after Powerup 4): Stored Value Act Value Default Value					alue 🗌		
Prop	erty-Servividual acc		s):	Read only	3	Rea	d/Write	· 🗆			
Excep	tion Hand	lling	<b>j</b> :						Save a	t Power	down
	al Feature	s:									
	As long as the 'real' time to next mode is out of range (> 65535 minutes) the maximum time delay (=										
	"65535 minutes to next mode") is sent.										
	see table interpretation of time and HVACillode fields										
				Heartbeat & COV (	("new" ne	ext mode	when	HVACM	<b>de</b> has c	hanged <sup>.</sup>	→ sent
	er <i>HVACM</i>					. "			,		
′ act	ual value is	s se	nt as s	soon as local time is	s valid (n	ot "corru	ıpted", I	no tault, .	)		

# Interpretation of Time and HVACMode fields:

Time	HVACMode	
= 0 (Undefined)	= 0 (Undefined)	the content of the Datapoint is void / undefined
		⇒ no next HVAC Mode available for an undefined time period,
		i.e. if the HVACS can't calculate neither a 'current HVACMode' nor a
		delay time to the 'next HVACMode'.
= 0 (Undefined)	= {14}	defined and valid HVACMode but the delay time is undefined (unknown)
		⇒ in cases, where a time delay until next mode can't be calculated in the HVACS → 'next HVACMode' = current 'HVACMode'
> 0	= 0 (Undefined)	undefined (unknown) HVACMode during a defined delay time
		⇒ not allowed for output HVACModeNext of HVACS
> 0	= {14}	defined and valid HVACMode and delay time
		⇒ normal case

# 2.5.1.3 Output: EnableComfort

#### **Standard Mode:**

DF	Name:	Enal	oleCor	mfort				Abbr.	:			Ma	andatory		$\boxtimes$	
FB	Name:	HVA	.CS										Ca	n be intern	al	$\boxtimes$
De	scription															
se	e LTE-HEE I	Mode	е													
Da	tapoint Typ	е														
DF	PT_Name:		T_En	able												
DF	PT Format:	B <sub>1</sub>								DF	PT_ID:		1	.003		
Fie	eld	De	scripti	on						S	Supp.	Range	)	Unit	Def	ault
		see	e LTE-	HEE N	1ode des	script	tion				М	{0,1}		boolean	С	s
Ac	cess Type															
<b>♦</b>	Output															
	$\text{this} \to M$			t	his $\rightarrow$ 1											
	Spontaneou	leous 🛛 COV: 🔻 Δ-Value: 1) MinRepTime: 10sec														
		Cyclic Period: 15 min														
	Request		$\boxtimes$													
Co	mmunication	on T	уре													
•	Group Obj	ect D	)atapo	int								N	1an	datory:	$\boxtimes$	
	Default Gro	up A	ddres	s: -												
Dy	namics															
	Power down	n:	Save:													
	Power up:		Value	<b>:</b> :	No initia	alisat	tion:				Default	value:				
					Saved	value	e:			F	Actual v	/alue:			$\boxtimes$	
			Trans	mit on	bus:				$\boxtimes$							
Ex	ception Hai	ndlin	ıg													
	ecial Featu															
1)	Transmission				_	al, e.	g. enab	ole/di	sable o	conc	dition d	epending	g or	n the differe	nt H\	/AC
	modes, are company specific.															

#### LTE-HEE Mode:

FB:	HVACS	LTE Se	erver Output Name	e: EnableCor	nfort					datory 🗌
Desc	ription:	<u> </u>		-						
			n be used to lock l							
			/AC Mode is 'Build							omfort' for
			eans of a 'Comfort'							
DPT:	Name	DPT_Er	,	DPT ID	1.003				ooolean	
Field			Description		Sup.	Range		Unit	COV	Default
					M	{0,1}		boolean	see 1)	CS
Comr	nunication	):								
Bine	ding Group	<b>)</b> :								
Clas			Туре				Defau	lt		
	eographical		Apartment.Roor	n.Subzone			CS			
	plication S	pecific_								
	assigned		Broadcast	Configura						
	Address:		IO Type(ID):	110 (HVAC			erty ID:		3	
	-Services	`		<u>—</u>						15 min
Inf	oReport		Output per defa	Output per default communicating  Binding Group Wild					ard allov	ved 🛚
	ΓΕ Read-R		Tx Prio:	High 🗌		No	rmal 🛭		Low	
sh	lling of the all always t pported)		Transm after Po	werup: Stored	l Value	□ A	ct Valu	ıe 🛭 D	efault Va	alue 🗌
	Property-Service (individual access):									
Exce	otion Hand	lling:						Save a	t Power	down
Speci	ial Feature	s:								
1) Tra	Transmission conditions for this signal, e.g. enable/disable condition depending on the different HVAC									
mo	modes, are company specific.									

### 2.5.1.4 Input: SystemClock

**Standard Mode:** 

See [02], description of SCLO input *SystemClock* (SCLO in slave mode).

LTE-HEE mode: NA

### **2.5.1.5 Input: Date**

**Standard Mode:** 

See [02], description of SCLO input *Date* (SCLO in slave mode).

LTE-HEE mode: NA

## **2.5.1.6 Input: Time**

**Standard Mode:** 

See [02], description of SCLO input *Time* (SCLO in slave mode).

LTE-HEE mode: NA

# 2.5.1.7 Parameter: Apartment

FB:	HVACS	Proper	ty	Name ( <u>Server</u> ):	Α	partment	:							datory 🖂
Doco	rintion	<u> </u>			_							_	<u> </u>	tional
	ription:													
LTE z	zone: Apart	<u>iment nui</u>	mt	oer										
DPT:	Name	DPT_U	20	untValue8_Z		DPT ID	202	2.002		Dat	atype forma	at	U <sub>8</sub> Z <sub>8</sub>	
Field				Description					S	up.	Range	l	Unit	Default
Coun	terValue		Α	partment number						M	1126			1
Statu	S				_							t	bitset	
- Out	OfService		z	one active /inactiv	́е				(	0	true/false			false
- all o	ther flags		n	ot supported, fixed	d t	o ' <u>0</u> '			١	۱A	1			
Comr	nand											€	enum	
- Norr	malWrite									M				
- Set0	OSV & Res	etOSV	set zone inactive / active					(	0					
- all o	ther comm	ands	not supported						١	۱A		$\perp$		
Com	munication	n:						-						
DP	Address:			IO Type(ID):		110 (HVA	(CS)		Р	rope	rty ID:	•	101	
(in t	the server)	)		Start-Index:		1			Ν	° of (	elements	7	1	
Pro	perty acce	ess:		Read only			Rea	ad/W	rite	<del>)</del>	$\boxtimes$			
Exce	ption Hand	dling:	٧	alue after Poweru	ıp:	Stored	Valu	e 🗵	Α	ct Va	alue 🔲 D	)efa	ault Value	<u> </u>
Spec	ial Feature	es:												
HVAC	CS DP's are	e not LTE	Ξ	communicating if z	zor	ne is 'Out(	OfSer	vice'	. If	Apa	rtment is 'O	ot(	OfService	also
the co	orrespondir	na Room	a	nd Subzone is 'Ou	ιtC	OfService'	(con	nmor	ı fla	ag)				

