

Application Description

Hot Water Heating

Heat Distribution

Summary:

This document is a part of the HVAC Application Interworking Standard for Hot Water Heating applications. This chapter describes the Functional Block HFDM for Heat Distribution and FTC for Flow Temperature Control

Version 01.02.01 is a KNX Approved Standard.

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

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Document updates

Version	Date	Modifications		
0.1	2001.05.04	[BKY] document created from HWHFuncBlocV20 => document split-up into multiple chapters Functional block diagram updated		
		Complete revision of the document: all datapoint descriptions updated Proposal for Heat Demand calculation added (recommended mechanism)		
0.2	2001.07.05	[BKY] calculation of resulting heat demand => only illustrative example Full integration of S-interface in all FB's All diagnostic data and parameters updated		
0.3	2001.07.19	[BKY] editorial update, changes are marked release for assessment in TFI		
0.4	2001.11.16	[BKY] new chapter 1.3; integration of heating/cooling changeover; HFDM editorial updates; resolution of general TFI comments; new FB FTC		
0.5	2002.01.07	[BKY] wording in chapter 1.3 updated; some editorial corrections; rename DPT_StatusFTC -> DPT_StatusWTC;		
0.6	2002.02.22	[BKY] editorial corrections, changeover input included in FTC; updated forcing/locking signals according to chapter 7-11-5; TFI approved, KNX Handbook 1.0		
1.0	2002.09.10	[BKY] editorial corrections; inclusion of new attribute EmergDem in DPT_TempFlowWaterDemAbs (210.100), TFI approved, updated for KNX Handbook 1.1		
1.1	2003.08.25	[BKY] editorial corrections; correction of timeout StatusHPM input; ChangeOverStatusWater: format B ₁ Z ₈ , LTE zone changed to DistrSegmH (secondary level). TFI approved, updated for KNX Handbook 1.1		
1.2	2006.01.12			
1.2	2009.06.17	Update in view of publication in the KNX Specifications v2.0.		
01.02.01	2013.10.29	Editorial updates for the publication of KNX Specifications 2.1.		

References

[01]	Chapter 3/7/2	"Datapoint Types"
[02]	Chapter 7/10/1	"HVAC Sensor Functional Blocks"
[03]	Chapter 7/10/2	"HVAC HMI Functional Blocks"
[04]	Chapter 7/10/3	"HVAC Actuator Functional Blocks"
[05]	Chapter 7/10/4	"HVAC Common Functional Blocks"
[06]	Chapter 7/10/5	"HVAC Scheduler Functional Blocks"
[07]	Chapter 7/11/5	"Load Management"
[80]	Part 7/12	"Direct Electric Heating"
[09]	Part 7/13	"Terminal Unit Functional Blocks"
[10]	Part 7/14	"Ventilation & Air Conditioning and Cold Water"
[11]	Part 10/1	"Logical Tag Extended"

Filename: 07_11_02 HWH FB HeatDistribution v01.02.01 AS.docx

Version: 01.02.01

Status: Approved Standard

Savedate: 2013.10.29

Number of pages: 65

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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 the Functional Blocks used for HVAC Hot Water Heating (HWH) applications – part Heat Distribution.

The target market is mainly (European) residential and small commercial buildings.

Functional Blocks specification for applications VAC [10], terminal units (TU) [09] and direct electric heating (DEH) [08] are described in separate documents.

General purpose Functional Blocks used for HVAC applications such as sensors, actuators, MMI and some common HVAC Functional Blocks are described in a separate document (HVAC Specification Functional Blocks, Sensors, MMI, Actuators, Common Controller Functions [02], [03], [04], [05] and [06]).

This document does not describe the general HVAC-HWH application field and application requirements to be covered. It does also not contain the description of typical application examples (scenarios) and application profiles.

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. Also data-interfaces for parameter setting, visualisation etc. are specified where appropriate (only state of the art datapoints generally used in all companies).

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 [11]).

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 functional blocks, i.e. black-box description of functional blocks including data-interface and relationship to other functional blocks.

Every functional block may be part of a complex device (e.g. a boiler & heating controller) containing more than one functional block. Because of this modular approach, there is no attempt in this specification to describe or dictate the internal construction of a functional block 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 HVAC HWH 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 Functional Blocks** and the **LTE** specific parts.

The document provides all necessary information needed:

- for a complete implementation of the Functional Blocks in LTE mode
- for the implementation of mandatory objects used for runtime interworking in standard mode (Basic Functional Block)

1.3.1 Runtime Interworking

Mode dependent (S, LT-R, LT-S, Ctrl, Pb, A) implementation of optional runtime interworking objects is not specified in this document, e.g. "easy channel" definitions.