#### 2.5.1.8 Parameter: Room

2.5.1.0 I arameter. Room											
FB: HVACS	Proper	ty Name ( <u>Server</u> ):	R	oom				Mandatory ☐ Optional ⊠			
Description:			_					<u>ı                                     </u>	otional 🔼		
LTE zone: Room	numbei	•									
DPT: Name	DPT_U	countValue8_Z		DPT ID	202.002	Dat	tatype format	U <sub>8</sub> Z <sub>8</sub>			
Field Description					,	Sup.	Range	Unit	Default		
CounterValue		Room number				M	0, 163		0 or 1		
Status								bitset			
- OutOfService		zone active /inactiv	/e			0	true/false		false		
- all other flags		not supported, fixe	d t	o '0'		NA					
Command								enum			
- NormalWrite											
- SetOSV & Rese	etOSV	set zone inactive / active									
- all other comma	ands	not supported				NA					
Communication	):										
DP Address:		IO Type(ID):		110 (HVA	CS)	Prope	erty ID:	102			
(in the server)		Start-Index:		1		N° of	elements	1			
Property acce	ss:	Read only			Read/W	rite	$\boxtimes$				
<b>Exception Hand</b>	Exception Handling: Value after Powerup: Stored Value Act Value Default Value										
<b>Special Feature</b>	s:										
		communicating if z					artment is 'Ou	tOfService	e' also		
he corresponding Room and Subzone is 'OutOfService' (common flag)											

# 2.5.1.9 Parameter: Subzone

FB:	HVACS	Proper	ty Name (Server):	Subzone					ndatory 🗌 Optional 🖂	
Desc	ription:	-		_						
LTE z	one: Subzo	ne num	ber within the Apart	ment.Roor	n. Subzon	e value	is a paramete	er used o	r fixed	
value	·*· (=0)									
DPT:	Name	DPT_U	countValue8_Z	DPT ID	202.00	2 Da	tatype format	$U_8Z_8$		
Field			Description			Sup.	Range	Unit	Default	
Count	terValue		Subzone number			M	0, 115		0 or 1	
Status	~							bitset		
	OfService		zone active /inactiv	_		0	true/false		false	
	ther flags		not supported, fixe	d to '0'		NA				
Comn								enum		
	malWrite					M				
- SetC	DSV & Rese	etOSV	set zone inactive /	active		0				
- all o	ther comma	ands	not supported			NA				
Comr	munication	:								
DP A	Address:		IO Type(ID):	110 (H\	/ACS)	Prope	erty ID:	103		
(in t	he server)		Start-Index:	1		N° of	elements	1		
Pro	perty acce	ss:	Read only		Read/V	Vrite	$\boxtimes$			
Exce	ption Hand	lling:	Value after Poweru	ıp: Store	d Value 🗵	Act V	alue 🔲 De	efault Val	ue 🗌	
Special Features:										
HVAC	CS DP's are	not LTE	communicating if a	zone is 'Ou	tOfService	e'. If Apa	artment is 'Ou	ıtOfServi	ce' also	
the co	the corresponding Subzone is 'OutOfService' (common flag)									

# 3 FB "DHW Mode Scheduler" (DHWS)

# 3.1 Aims and objectives

The FB "DHW Mode Scheduler" (DHW = Domestic Hot Water) is used in simple applications / plants, where no supervisor (BMS) is available. This means there is no 'Programme to DHW Mode Converter' in the same zone (logical tag).

The FB "DHW Mode Scheduler" is providing the *DHWMode*, the *DHWModeNext* and the *EnableDHWPrep*. These signals are provided for the 'Domestic Hot Water Setpoint Manager' (DHWSM).

DHW Mode Scheduler information typically is related with a single device or small number of devices within a DHW Zone. Therefore, in an 'easy installation' plant with LTE-HEE Mode devices, scheduler dependent HVAC process data (DHW Mode) is distributed within an application specific zone (DHW Zone). In a Standard Mode system, scheduler dependent DHW process data is distributed with Standard Mode Group Objects.

A device may consist of several time channels, this means this FB may be realised more than once in a device, each block belonging to another binding group.

The device with the FB DHWS needs an internal clock, which may be autonomous or may be related to the FB 'System Clock' If FB 'System Clock' is not available or implemented, the FB DHWS itself may use (optional) inputs for time and date reception as input for the devices internal/local clock.

## 3.2 Functional Specifications

The DHW Mode Scheduling Programme is characterised by "switching points". ". A "switching point" is defined by output value(s) and a date and/or time value. The output value(s) has/have to be sent if the local clock matches the switching points date & time value.

The following output signals are provided by the DHWS:

• DHWMode All 3 signals are information from a scheduling programme and

• DHWModeNext provided for the DHW setpoint manager

EnableDHWPrep

If SCLO is not implemented in a device, the following inputs may be used in the same way as with SCLO in slave mode, they are intended as synchronisation input to the device's internal/local clock.

System Clock System Clock Input (Date & Time)
 Time Input, Standard Mode only
 Date date Input, Standard Mode only

#### Parameters:

The Time Schedule or "internal programme" (switching points with their output value(s)) is given by parameters. These parameter(s) are manufacturer specific.

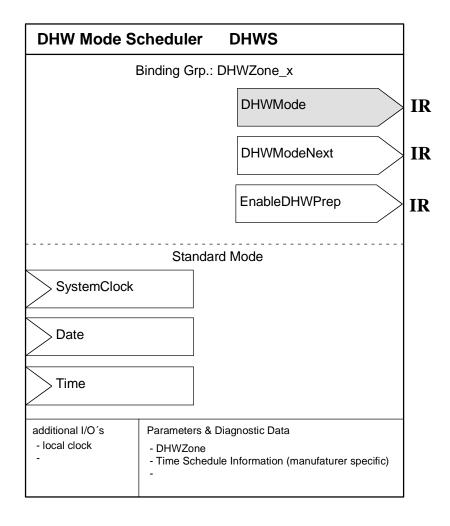
Time Schedules in a bus device may be changed by a management station or a complex bus device (with sophisticated user interface/MMI). That means, change of time schedule parameters is not only an action during configuration phase of an installation, but also during runtime.

For LTE-HEE mode implementation, zoning parameters are included in this document.

### 3.3 Constraints

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# 3.4 Functional Block diagram



# 3.5 Datapoints

Data Point	Description	Data Point Type	DPT ID
Outputs			
DHWMode	Actual DHW mode; input to DHWSM  – LTE-Mode  – Standard Mode	DPT_DHWMode_Z DPT_DHWMode	201.102 20.103
DHWModeNext	Next DHW mode plus time to next status input to DHWSM	DPT_DHWModeNext	206.102
EnableDHWPrep	indicates whether energy supply for DHW load is available or not	DPT_Enable	1.003
Inputs			
SystemClock	System Clock as input for the device's local clock; available only in Standard Mode	DPT_DateTime	19.001
Date	alternative to SystemClock; only in Standard Mode	DPT_Date	10.001
Time	alternative to SystemClock; only in Standard Mode	DPT_Time	11.001
Parameters			
DHWZone	LTE zone: number of the DHW Zone	DPT_UcountValue8_Z	202.002
Diagnostic Data			

Table 3–1: DHWS - Overview on runtime Interworking and parameter properties

			STANDARD MODE	EXTE Mo	
		Basic FB	S-Mode	Standard Mode Interface	LTE-Mode
Outputs	DHWMode	GO <sub>b</sub>	GO	GO	M
	DHWModeNext	NA 1)	NA	NA	О
	EnableDHWPrep	(GO <sub>b</sub> )	(GO)	(GO)	О
Inputs	SystemClock	(GO <sub>b</sub> )	(GO)	(GO)	NA
	Date	(GO <sub>b</sub> )	(GO)	(GO)	NA
	Time	(GO <sub>b</sub> )	(GO)	(GO)	NA

<sup>&</sup>lt;sup>1)</sup> optional in LTE-Mode; the information is NA in the Basic FB and all other modes because the Datapoint Type is today not yet available in Standard Mode. Splitting of DPT is not possible because of necessary data consistency

Table 3-2: DHWS Runtime Interworking - dependence on Configuration Modes

		Support
Parameter	DHWZone	M

Table 3–3: DHWS LTE specific Properties

	Support
Parameter	

Table 3–4: DHWS Properties of Interface Objects (or memory mapped DP)

# 3.5.1 Detailed specification of the Datapoints

### 3.5.1.1 Output: DHWMode

### **Standard Mode:**

DP Name:	DH	WMode	)				Abbr.:			Mandatory			$\boxtimes$
FB Name:	DH	WS								Can b	e interna	al	$\boxtimes$
Description													
see LTE-HEE	Мо	de											
For Standard	Mod	le transı	missior	n, a simple da	atatype (v	with	out Z <sub>8</sub> st	atus/comma	and fi	ield) is	used.		
<b>Datapoint Ty</b>	ре												
DPT_Name:	D	PT_DH	WMod	е									
<b>DPT Format:</b>	N	8						DPT_ID:		20.1	03		
Field	D	escription	on					Supp.	Ra	nge	Unit	Defa	ault
DHWMode	S	ee LTE-	HEE N	lode					14	4 <sup>1)</sup>		C	S
Access Type	)												
♦ Output													
this $\rightarrow$ M													
Spontane	neous 🛛 COV: Δ-Value: 2 MinRepTime: 10sec												
	Cyclic Period: 15 min												
Request		$\boxtimes$											
Communica	ion	Туре											
♦ Group Ol	oject	Datapo	int						N	1andat	ory:	$\boxtimes$	
Default G	oup	Address	s:										
Dynamics													
Power do	wn:	Save:											
Power up:		Value	:	No initialisat	ion:			Default value	ue:				
				Saved value	): [			Actual valu	e:			$\leq$	
		Trans	mit on	bus:									
<b>Exception H</b>	andli	ing											
<b>Special Feat</b>	ures												
1) value 0='A													
2) COV / trar	nsmis	ssion co	ndition	: local time of	f the dev	ice	matches	a schedule	's sw	/itching	g point.		
3) actual val	actual value is sent as soon as local time is valid (not "corrupted", no fault,)												

#### LTE-HEE Mode:

FB:	DHWS	LTE Se	rver Output Name:	DHWMode	•					datory 🛚	
Desci	iption:	-							-		
			used by the FB "Don					er" (DHV	VSM) to	calculate	
			(further description se								
			es are used: LegioPro								
DPT:	Name	DPT_DF	HWMode_Z	DPT ID	201.10			format			
Field			Description		Sup.			Unit	COV	Default	
DHWI			DHW Operating Mod					enum.	see 2)	CS	
Status	3		standard Status attrib	outes				bitset		İ	
- all fla	ags		not supported		NA	fixed t	to '0'			İ	
Comn			standard Command,	write only				enum.		İ	
- all co	ommands		not supported		NA					i	
Comr	nunication	1:				_					
	ding Group	o:									
Clas			Туре				Defau	lt			
Ge	ographical										
Ap	plication S	pecific $oxtime \boxtimes$	DHWZone				cs				
Un	assigned		Broadcast	Configura							
DP A	Address:		IO Type(ID):								
	-Services			COV MinRepTime: 10 sec Hear					beat:	15 min	
	oReport		Output per default	communicat	ting	Bind	ing Gro	up Wildo	ard allov	ved 🖂	
	TE Read-R		Tx Prio:	High 🗌		No	ormal 🛭	3	Low		
sh	lling of the all always toported)	•	Transm after Powe	rup <sup>3)</sup> : Store	ed Valu	e 🗌 A	Act Valu	ıe 🛛 D	efault Va	alue 🗌	
	Property-Service (individual access):										
Excep	otion Hand	lling:						Save a	at Power	nwok	
	al Feature	s:									
	ue 'Auto' is										
			ondition: local time of						g point.		
3) ac	actual value is sent as soon as local time is valid (not "corrupted", no fault,)										

3.5.1.2 Output: DHWModeNext

Standard Mode: NA LTE-HEE Mode:

FB:	DHWS	LTE	Serv	er Output Nan	ne: D	HWM	odeNext	t					datory 🗌 tional 🖂
Desci	ription:												
Provid	des next DH	HW M	ode f	for FB RSMHD	and th	ne time	delay (i	n mir	nutes	s) until	this next	DHW mo	ode
DPT:	Name	DPT_	DHV	VModeNext		DPT IC	206.	102	Da	tatype	format	U <sub>16</sub> N <sub>8</sub>	
Field			Desc	cription			Sup.	Ran	ge		Unit	COV	Default
Time	1)		Dela	y Time in minut	tes		М	[0	. 655	35] <sup>2)</sup>	min		CS
DHW	Mode		next	DHW Operatin	g Mod	le	М	[0	. <b>4]</b> <sup>2)</sup>		enum.	see 3)	CS
Comr	nunication	):				_	•				-	-	
Bine	ding Group	<b>)</b> :											
Clas				Туре						Defau	lt		
	eographical												
	plication Sp	pecific	$\boxtimes$	DHWZone						cs			
	nassigned			Broadcast			gurable [						
	Address:			IO Type(ID):		111 (DI				erty ID		52	
	-Services	•		COV 🛛		inRepT			10 s	ec	Heart	tbeat:	15 min
Inf	oReport			Output per defa	ault co	ommun	icating		Bindi	ng Gro	oup Wildo	ard allow	ved 🖂
	ΓΕ Read-Re			Tx Prio:		High [			No	rmal 🛭	3	Low	
sh	Iling of the all always be poorted)		t	Transm after P	oweru	ир <sup>4)</sup> : S	tored Va	alue [	A	ct Valu	ıe⊠ C	efault Va	alue 🗌
	perty-Servi			Read only	$\boxtimes$		Read	d/Wri	ite				
Exce	otion Hand	lling:	-								Save at	Powerdo	wn 🗌
	ial Feature	s:											
				e to next mode	is out	of rang	ge (> 65	535 r	ninut	es) the	maximu	ım time d	elay (=
				mode") is sent.									
				of Time and DI									
			ion:	Heartbeat & CC	OV ("n	ew" ne	xt mode	whe	n <i>DH</i>	<i>IWM</i> oo	<b>de</b> has ch	nanged –	⇒ sent
	er <b>DHWM</b> o			,			. "			• 1	,		
' ac	tual value is	s sent	as s	soon as local tin	ne is v	∕alid (n	ot "corru	pteď	", no	tault, .	)		