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

			STANDARD MODE	Ехте	
		Basic FB	S-Mode	Standard Mode Interface	LTE-Mode
Inputs	Inp1	NA	NA	NA	M
	Inp2	NA	NA	NA	О
	Inp3	(GO _b)		(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 Functional Block 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 Functional Block. 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**^{used} = **IO Type**^{HVAC-LTE}
 - ⇒ 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^{used} = IO Type^{standardDPT} = IO Type^{HVAC-LTE} + 10000d (e.g. BUC^{HVAC-LTE} = 128 => BUC^{standardDPT} = 10128)
 - ⇒ It is allowed to implement in a device both Interface Object Types IO Type^{HVAC-LTE} and IO Type^{standardDPT}. The implementation of parameters and diagnostic data of one given Functional Block shall however be complete. It is thus not allowed to implement part of the datapoints of a Functional Block in IO Type^{standardDPT} and the remaining in IO Type^{HVACLTE}.

	Implementation of Parameter and Diagnostic Data					
	Propert	ty based	Group Object	Memory mapped		
	HVAC-LTE style	Standard DPT				
IO Type	IO Type ^{HVAC-LTE} e.g. BUC=128	IO Type ^{HVAC-LTE} + 10000 e.g. BUC=10128				
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. 205.100	=> mapped standard DPT, e.g. 9.001	=> mapped standard DPT, e.g. 9.001			

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

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] – HVAC Datapoint Types; Supplement 11 (TFI 18)

1.4 Abbreviations

Functional Blocks:

Hot Water Heating (HWH)

Abbreviation	Description
BUC	Burner Controller
BOC	Boiler Controller
HPM	Heat Production Manager
BST	Buffer Storage Tank
HFDM	Heating Flow Demand Manager
FTC	Flow Temperature Controller
HPM	Heat Production Manager
HZC	Heating Zone Controller
HIRC	Heating Individual Room Controller
HRDM	Heating Room Demand Manager
HDTACT	Heat Demand Transformer Actuator Position
HDTRT	Heat Demand Transformer Room Temperature
HDAUX	Auxiliary Heat Demand
DHWC	Domestic Hot Water Controller
DHWS	Domestic Hot Water Scheduler
DHWCPS	Domestic Hot Water Circulation Pump Scheduler
SDHWC	Solar Domestic Hot Water Controller
DHWSM	Domestic Hot Water Setpoint Manager
DHWCPC	Domestic Hot Water Circulation Pump Controller
UDHWSET	DHW User Settings

Ventilation, Air Conditioning and Cold Water (VAC)

Abbreviation	Description
AHUC	Air Handling Unit Controller
CC	Chiller Control
CDAUX	Auxiliary Cooling Demand
CDAUXPER	Auxiliary Cooling Demand Precent
CDTAHU	Cooling Demand Transformer Air Handling Unit
CFDM	Cooling Flow Demand Manager
CPM	Cold Water Production Manager
CRC	Re-Cooling Controller
CZC	Cooling Zone Controller
HDAUXPER	Auxiliary Heating Demand Precent
HDTAHU	Heating Demand Transformer Air Handling Unit
SATC	Supply Air Temperature Controller

Terminal Units (TU) [08]

WHPC

Abbreviation	Description
ACDTTU	Air Cooler Energy Demand Transformer Terminal Unit
AHDTTU	Air Heater Energy Demand Transformer Terminal Unit
CCDTTU	Chilled Ceiling Energy Demand Transformer Terminal Unit
FCC	Fan Coil Unit Controller
RCC	Radiator and Chilled Ceiling Control
RHDTTU	Radiator Heating Energy Demand Transformer Terminal Unit
SPUC	Split Unit Control
VAVC	Variable Air Volume Control
VDTTU	Ventilation Demand Transformer Terminal Unit

Water Heat Pump Control

Sensor, MMI, Actuators - Common Controller Functions [02], [03], [04], [05] and [06]

$Sensor, MMI, Actuators - Common \ Controller \ Functions \ [02], [03], [04],$			
Abbreviation	Description		
CFWTS	Condensor Flow Temperature Sensor		
CRNWTS	Condensor Retrun Water Temperature Sensor		
DPS	Dew Point Status Sensor		
FWTS	Flow Water Temperature Sensor		
HVA	HVAC Valve		
OAD	Outside Air Damper		
ORHS	Outside Relative Humidity Sensor		
OAQS	Outside Air Quality Sensor		
OTS	Outside Air Temperature Sensor		
PRD	Presence Detector		
RRHS	Room Relative Humidity Sensor		
RAQS	Room Air Quality Sensor		
RNARHS	Return Air Relative Humidity Sensor		
RNAQS	Return Air Quality Sensor		
RNATS	Return Air Temperature Sensor		
RNWTS	Return Water Temperature Sensor		
RSMHD	Room Setpoint Manager HVAC-Mode Driven		
RSMTD	Room Setpoint Manager Temperature Driven		
RTS	Room Temperature Sensor		
SARHS	Supply Air Relative Humidity Sensor		
SAQS	Supply Air Quality Sensor		
SATS	Supply Air Temperature Sensor		
SIS	Sun Intensity Sensor		
SMAQ	Setpoint Manager Air Quality		
SMRH	Setpoint Manager relative Humidity		
UAQSS	Air Quality Setpoint Setting		
URHSS	Air Relative Humidity Setpoint Setting		
UHRS	User HVAC Room Setting		
UHD	User HVAC Display		
WCOS	Water Change over Status Sensor		
WOS	Window Switch		