# Interpretation of Time and DHWMode fields:

Time	DHWMode	
= 0 (Undefined)	= 0 (Undefined)	the content of the Datapoint is void / undefined
		⇒ no next DHW Mode available for an undefined time period,
		i.e. if the DHWS can't calculate neither a 'current DHWMode' nor a delay time to the 'next DHWMode'.
= 0 (Undefined)	= {14}	defined and valid DHWMode but the delay time is undefined (unknown)
		⇒ in cases, where a time delay until next mode can't be calculated in the DHWS → 'next DHWMode' = current 'DHWMode'
> 0	= 0 (Undefined)	undefined (unknown) DHWMode during a defined delay time
		⇒ not allowed for output DHWModeNext of DHWS
> 0	= {14}	defined and valid DHWMode and delay time
		⇒ normal case

# 3.5.1.3 Output: EnableDHWPrep

#### **Standard Mode:**

DP Name:	Enabl	<u>eDHWPrep</u>			Abbr.:			Mar	ndatory		Ш
FB Name:	DHW	S						Car	n be interna	al	$\boxtimes$
Description											
see LTE-HEE	Mode										
For Standard	Mode t	ransmissior	n, a simple da	atatype (w	ithout Z <sub>8</sub> s	status/cor	mmand fi	ield)	is used.		
Datapoint Ty	ре										
DPT_Name:		DPT_Enab	le								
DPT Format:		B <sub>1</sub>				DPT_ID	):	1.	003		
Field		Description	1			Supp.	Range	Э	Unit	Defa	ault
		see LTE-H	EE Mode des	scription		М	{0,1}		boolean	CS	3
<b>Access Type</b>											
♦ Output											
this $\rightarrow M$		t	his $\rightarrow$ 1								
Spontaneo	us		$\boxtimes$	Δ-Value:	1)	MinRep	Time:		10se	С	
		Cyclic		Period:	15 min						
Request		$\boxtimes$									
Communicati	ion Ty <sub>l</sub>	pe									
♦ Group Ob	ject Da	atapoint					N	/lanc	datory:	$\boxtimes$	
Default Gro	oup Ad	ldress: -									
Dynamics											
Power dow	/n: S	Save:									
Power up:	V	/alue:	No initialisat	ion:		Default	value:				
			Saved value	):		Actual v	/alue:			$\overline{A}$	
		ransmit on	bus:		$\boxtimes$						
<b>Exception Ha</b>	ndling	J									
Special Featu											
		nditions for to any specific	his signal, e.g c.	g. enable/	disable co	ondition c	lependin	g on	the differe	nt DH	łW

#### LTE-HEE Mode:

FB:	DHWS	LTE	Serv	er Output Nar	ne: En	ableDH	IWPre	ер					datory 🗌 otional 🖂
Desci	ription:									<del>.</del>		-	
DPT:	Name	DPT.	_Ena	ble	DF	PT ID	1.00	3	Da	tatype fo	ormat	B <sub>1</sub>	
Field			Des	cription		Su	p.	Ran	ge	Unit		COV	Default
						N	1	{0,1]	}	bool	ean	see 1)	CS
Comr	nunication	1:	-							<u>-</u>			
Bind	ding Group	<b>)</b> :											
Clas	S			Type						Default			
Ge	ographical												
Ар	plication S	pecifi	$\boxtimes$	DHWZone						CS			
Un	assigned			Broadcast	С	onfigur	able [						
DP A	Address:			IO Type(ID):	111	1 (DHW	/S)		Prope	erty ID:	;	53	
LTE	-Services	(ever	nt):	COV 🛛	Minf	RepTim	ie:		10 s	ec	Hear	tbeat:	15 min
Inf	oReport		$\boxtimes$	Output per def	ault com	munica	iting		Bindi	ng Grou	p Wildo	ard allow	ved 🖂
	ΓΕ Read-R			Tx Prio:	Н	igh 🔲			No	rmal 🛚		Low	
sh	lling of the all always b pported)		ıt	Transm after F	owerup	: Store	d Val	ue [	] A	ct Value		efault Va	alue 🗌
	oerty-Serv ividual acc		:	Read only	$\boxtimes$		Rea	d/Wr	ite				
Excep	otion Hand	lling:								S	ave at	Powerdo	own 🗌
					·								
	al Feature	s:											
1) Tra	ansmission	conc	litions	s for this signal,	e.g. ena	able/dis	able	cond	ition (	dependir	ng on th	ne differe	nt DHW
mo	odes, are co	ompa	ny sr	ecific.									

# 3.5.1.4 Input: SystemClock

**Standard Mode:** 

See [02], description of SCLO input *SystemClock* (SCLO in slave mode).

LTE-HEE mode: NA

### **3.5.1.5** Input: Date

**Standard Mode:** 

See [02], description of SCLO input Date (SCLO in slave mode).

LTE-HEE mode: NA

## **3.5.1.6 Input: Time**

**Standard Mode:** 

See [02], description of SCLO input *Time* (SCLO in slave mode).

LTE-HEE mode: NA

# 3.5.1.7 Parameter: DHWZone

FB: DHWS	Propert	y Name ( <u>Server</u> ):	DHWZone				ndatory 🛚
Description:						÷	
LTE zone: DHW 2	Zone nu	mber					
DPT: Name [	OPT_Uc	ountValue8_Z	DPT ID 202.002	2 Dat	tatype forma	$t U_8Z_8$	
Field		Description		Sup.	Range	Unit	Default
CounterValue		number of DHW Zo	one	М	[131]		1
Status						bitset	
<ul> <li>OutOfService</li> </ul>		zone active /inactiv	-	0	true/false		false
- all other flags		not supported, fixe	d to '0'	NA			
Command						enum	
- NormalWrite				M			
- SetOSV & Rese		set zone inactive /	active	0			
- all other comma	nds	not supported		NA			<u> </u>
Communication:							
DP Address:		IO Type(ID):	111 (DHWS)	Prope	erty ID:	101	
(in the server)		Start-Index:	1	N° of	elements	1	
Property acces	s:	Read only	Read/V	Vrite	$\boxtimes$		
<b>Exception Handl</b>	ling:	Value after Poweru	ıp: Stored Value 🗵	Act V	alue 🔲 🛛 D	efault Valu	ıe 🗌
Special Features	s:						
DHWS DP's are r	not LTE	communicating if D	HWZone is 'OutOfSe	rvice'.			