Wind Speed Sensor

WSS

General

Abbreviation	Description
cs	Company specific
NA	not allowed / not available
LTE	Logical Tag Extended Mode, see [11] Volume 10, LTE Specification
FB	Functional Block
DPT	Datapoint Type
IO	Interface Object
IR	LTE InfoReport Input / Output
IR/P	LTE InfoReport Input with Polling capability (LTE property client)
\mathbf{W}	LTE Write Input / Output

2 Functional Blocks: Heat distribution and flow demand management

2.1 Aims and Objectives

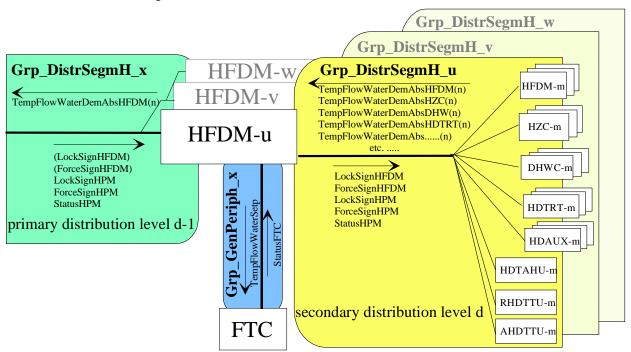


Figure 1 Heat Distribution levels (simplified)

Functional Blocks: HFDM: Heating Flow Demand Manager

FTC: Flow Temperature Controller
HZC: Heating Zone Controller
DHWC: Domestic Hot Water Controller

HDTRT: Heating Demand Transformer Room Temperature

HDAUX: Heating Demand Auxiliary

HDTAHU Heating Demand Transformer Air Handling Unit

RHDTTU Radiator Heating Energy Demand Transformer Terminal Unit
AHDTTU Air Heater Energy Demand Transformer Terminal Unit

In more complex systems the consumers are not linked to the primary hot water Distribution Segment (directly connected to the boiler). Different levels of hot water distribution are possible (e.g. like high voltage - low voltage electrical distribution network). Each distribution level has its own hot water pipe.

The HFDM collects the flow temperature demand signals from all heat consumers (HZC, HDTRT, DHWC, HFDM etc.) in the secondary Heat Distribution Segment (level d), calculates the resulting heat demand and sends it to the preceding primary Heat Distribution Segment (level d-1).

The Functional Blocks HFDM, HZC, HDTRT, DHWC, HDAUX have a N:1 relation with the HFDM. I.e. multiple instances of these Functional Block exist in a Distribution Segment and therefore multiple heat demand signals are received in the HFDM.

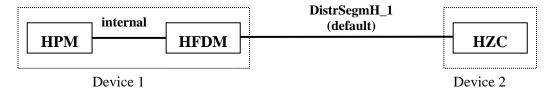
The Functional Blocks HDTAHU, RHDTTU and AHDTTU have a 1:1 relation with the HFDM. I.e. only one instance of these Functional Block exists in a Distribution Segment.

The hot water flow temperature in the secondary Heat Distribution Segment is usually pre-controlled by an FTC according to the resulting heat demand of the consumers in the Heat Distribution Segment. The Flow Temperature Controller and the Heating Flow Demand Manager have a 1:1 relationship and are often located in the same device. Otherwise the 1:1 functional binding is established by setting a specific 1:1 link group 'GenPeripheral'.

The "first" Heating Flow Demand Manager HFDM in a heat distribution system is linked to the Producer Manager HPM which receives from the HFDM the resulting overall heat flow demand of the primary Heat Distribution Segment. HPM and "first" HFDM have always a 1:1 relationship and are usually located in the same device (and therefore data-flow between HPM and HFDM is normally purely device-internal). DistrSegmentH_31 is default for those special cases where HPM and "first" HFDM are not in the same device. DistrSegmH_1 is default for the first heat distribution level in order to enable "plug&play" LZE zoning with heat consumers in simple systems.

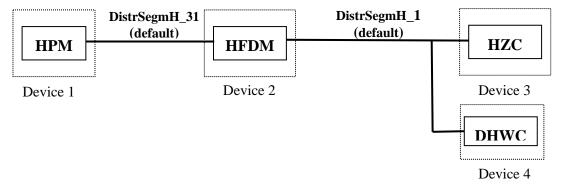
Example 1: simple system (e.g. single family home) "plug & play" LTE zoning

- system has only one heat distribution level
- HPM and HFDM are located in the same device
- a Heating Zone Controller HZC is directly connected to the heat production system.



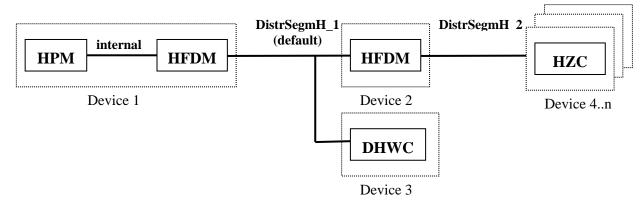
Example 2: small system with multiple devices, "plug & play" LTE zoning for heat consumers

- system has only one heat distribution level
- HPM and HFDM are NOT located in the same device => DistrSegmH_31 & DistSegmH_1 to be configured on the HFDM
- a Heating Zone Controller HZC and a DHW controller are directly connected to the heat production system.



Example 3: complex system (e.g. multi family home, LTE zoning configuration necessary)

- two Heat Distribution Segments
- HPM and HFDM are located in the same device
- a DHW Controller is directly connected to the heat production system (DistrSegmH_1)
- multiple Heating Zone Controller are connected to the secondary Heat Distribution Segment (DistrSegmH2)



There is usually no pre-controller FTC associated with the <u>first HFDM</u> which is directly linked to the HPM because the HPM is already providing the requested flow temperature.

In the secondary Heat Distribution Segment a common System Pump is usually installed to provide water flow in the Segment. The System Pump is normally controlled by the HFDM (this pump is not shown in the figures above).

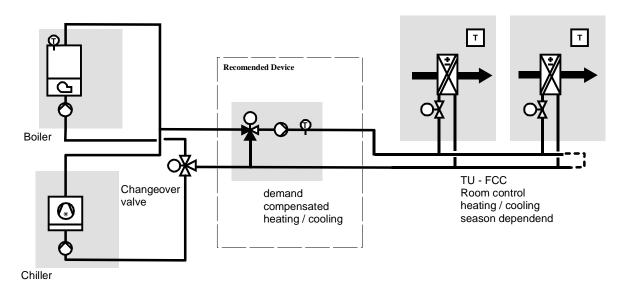
The HFDM also handles load management functions between the consumers in the secondary Heat Distribution Segment. The flow temperature demand signals from the consumers may contain some load priority information which is collected in the HFDM. If load priority is requested by some consumers, the HFDM sends a specific locking signal. For more details see also document [07]

Heat Distribution Segments may even be cascaded. In this case the resulting heat demand signals sent by the various HFDM's (on level d) to the preceding primary Heat Distribution Segment (level d-1) are there collected again by an HFDM and the resulting heat demand is sent to the pre-preceding Heat Distribution Segment (level d-2) etc...

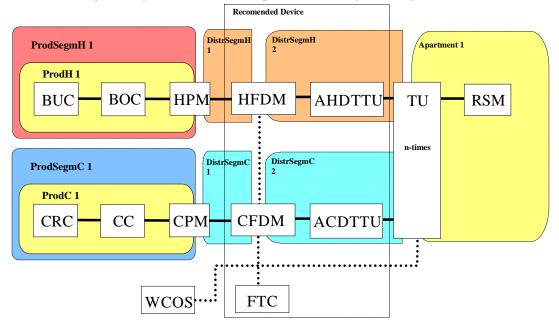
The HFDM has also "router" functionality for forcing, locking and status signals from HPM: these signals from HPM are received from the primary heat Distribution Segment and transparently routed by the HFDM to the secondary Heat Distribution Segment.

2.2 Hot / Cold Water Distribution in changeover systems

Changeover systems are used to reduce the pipework (installation cost) in the Terminal Unit area. The following schematic diagram shows a simplified example of a 2-pipe changeover system:



Model of a changeover system "demand compensated heating / cooling" with KNX Functional Blocks:



The Terminal Unit controllers are sending their demands regardless of the status of the changeover system in their Distribution Segments. The transformers AHDTTU and ACDTTU are collecting all the data and determine a setpoint for the HFDM respective CFDM.

The calculated setpoint of the Flow Temperature Controller is set depending on the changeover sensor input into the HFDM / CFDM.

Flow Temperature Demand signals to the HPM / CPM are only sent if the changeover sensor is set accordingly.

2.3 Functional Block: Heating Flow Demand Manager (HFDM)

2.3.1 Functional Specification

This FB manages the flow demand of a Heat Distribution Segment. The HFDM gets the flow temperature demands from the consumer FB's (HZC, DHW, HDTRT, HFDM etc.) in the secondary Heat Distribution Segment and calculates the resulting flow temperature demand which will be sent to the preceding primary Heat Distribution Segment.

HFDM in a changeover system: see also chapter 2.2

The optional input signal ChangeOverStatusWater indicates the water change over status in a change over system. The HFDM is deactivated whenever this input is set to cooling. I.e. no resulting flow temperature demand will be generated and sent to the HPM or the preceding Heat Distribution Segment. In addition the HFDM will not control its FTC.

2.3.1.1 Calculation of the resulting flow temperature demand (illustrative example)

Choice of the maximum temperature demand (considering max. temperature limitation) is today the standard mechanism in the HFDM. In the future other mechanisms could be possible (e.g. calculation of weighted mean value).

The following section is an **illustrative example** for heat demand collection and calculation of the resulting heat demand in the HFDM. This example is introduced for better understanding of the functionality of a HFDM. The HFDM mechanism is quite complex and may incorporate other manufacturer specific solutions.

The calculation of the resulting flow temperature demand output depending on heat demand signal inputs is not part of the KNX certification.