## 4 FB ,,DHW Circulation Pump Scheduler" (DHWCPS)

## 4.1 Aims and objectives

The FB "DHW Circulation Pump Scheduler" DHWCPS is providing the *EnableDHWCP*, signal. This signal is provided for the 'Domestic Hot Water Circulation Pump Controller' (DHWCPC).

The FB DHWCPS typically is independent of the FB DHWS.

DHW Circulation Pump Scheduler information is sent to one single device (with FB DHW Circulation Pump Controller) within a DHW Zone. Therefore, in an 'easy installation' plant with LTE-HEE Mode devices, scheduler dependent HVAC process data (*EnableDHWCP*) is distributed within an application specific zone (DHW Zone). In a Standard Mode system, scheduler dependent DHW process data is distributed with Standard Mode Group Objects.

A device may consist of several time channels, this means this FB may be realised more than once in a device, each block belonging to another binding group.

The device with the FB DHWCPS needs an internal clock, which may be autonomous or may be related to the FB 'System Clock' If FB 'System Clock' is not available or implemented, the FB DHWCPS itself may use (optional) inputs for time and date reception as input for the devices internal/local clock.

## **4.2** Functional Specifications

The DHW Circulation Pump Scheduling Programme is characterised by "switching points". ". A "switching point" is defined by output value(s) and a date and/or time value. The output value(s) has/have to be sent if the local clock matches the switching points date & time value.

The following output signal is provided by the DHWCPS:

• EnableDHWCP

This signal is provided for the DHW Circulation Pump Controller (DHWCPC). It enables / disables the circulation pump independent of the actual DHW Mode (schedule for DHW circulation may be independent of DHW load).

If SCLO is not implemented in a device, the following inputs may be used in the same way as with SCLO in slave mode, they are intended as synchronisation input to the device's internal/local clock.

System Clock System Clock Input (Date & Time)
 Time Input, Standard Mode only
 Date date Input, Standard Mode only

#### Parameters:

The Time Schedule or "internal programme" (switching points with their output value(s)) is given by parameters. These parameter(s) are manufacturer specific.

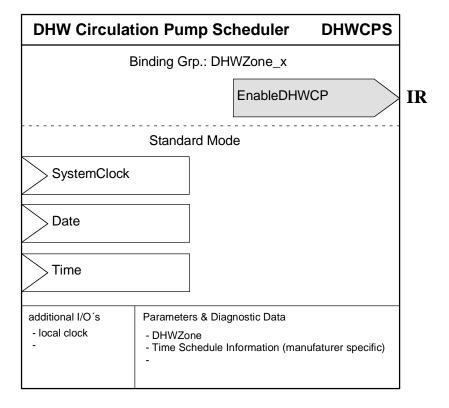
Time Schedules in a bus device may be changed by a management station or a complex bus device (with sophisticated user interface/MMI). That means, change of time schedule parameters is not only an action during configuration phase of an installation, but also during runtime.

For LTE-HEE mode implementation, zoning parameters are included in this document.

#### 4.3 Constraints

In a LTE-HEE System, only one DHW Circulation Pump Scheduler is allowed per DHW Zone.

# 4.4 Functional Block diagram



# 4.5 Datapoints

Data Point	Description	Data Point Type	DPT ID
Outputs			
EnableDHWCP	enables / disables DHW circulation pump (controlled by FB DHWCPC)	DPT_Enable	1.003
Inputs			
SystemClock	System Clock as input for the device's local clock; available only in Standard Mode	DPT_DateTime	19.001
Date	alternative to SystemClock; only in Standard Mode	DPT_Date	10.001
Time	alternative to SystemClock; only in Standard Mode	DPT_Time	11.001
Parameters			
DHWZone	LTE zone: number of the DHW Zone	DPT_UcountValue8_Z	202.002
Diagnostic Data			

Table 4-1: DHWCPS - Overview on runtime Interworking and parameter properties

			STANDARD MODE	EXTE MO	
		Basic FB	S-Mode	Standard Mode Interface	LTE-Mode
Outputs	EnableDHWCP	GO <sub>b</sub>	GO	GO	M
Inputs	SystemClock	(GO <sub>b</sub> )	(GO)	(GO)	NA
	Date	(GO <sub>b</sub> )	(GO)	(GO)	NA
	Time	(GO <sub>b</sub> )	(GO)	(GO)	NA

Table 4-2: DHWCPS Runtime Interworking - dependence on Configuration Modes

		Support
Parameter	DHWZone	M

Table 4-3: DHWCPS LTE specific Properties

	Support
Parameter	

Table 4–4: DHWCPS Properties of Interface Objects (or memory mapped DP)

# **4.5.1** Detailed specification of the Datapoints

# 4.5.1.1 Output: EnableDHWCP

### **Standard Mode:**

Dl	P Name:	Ena	bleDHWCP					Abbr.:		]	Man	datory		
FF	B Name:	DH	WCPS							(	Can	be interna	1 🛛	1
De	escription													
	e LTE-HEE		2											
	atapoint Tyj													
	PT_Name:		PT_Enable											
_	PT Format:	$B_1$							DPT_ID:		1.0			
Fi	eld		escription						Supp.	Rang	ge	Unit	Default	t
		se	e LTE-HEE	Mode de	escripti	on			M	{0,1}		boolean	cs	
A	ccess Type													
<b>♦</b>	Output		_											
	this $\rightarrow$ M			this $\rightarrow$										
	Spontaneou	1S	⊠ CO	V:		Δ-Val	lue:	1)	MinRepTin	me:		10se	c	
			Cyc	lic	$\boxtimes$	Period	d:	15 min						
	Request													
C	ommunicati	on Ty	ype											
<b>♦</b>	Group Ob	ject D	Datapoint							M	anda	atory:	$\boxtimes$	
	Default Gro	oup A	ddress:											
D	ynamics													
	Power dow	n:	Save:											
	Power up:		Value:		itialisa				Default val	lue:				
					d value	:			Actual valu	ıe:			$\boxtimes$	
			Transmit o	n bus:				2)						
Ex	xception Ha	ndlin	g											
														_
_	pecial Featu	res												
1)	COV / tran	smiss	ion conditio	n: local t	ime of	the dev	ice m	natches a	schedule's s	witchin	g po	int.		
2)	actual valu	e is s	ent as soon a	s local ti	ime is	valid (no	ot "co	orrupted",	no fault,	.)				