The HFDM acts a data collector of "many" TempFlowWaterDemAbs... signals received in the secondary Heat Distribution Segment. Out of these signals the resulting heat demand is calculated. Both the received and the resulting heat demand signals have the following content:

Data field	Description		
TempFlowDem	flow temperature demand (setpoint)		
Attributes			
- DemValid	Validity of TempFlowDem		
- AbsLoadPriority	absolute load priority if one or more consumer(s) request all available power => evtl. LockSignHFDM		
- ShiftLoadPriority	shift load priority: set e.g. if DHW load has priority in case of boiler overload => evtl. LockSignHPM		
- MaxTempLimit	TempFlowDem contains max. temp. limit e.g. for DHW load. Flow temp must be limited to max level		
- MinTempLimit	for cold water only; not used in the HFDM		
- DHWReq	Heat demand from DHW => for DHW preparation during summer		
- RoomHeatingReq	Heat demand from Room Heating		
- VentReq	Heat demand from Ventilation		
- AuxAllSeasonReq	demand from auxiliary heat consumer; all season		
- SystemPumpReq	request for water circulation in the distribution segment (common system pump on)		
- EmergDem	set if one or more heat consumers have emergency heat demand for frost protection		
	if no heat is provided by the heat production system (e.g. because boiler is in		
	'summer mode' or manually switched off)		
- DHWLegioReq	set if DHW load is active in legionella protection mode by one or more domestic hot water controllers DHWC (can only be 'true' if DHWReq = 'true')		

Plug & Play mechanism in the LTE-HEE implementation:

Remark: This mechanism is only possible in LTE-HEE implementations.

HFDM functionality can today not be implemented in standard mode since the necessary DPT are not available in standard mode.

If DPT_TempFlowWaterDemAbs would be available in the standard mode in the future, there would be still some restrictions concerning the implementation.

Reason:

In the shared variable model (e.g. S-mode) implementation all "partners" of the HFDM have to be linked and separate Group Addresses must be assigned for each Demand input signal. The number of "partners" has to be defined at design time of the product.

The HFDM does not need to know which and how many consumers are allocated in the secondary Heat Distribution Segment. The HFDM has no complete list of all HZC, HDTRT, DHW, HFDM etc. connected to it (no directory). Therefore adding or removing of "partners" is simple.

It is not necessary to store TempFlowWaterDemAbs... signals (data image) from **all** connected FB's in the HFDM in order to calculate the resulting TempFlowWaterDemAbsHFDM. Due to the "heartbeat" repetition of the TempFlowWaterDemAbs... signals, it is sufficient to have a dynamic process image of the N temporary **"most relevant"** demands.

The dynamic data image consists of a main list and multiple attributes lists because the resulting TempFlowWaterDemAbsHFDM signal is a "mixture" of some of the received signals.

Out of this dynamic data image the entry of the main list with the highest priority is taken for the calculation of the resulting TempFlowWaterDemAbsHFDM signal. In addition the attributes of other signals are also considered according to the attributes lists.

Structure of the Main List (recommendation, manufacturer specific solution)

	Main List						
Entry N°	TempFlowDem	Attrib: – DemValid – AbsLoadPriority – MaxTempLimit	Source FB Type and Instance	Source Individual Addr	Timeout		
1							
2							
$N \ge 4$							

Besides the value of the flow temperature demand, the list entry contains also the 3 most important attributes 'DemValid', 'AbsLoadPriority', 'MaxTempLimit' which are also used as priority criteria. Each entry contains also the source functional block (type and instance) and the source individual address

of the sender in order to have an unique identifier.

Also a receiver timeout must be handled for each entry independently. In case of removal of a device

from the system its relevant heat demand should not remain forever in the list!

The HFDM will use the default value ,no demand and default individual address of the sender in the dynamic list if there are no valid demand signals or after power-up or in case of communication failure, if no data is received.

The min. size of the list N > 4

The probability that the N most relevant demand signals change to "no demand" at the same time is very low => in this case, resulting demand would be "no demand for a short period until the new dynamic process image is built up with the N most relevant demand from other devices.

Criteria for a new entry in the Main List: (recommendation, manufacturer specific solution) Each received signal is checked if it is relevant enough to become an entry of the list. The steps are as follows:

- 1. first check if there is already an entry in the list with the same sender (source individual addr). If Yes: delete the entry in the list (in the next steps the new data will be entered instead)
- 2. check **DemValid** attribute

Signals with **DemValid** = false ("no demand") are ignored and not further processed

If **DemValid** = true: If there is still free space in the list (void entries) the signal is inserted in the list.

3. The following rules apply if the new signal has **DemValid** = true and all entries in the list are valid. One of the entries may be replaced in the following cases:

Check the attribute AbsLoadPriority:

This attribute must be considered with highest priority because the flow temperature demand of the consumer who requests load priority is in this case relevant.

Check the attribute **MaxTempLimit**:

This attribute must be considered with 2^{nd} priority because max. temperature limitations e.g. for DHW load must be respected. I.e. the resulting flow temperature demand must be not higher than specified in the flow temperature demand signal

The following combinations have to be considered

Feature	AbsLoadPriority	MaxTempLimit
A	false	false
В	false	true
C	true	false
D	true	true

Check the **TempFlowDem** value with 3rd priority. The higher the value the more relevant the signal is.