#### LTE-HEE Mode:

FB:	DHWCPS	LTE S	erver Output Name:	Enable	OHWCF	<b>)</b>				datory 🛚
Desc	ription:	-		_						
			ition Pump' signal is use							
			ndependent of the curre	ent DHW I	Mode, (	On/Off	switchi	ing of the	DHW C	irculation
	o is enabled/d									
			e description of FB DH\		[09].					
DPT:	Name D	PT_En	able [	DPT ID	1.003	Da	ıtatype	format	B <sub>1</sub>	
Field			Description		Sup.	Range	÷	Unit	COV	Default
					М	{0,1}		boolean	see 1)	CS
Com	munication:	_							_	
Bin	ding Group:									
Cla	SS		Туре				Defau	ılt		
	eographical									
Ar	oplication Spe	ecific⊠	DHWZone				cs			
Uı	nassigned		Broadcast	Configura	ble 🗌					
DP	Address:		IO Type(ID): 1	12 (DHW	CPS)	Prop	erty ID	: !	51	
LTE	E-Services (e	event):	COV Min	nRepTime	<del>)</del> :	10 s	ec	Heart	tbeat:	15 min
ln <sup>.</sup>	foReport		Output per default co	mmunicat	ing	Bindi	ng Gro	oup Wildo	ard allow	wed 🖂
(L	TE Read-Res	sponse	Tx Prio:	High 🗌		No	rmal 🛭		Low	
sh	olling of the ou nall always be upported)		Transm after Poweru	p <sup>2)</sup> : Store	ed Valu	e 🗌 A	ct Valu	ıe ⊠ C	efault Va	alue 🗌
	perty-Servic dividual acce		Read only		Read/V	Vrite				
Exce	ption Handli	ng:	-					Save a	at Power	down
Spec	ial Features:	:								
1) C(	OV / transmis	sion co	ndition: local time of the	e device n	natches	a sch	edule's	switchin	g point.	
			soon as local time is va						•	

### 4.5.1.2 Input: SystemClock

**Standard Mode:** 

See [02], description of SCLO input *SystemClock* (SCLO in slave mode).

LTE-HEE mode: NA

**4.5.1.3** Input: Date

**Standard Mode:** 

See [02], description of SCLO input Date (SCLO in slave mode).

LTE-HEE mode: NA

**4.5.1.4** Input: Time

**Standard Mode:** 

See [02], description of SCLO input *Time* (SCLO in slave mode).

LTE-HEE mode: NA

# 4.5.1.5 Parameter: DHWZone

FB: DHWCPS Pr	operty Name ( <u>Server</u> ):	DHWZone				ndatory 🛚
Description:					÷	
LTE zone: DHW Zone	number					
<b>DPT</b> : Name DPT	_UcountValue8_Z	DPT ID 202.002	2 Dat	atype format	$U_8Z_8$	
Field	Description		Sup.	Range	Unit	Default
CounterValue	number of DHW Zor	ne	М	[131]		1
Status					bitset	
<ul> <li>OutOfService</li> </ul>	zone active /inactive		0	true/false		false
- all other flags	not supported, fixed	to '0'	NA			
Command					enum	
- NormalWrite			М			
- SetOSV & ResetOS	V set zone inactive / a	ctive	0			
- all other commands	not supported		NA			
Communication:						
DP Address:	IO Type(ID):	112 (DHWCPS)	Prope	erty ID:	101	
(in the server)	Start-Index:	1	N° of	elements	1	
Property access:	Read only	] Read/W	/rite	$\boxtimes$		
<b>Exception Handling</b>	Value after Powerup	$\sim$ : Stored Value $\boxtimes$	Act V	alue 🔲 🛮 De	efault Valu	ıe 🗌
Special Features:						
DHWCPS DP's are n	ot LTE communicating if	DHWZone is 'OutO	fService	e'.		

# 5 FB "Absolute Room Temperature Setpoint Scheduler" (ARTSS)

## 5.1 Aims and objectives

The FB 'Absolute Room Temperature Setpoint Scheduler' is used in simple applications / plants, where no supervisor (BMS) is available or it makes part of a supervisor.

The FB 'Absolute Room Temperature Setpoint Scheduler' is providing the *RoomTempSetpAbs* and the *TempRoomSetpAbsNext*. These signals are provided for the FB 'Room Setpoint Manager Temperature Driven)' RSMTD.

Absolute Room Temperature Setpoint Scheduler information typically is related with a single device or small number of devices within a single apartment/floor or room. Therefore, in an 'easy installation' plant with LTE-HEE Mode devices, scheduler dependent HVAC process data (here temperature setpoints) is distributed within geographical zones like Apartment\_x.Room\_y. In a Standard Mode system, scheduler dependent process data is distributed with Standard Mode Group Objects.

A device may consist of several time channels, this means this FB may be realised more than once in a device, each block belonging to another binding group or zone.

The device with the FB ARTSS needs an internal clock. This internal clock may be the 'local clock' related to the FB 'System Clock'. If the FB 'System Clock' is not available or implemented, the FB ARTSS itself may use (optional) inputs for time and date reception as input for the devices internal/local clock.

# **5.2** Functional Specifications

The Absolute Room Temperature Scheduling Programme is characterised by "switching points". A "switching point" is defined by output value(s) and a date and/or time value. The output value(s) has/have to be sent if the local clock matches the switching points date & time value.

The following output signals are provided by the ARTSS:

TempRoomSetpAbs
 Both signals are information from a scheduling programme and
 TempRoomSetpAbsNext
 provided for the room setpoint manager (temperature driven).

If the FB SCLO (System Clock) is not implemented in a device, the following inputs may be used in the same way as with SCLO in slave mode, they are intended as synchronisation input to the device's internal/local clock.

System Clock System Clock Input (Date & Time)
 Time Input, Standard Mode only
 Date date Input, Standard Mode only

#### Parameters:

The Time Schedule or "internal programme" (switching points with their output value(s)) is given by parameters. These parameter(s) are manufacturer specific.

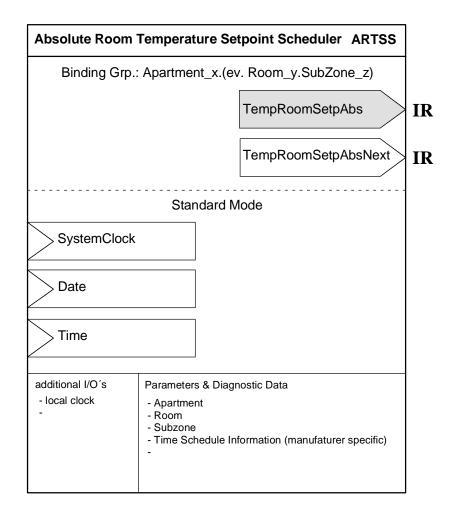
Time Schedules in a bus device may be changed by a management station or a complex bus device (with sophisticated user interface/MMI). That means, change of time schedule parameters is not only an action during configuration phase of an installation, but also during runtime.

For LTE-HEE mode implementation, zoning parameters are included in this document.

### 5.3 Constraints

Apartment.Room(.Subzone) is a structured/compound zoning address, each part with its own Z<sub>8</sub>
 Status. If one part of the this compound zoning address is 'Out of Service' all parts are Out of Service.