Procedure:

- a) An existing entry in the list with Feature **A** and the <u>lowest</u> **TempFlowDem** value => will be removed by a signal having Feature **A** with a higher **TempFlowDem** value
- b) An existing entry in the list with Feature **A** and the <u>lowest</u> **TempFlowDem** value => will be removed by a signal having Feature **B**, **C** or **D**
- c) An existing entry in the list with Feature **B** and the <u>highest</u> **TempFlowDem** value => will be removed by a signal having Feature **C** or **D**
- d) An existing entry in the list with Feature **B** and the <u>highest</u> **TempFlowDem** value => will be removed by a signal having Feature **B** with a <u>lower</u> **TempFlowDem** value (max. temperature limitation!)
- e) An existing entry in the list with Feature **C** and the <u>lowest</u> **TempFlowDem** value => will be removed by a signal having Feature **D**
- f) An existing entry in the list with Feature C and the <u>lowest</u> **TempFlowDem** value => will be removed by a signal having Feature C with a higher **TempFlowDem** value
- g) An existing entry in the list with Feature **D** and the <u>highest</u> **TempFlowDem** value
 - => will be removed by a signal having Feature **D** with a <u>lower</u> **TempFlowDem** value (max. temperature limitation !)

Handling of the Attributes Lists: (recommendation, manufacturer specific solution)

For each of the attributes

- ShiftLoadPriority
- DHWReq
- RoomHeatingReq
- VentReq
- AuxAllSeasonReg
- SystemPumpReq
- EmergDem
- DHWLegioReq

a separate list exists with the following structure

List for Attribute											
Entry N°	Attrib value	Source FB	Source	Timeout							
	true/false	Type and	Individual								
		Instance	Addr								
1											
2											
$N \ge 4$											

A void entry in the list is marked with the attribute value = false

Each entry contains also the source functional block (type and instance) and the source individual address of the sender in order to have an unique identifier.

Also a receiver timeout must be handled for each entry independently. In case of removal of a device from the system the attribute should not remain forever in the list!

The HFDM will use the default attribute value = false and default individual address of the sender in the dynamic list if there are no signals with the attribute value = true or after power-up or in case of communication failure, if no data is received.

Mechanisms for new entries in Attribute lists: (recommendation, manufacturer specific solution)

- 1. first check if there is already an entry in the list with the same sender (source individual addr). If Yes: delete the entry in the list if the attribute is now false otherwise the entry is unchanged => no further action.
- check the attribute value of the received signal Signals with attribute value = false are ignored and not further processedSignals with attribute value = true: if there is still free space in the list (void entries) the signal is inserted in the list.

Resulting Attribute from each list: (recommendation, manufacturer specific solution)

- calculation: logical OR of the attribute value of each entry
- if the resulting attribute is true this means that at least one of the TempFloWaterDemAbs... signals has the attribute value = true

This means for:

- ShiftLoadPriority: at least one heat consumer wants shift load priority in case of overload

- DHWReq: at least one DHWC has a valid heat demand

RoomHeatingReq: at least one HZC, HDTRT or RHDTTU has a valid heat demand
 VentReq: at least one HDTAHU or AHDTTU has a valid heat demand
 AuxAllSeasonReq: at least one auxiliary heat consumer has a valid heat demand

- SystemPumpReq: at least one heat consumer needs water flow provided by the SystemPump in the

Heat Distribution Segment

- EmergDem: at least one heat consumer has emergency heat demand for frost protection. If

supported by the heat production system (HPM), the attribute 'EmergDem'=true will activate heat production in any case (override of e.g. local 'summer mode')

- DHWLegioReq: at least one DHWC requests hot water for DHW load with active legionella

protection mode (can only be 'true' if DHWReq = 'true')

'DHWLegioReq' information can be useful in the heat distribution system (HFDM) for optimized flow-/return temperature control. A pre-controller in the heat distribution system with active return temperature limitation can affect proper

legionella protection due to reduced flow temperature to the DHWC. With

'DHWLegioReq' appropriate adaptation of the return temperature limitation can be

managed by the heat distribution system

Calculation of the resulting heat demand out of the dynamic lists: (recommendation, manufacturer specific solution)

First extract the most relevant entry out of the Main List.

- 1. From all entries with feature **D** take the one with the <u>lowest</u> **TempFlowDem** value (max. temperature limitation!). If no entries with feature $D \Rightarrow$ check feature C
 - 2. From all entries with feature **C** take the one with the <u>highest</u> **TempFlowDem** value If no entries with feature D => check feature B
 - 3. From all entries with feature **B** take the one with the <u>lowest</u> **TempFlowDem** value If no entries with feature $D \Rightarrow$ check feature A
 - 4. From all entries with feature **A** take the one with the <u>highest</u> **TempFlowDem** value If no entries with feature $A \Rightarrow$ no demand

The resulting value* out of this procedure is inserted in the TempFlowWaterDemAbsHFDM signal Example:

	Main List											
Entry N°	TempFlowDem	Attrib: – DemValid – AbsLoadPriority – MaxTempLimit		Source FB Type and Instance	Source Individual Addr	Timeout						
1	65 °C	true / true / true	(D)	DHWC (1)	••••							
2	60 °C	true / false / true	(B)									
3	70 °C	true / true / false	(C)	••••		••••						
4		false										

TempFlowWaterDemAbsHFDM signal will contain the value of entry 1. For the resulting TempFlowDem usually temperature elevation 'TempFlowDiffFTC' is added in order to have sufficient control loop margin.

In addition for each attribute out of the **Attributes Lists** the resulting value is separately calculated (logical OR) and the corresponding value *) is inserted in the TempFlowWaterDemAbsHFDM signal.

Each of the resulting DHWReq, RoomHeatingReq, VentReq and AuxAllSeasonReq attributes may be set in any combination. I.e. the resulting TempFlowWaterDemAbsHFDM signal indicates which classes of consumers currently have a valid heat demand but which class is responsible for the resulting TempFlowDem is uncertain.

*) It shall be allowed in implementations of the HFDM that individual attributes (except 'DemValid') in the resulting TempFlowWaterDemAbsHFDM signal are not supported => default value 'false'

It shall be allowed in implementations of the HFDM that propagation of individual attributes (except 'DemValid') in the TempFlowWaterDemAbsHFDM signal may be suppressed or activated according to parameter settings.

2.3.1.2 Flow temperature control

The HFDM itself has no built-in pre-controller functionality for the common flow temperature in the secondary Heat Distribution Segment. But usually there is a pre-controller Functional Block FTC (flow temperature controller) linked 1:1 to the HFDM. The FTC may be located in the same device containing the HFDM or it may be located in a separate device. In case of a remote FTC, the signal TempFlowWaterSetp is sent to the FTC via Bus.

The setpoint for the pre-controller is calculated out of the resulting TempFlowWaterDemAbsHFDM signal.

DHW load: A pre-controller in the heat distribution system with active return temperature limitation can affect proper legionella protection due to reduced flow temperature to the DHWC. With 'DHWLegioReq' appropriate adaptation of the return temperature limitation can be managed by the heat distribution system

2.3.1.3 System pump control

This is an optional feature of the HFDM.

In the secondary Heat Distribution Segment a common System Pump is usually installed to provide water flow in the Segment. The System Pump is normally controlled by the HFDM. The pump is usually hard wired but optionally also a bus-connected pump is possible.

The setpoint (e.g. On / Off) for the System Pump may be calculated out of the 'SystemPumpReq' attributes from the received TempFlowWaterDemAbs.... signals (logical OR, see chapter 2.3.1.1)

Heat consumers <u>without</u> an own pump like HZC will normally set the 'SystemPumpReq' attribute in the TempFlowWaterDemAbs.... signal if they have a valid heat demand.

Heat consumers with an own pump like DHWC will normally not set the 'SystemPumpReq' attribute in the TempFlowWaterDemAbs.... signal if they have a valid heat demand.

The separation of the attributes 'SystemPumpReq' and 'DemValid' enables an optimized control of the System Pump depending on the hydraulic situation (e.g. turn off the SystemPump during DHW load)

2.3.1.4 Routing of HPM signals

Routing of forcing and locking and status signals from HPM is a mandatory feature of the HFDM.

These signals from HPM are transparently routed by the HFDM to the secondary Heat Distribution Segment without changing data value or datapoint addressing (Object Type and Property ID). I.e. the binding group (LTE-HEE) is changed by the HFDM. The Object Instance in the routed frame is either the one of the HPM in the device sending the original frame or the one of the routing HFDM in the device sending the routed frame. The source address in the routed frame is always the source address of the device with the routing HFDM.

Because of this routing mechanism, the consumers in the Heat Distribution Segments do not need to know to which 'ProdSegmH' or HPM they are connected.

2.3.1.5 Usage of LockSignHPM by the HFDM

If the HFDM receives a critical locking signal from the HPM the FTC will normally reduce the flow according to the % reduction factor. Reduction of flow is only possible if an FTC is connected to the HFDM. This is an optional feature of the HFDM. For further details see [07].

2.3.1.6 Usage of ForceSignHPM by the HFDM

If the HFDM receives a forcing signal from the HPM with the type 'Protection' or 'Oversupply' it will increase the flow until a max. flow temperature (parameter) is reached. I.e. the pre-controller FTC will open the valve accordingly. In case of 'Overrun' the last flow temperature setpoint is usually restored. This is an optional feature of the HFDM. For further details see [07].

2.3.1.7 Local generation of LockSignHFDM

The HFDM itself may also generate a locking signal LockSignHFDM which is sent to the secondary Heat Distribution Segment. This is an optional feature of the HFDM and the method to calculate the power reduction value is company specific.