# 5.4 Functional Block diagram



# 5.5 Datapoints

Data Point	Description	Data Point Type	DPT ID	
Outputs				
TempRoomSetpAbs	Present temperature setpoint; input to RSMTD  – LTE-Mode  – Standard Mode	DPT_TempHVACAbs_Z DPT_Value_Temp	205.100 9.001	
TempRoomSetpAbsNext	Next temperature setpoint plus time to next status input to RSMTD	DPT_TempHVACAbsNext	220.100	
Inputs				
SystemClock	System Clock as input for the device's local clock; available only in Standard Mode	DPT_DateTime	19.001	
Date	alternative to SystemClock; only in Standard Mode	DPT_Date	10.001	
Time	alternative to SystemClock; only in Standard Mode	DPT_Time	11.001	
Parameters				
Apartment	LTE zone: Apartment number	DPT_UcountValue8_Z	202.002	
Room	LTE zone: Room number	DPT_UcountValue8_Z	202.002	
Subzone	ubzone LTE zone: Subzone number		202.002	
Diagnostic Data				

Table 5–1: ARTSS - Overview on runtime Interworking and parameter properties

			STANDARD MODE	EXTE MO	
		Basic FB	S-Mode	Standard Mode Interface	LTE-Mode
Outputs	TempRoomSetpAbs	$GO_b$	GO	GO	M
	TempRoomSetpAbs Next	NA 1)	NA	NA	О
Inputs	SystemClock	(GO <sub>b</sub> )	(GO)	(GO)	NA
	Date	(GO <sub>b</sub> )	(GO)	(GO)	NA
	Time	(GO <sub>b</sub> )	(GO)	(GO)	NA

<sup>&</sup>lt;sup>1)</sup> optional in LTE-Mode; the information is NA in the Basic FB and all other modes because the Datapoint Type is today not yet available in Standard Mode. Splitting of DPT is not possible because of necessary data consistency

Table 5-2: ARTSS Runtime Interworking - dependence on Configuration Modes

		Support
Parameter	Apartment	M
	Room	О
	Subzone	О

**Table 5–3: ARTSS LTE specific Properties** 

	Support
Parameter	

Table 5-4: ARTSS Properties of Interface Objects (or memory mapped DP)

# **5.5.1** Detailed specification of the Datapoints

# 5.5.1.1 Output: TemRoomSetpAbs

#### **Standard Mode:**

DF	Name:	Ten	npRoor	nSetp/	Abs				Abbr.:				Manda	atory		
FB	Name:	AR1	TSS	-									Can b	e interna	al 🛛	Γ
De	scription															
se	e LTE-HEE I	Mod	le													
Fo	r Standard N	/lode	e transi	missio	n, a sim	iple da	atatype	(with	nout Z <sub>8</sub> s	tat	tus/comma	and f	ield) is	used.		
Da	tapoint Typ	е														
DF	PT_Name:	DF	PT_Val	lue_Te	mp											
DF	PT Format:	F <sub>1</sub>	6								DPT_ID:		9.00	1		
Fie	eld	De	escripti	on							Supp.	Ra	inge	Unit	Default	t
												f	ull	°C	cs	
Ac	cess Type															
<b>♦</b>	Output															
	this $\rightarrow$ M		3	t	this $\rightarrow$ 1											
	Spontaneou	JS		COV:		$\boxtimes$	Δ-Val	ue:	1)	N	/linRepTim	e:		10se	C	
	•			Cyclic	2	$\overline{\boxtimes}$	Perio	d:	15 min		ecommen		value)			
	Request				•				•	,						
Co	mmunication	on T	Гуре													
<b>*</b>	Group Obj	ect [	Datapo	int								N	/landate	ory:	$\overline{\mathbb{X}}$	
	Default Gro															
Dy	namics															
	Power down	n:	Save:													
	Power up:		Value	):	No init	ialisat	tion:			D	efault valu	ie:				
	•				Saved	value	<del>)</del> :			Α	ctual value	э:			$\overline{\mathbb{X}}$	
			Trans	mit on	bus:				∑ <sup>2)</sup>							
Ex	ception Hai	ndli	ng													
Sp	ecial Featu	res														
1)	COV / trans	mis	sion co	ndition	n: local t	time o	of the d	evice	matches	s a	a schedule	's sv	vitching	point.		
2)	actual value															

#### LTE-HEE Mode:

FB:	ARTSS	LTE Se	rver Output Nam	e: TempRoor	nSetpA	Abs				datory 🛚
Desci	ription:	-		<u> </u>						
			is used by the FE		nt Mana	ager Ter	nperat	ure Driv	en" (RSN	ЛTD)
(furthe	er description	on see d	escription of FB R	SMTD).						
DPT:	Name	DPT_Te	mpHVACAbs_Z	DPT ID	205.10	0 Dat	atype f	ormat	$V_{16}Z_{8}$	
Field			Description		Sup.	Range	U	Jnit	COV	Default
Temp	erature		Setpoint value		М	full		°C	see 1)	CS
Status	3		Standard STATU	S attributes				bitset		
- all fla	ags		not supported		NA	fals	е			
Comn	nand		standard Comma	nd, write only				enum.		
- all co	ommands		not supported		NA					
Comr	nunication	):								
Bind	ding Group	):								
Clas	ss		Туре				Default	t		
Ge	ographical	$\boxtimes$	Apartment . Ro	om . Subzone		(	cs			
Ap	plication Sp	pecific								
	assigned		Broadcast	Configura	able 🗌					
	Address:		IO Type(ID):	113 (ARTS	SS)	Prope	rty ID:		51	
	-Services	(event):	COV 🛛	MinRepTime		10 se	ec .	Heart	beat:	15 min
Inf	oReport		Output per defa	ult communicat	ting	Bindin	ıg Grou	up Wildo	ard allov	ved 🖂
(L	ΓΕ Read-R	esponse	Tx Prio:	High 🗌		Nor	mal 🛚		Low	
	lling of the all always b		Transm after Po		ed Valu	e∏ Ac	t Value	e 🛛 D	efault Va	alue $\square$
su	pported)			·				<del></del>		_
	perty-Serv ividual acc		Read only	$\boxtimes$	Read/V	Vrite				
Exce	otion Hand	lling:						Save a	at Power	down
Speci	al Feature	s:								
1) CC	OV / transm	ission co	ondition: local time	of the device r	natches	s a sche	dule's	switchin	g point.	
			soon as local tim						•	

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# 5.5.1.2 Output: TempRoomSetpAbsNext

Standard Mode: NA LTE-HEE Mode:

FB:	ART	SS	LT	E Ser	ver Output Name:	TempR	00	mSe	tpAbs	Next				datory 🗌 otional 🖂	
Desc	ription	1:	•										•		
Provi	des ne	xt ter	npe	rature	setpoint for FB RS	MTD and	d th	e tim	e dela	ıy (in mi	nute	s) until	this next	value	
DPT:	Na	me	DP	T_Ten	npHVACAbsNext	DPT II	)	220.	.100	Dataty	pe f	ormat	U <sub>16</sub> V <sub>16</sub>		
Field				Descr	ription		S	up.	Rang	je	J	Jnit	COV	Default	
Time	1)			Delay	Time in minutes			M	[0	. 65535	5]	min		CS	
Temp	eratur	е		next s	etpoint value			M		full		°C	see 2)	CS	
Com	munic	ation	:						-				-		
	ding G	roup	):												
Clas	ss				Type					De	fault				
	eograp				Apartment . Room	. Subzo	ne			cs					
	plicati		peci	fic											
	nassigr				Broadcast	Confi	_								
	Addre				IO Type(ID):	113 (A				Property	ID:		52		
	-Servi		(eve			MinRep <sup>-</sup>				10 sec			tbeat:	15 min	
Int	foRepo	ort			Output per default	commur	nica	iting		Binding ( ☑	Grou	p Wildo	card allov	ved	
	TE Rea				Tx Prio:	High				Norma	al 🖂		Low 🗌		
sh	olling of all alw pporte	ays b		ut	Transm after Powe	erup <sup>3)</sup> : S	Stor	ed V	alue [	☐ Act \	/alue	e 🛛 🖸	Default V	alue 🗌	
	perty-: lividua			<b>)</b> :	Read only			Rea	d/Writ	e					
Exce	ption I	Hand	ling	:								Save a	at Power	down	
	ial Fea														
. "6	5535 n	ninute	es to	next	e to next mode is o mode") is sent.		-	•		,				,	
					Heartbeat & COV (		xt s	setpo	int wh	en <i>Tem</i>	<i>ipRc</i>	omSe	t <b>pAbs</b> ha	IS	
					empRoomSetpAb					_					
<sup>3)</sup> ac	tual va	lue is	se	nt as s	soon as local time is	s valid (n	ot "	corru	ıpted".	, no faul	t,	.)			

### 5.5.1.3 Input: SystemClock

**Standard Mode:** 

See [02], description of SCLO input *SystemClock* (SCLO in slave mode).

LTE-HEE mode: NA

**5.5.1.4 Input: Date** 

**Standard Mode:** 

See [02], description of SCLO input Date (SCLO in slave mode).

LTE-HEE mode: NA

# **5.5.1.5** Input: Time

**Standard Mode:** 

See [02], description of SCLO input *Time* (SCLO in slave mode).

LTE-HEE mode: NA

# 5.5.1.6 Parameter: Apartment

FB:	ARTSS	Proper	ty Name ( <u>Server</u> ):	Apartment					datory 🛚
Desci	ription:							•	
LTE z	one: Apart	ment nui	mber						
DPT:	Name	DPT_U	countValue8_Z	DPT ID	202.002	Dat	atype format	$U_8Z_8$	
Field			Description			Sup.	Range	Unit	Default
Count	terValue		Apartment number			М	1126		1
Status	3							bitset	
	OfService		zone active /inactiv	⁄e		0	true/false		false
- all of	ther flags		not supported, fixe	d to '0'		NA			
Comn	nand							enum	
- Norr	nalWrite					М			
- SetC	OSV & Res	etOSV	set zone inactive /	active		0			
- all o	ther comma	ands	not supported			NA			
Comr	nunicatior	١:							
DP A	Address:		IO Type(ID):	113 (ART	SS)	Prope	rty ID:	101	
(in t	he server)		Start-Index:	1		N° of	elements	1	
Pro	perty acce	ss:	Read only		Read/Wi	rite	$\boxtimes$		
Exce	otion Hand	lling:	Value after Poweru	ip: Stored	Value 🛚	Act V	alue 🔲 De	efault Valu	e 🗌
Speci	ial Feature	s:							
ARTS	S DP's are	not LTE	communicating if z	one is 'OutO	fService'.	If Apa	rtment is 'Ou	tOfService	also the
corre	enondina R	oom and	Subzone is 'OutOf	Service' (cor	mmon flad	r)			

# 5.5.1.7 Parameter: Room

FB:	ARTSS	Proper	ty	Name ( <u>Server</u> ):	R	oom					Mandatory ☐ Optional ⊠			
Desc	ription:	<del>*</del>			_									
LTE z	zone: Room	numbe	r											
DPT:	Name	DPT_U	201	untValue8_Z		DPT ID	202	2.002		Dat	atype forma	ıt l	$\overline{U_8Z_8}$	
Field			D	Description					S	up.	Range	l	Jnit	Default
Coun	terValue		R	Room number						М	0, 163		-	0 or 1
Status	S											b	oitset	
- Out	- OutOfService			one active /inactiv	/e					0	true/false			false
- all o	ther flags		n	ot supported, fixed	d t	to '0'			١	NΑ				
Comr	nand											е	enum	
- Norr	malWrite								M					
- SetC	DSV & Res	etOSV	set zone inactive / active						O					
- all o	ther comma	ands	not supported					١	NA_					
Comr	municatior	1:												
DP	Address:			IO Type(ID):		113 (ART	SS)				rty ID:	1	102	
(in t	he server)	<u> </u>		Start-Index:		1			N	° of	elements	1	l	
Pro	perty acce	ss:		Read only			Rea	ad/W	rite	è				
Exce	ption Hand	lling:	V	alue after Poweru	Jp:	Stored	Valu	ıe 🛚	Α	ct Va	alue 🔲 D	efa	ault Value	÷ 🗌
Spec	ial Feature	s:												
ARTS	S DP's are	not LTE	- c	communicating if z	or	ne is 'OutC	OfSer	vice'.	. If	Apa	rtment is 'O	utC	Service	also the
corres	spondina R	coom and	3 b	Subzone is 'OutOf	Sε	ervice' (co	ommo	on fla	a)					

# 5.5.1.8 Parameter: Subzone

								Man	ndatory 🗌
FB:	ARTSS	Proper	ty Name ( <u>Server</u> ):	Subzone					ptional 🖂
Desc	ription:	<u> </u>		-				<del>- 1</del>	
LTE:	zone: Subz	one num	ber within the Apart	ment.Room.	Subzone	value	is a paramet	er used or	fixed
value	· ·*· (=0)								
DPT:	Name	DPT_U	countValue8_Z	DPT ID	202.002	Dat	atype forma	$U_8Z_8$	
Field			Description			Sup.	Range	Unit	Default
Cour	iterValue		Subzone number			М	0, 115		0 or 1
Statu	S							bitset	
- Out	OfService		zone active /inactiv	/e		0	true/false		false
- all c	ther flags		not supported, fixe	d to '0'		NA			
Com	mand							enum	
- Nor	malWrite					M			
- Set	OSV & Res	etOSV	set zone inactive / active						
- all c	ther comm	ands	not supported			NA			
Com	munication	۱:							
DP	Address:		IO Type(ID):	113 (ART	SS)	Prope	erty ID:	103	
(in	the server)		Start-Index:	1		N° of	elements	1	
Pro	perty acce	ss:	Read only		Read/W	'rite	$\boxtimes$		
Exce	ption Hand	lling:	Value after Poweru	ıp: Stored	Value 🛚	Act V	alue 🔲 D	efault Valu	ie 🗌
Spec	ial Feature	s:							
ARTS	SS DP's are	not LTE	E communicating if z	one is 'OutC	OfService'	. If Apa	ırtment is 'Oı	utOfServic	e' also the
corre	sponding S	ubzone	is 'OutOfService' (c	common flag	)	-			