The LockSignHFDM may be generated in the following cases:

- Some consumers in the secondary Heat Distribution Segment request absolute load priority. This
 feature is normally used for DHW load priority. Priority information for DHW load is contained in
 specific attributes in the incoming heat demand signals
 - => LockSignHFDM indicates that consumers without priority stop energy consumption (100% reduction)
- If an overload condition in the Heat Distribution Segment occurs i.e. the requested flow temperature
 can not be provided <u>and some consumers request shift load priority</u>. In this situation the HFDM may
 also generate a locking signal
 - => load priority between consumers, LockSignHFDM indicates that consumers without priority reduce energy consumption
- For more details see document [07]

2.3.1.8 Local generation of ForceSignHFDM

In rare situations critical overheat conditions may also occur in a HFDM (e.g. heat-exchanger) Therefore the HFDM can also generate a forcing signal which is independent from ForceSignHPM

The signal is sent to the secondary Heat Distribution Segment. This is an optional feature of the HFDM and the method to calculate the signal is company specific.

The ForceSignHFDM may be generated in the following cases:

- critical overheat in heat exchanger:
- oversupply: uncritical overheat in heat exchanger. The heat-exchanger temperature is much higher than requested by heat demand
- overrun: indicates that remaining energy is available in the heat-exchanger after load shutdown
- an external ForceSignHFDM from the preceding HFDM was received
- For more details see document [07]

2.3.1.9 Usage of received LockSignHFDM from primary HFDM

- a) The locking signal received from the HFDM in the primary Heat Distribution Segment is evaluated in the HFDM and combined with the locally calculated locking signal.
 E.g. the received power reduction value and the locally calculated value (see chapter 2.3.1.7) are compared and the higher power reduction value is sent in the resulting LockSignHFDM
- b) Reception of LockSignHFDM may cause a reduction of the flow temperature in the pre-controller (FTC), i.e. the whole secondary Distribution Segment is concerned But the resulting TempFlowWaterDemAbsHFDM must not be influenced!

Specific behavior of a) and b) can be enabled/disabled/controlled by company specific parameters For more details see document [07]

2.3.1.10 Usage of received ForceSignHFDM from primary HFDM

- a) If the HFDM receives a forcing signal with the type 'Protection' or 'Overrun' from the preceding HFDM (ForceSignHFDM), the HFDM will increase the flow until a max. flow temperature (parameter) is reached. I.e. the pre-controller FTC will open the valve accordingly. But the resulting TempFlowWaterDemAbsHFDM must not be influenced!
- b) The forcing signal received from the HFDM in the primary Heat Distribution Segment is evaluated in the HFDM and combined with the locally calculated forcing signal. The resulting ForceSignHFDM is sent to the secondary Heat Distribution Segment in order to force heat consumers to increase temporarily their energy consumption.

Specific behavior of a) and b) can be enabled/disabled/controlled by company specific parameters For more details see document [07]

2.3.2 Constraints

IMPORTANT: HFDM functionality can today not be implemented in standard mode because:

- the necessary compound HVAC DPT for runtime-interworking are not yet available in standard mode
- mapping to standard DPT is not possible because of loss of the necessary data consistency

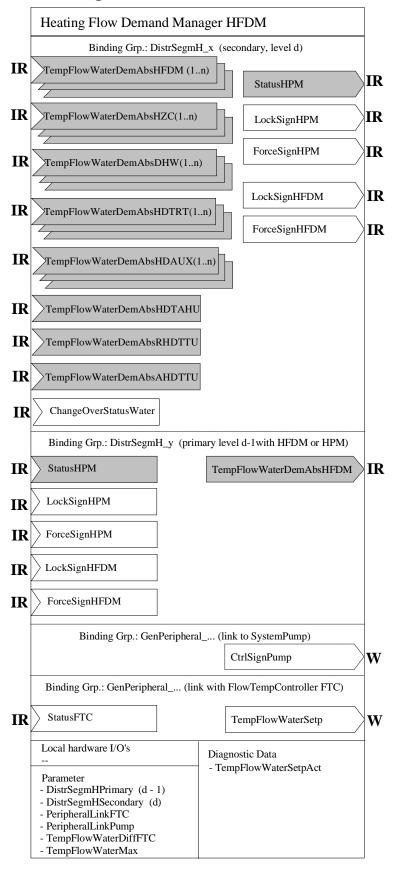
Therefore for the time being only LTE implementations of the HFDM functional block are possible.

After a transition period the DPT for Heat Flow Demand Management may be accepted in standard mode. Therefore this documents already contains references to standard mode implementations where appropriate.

Routing of StatusHPM by the HFDM from the primary to the secondary Heat Distribution Segment is necessary in LTE-HEE mode only. In standard mode routing of these signal is not necessary and therefore not supported because of different linking mechanisms.

In LTE implementations using the producer/consumer model, the number of partners of the HFDM in the secondary Heat Distribution Segment is "unlimited" and is not relevant at design time of a product. For standard mode implementations using the shared variable model the number of partners of the HFDM in the secondary Heat Distribution Segment is limited (max. number to be defined at design time of a product) because for every TempFlowWaterDemAbs.. input one separate group address must be assigned.

2.3.3 Functional block diagram



2.3.4 Datapoint description

2.3.4.1 Overview

Data Point	Description	Data Point Type	DPT N°
Outputs			
StatusHPM	routed status information from HPM to the secondary Heating Distribution Segment	DPT_StatusHPM	209.100
ForceSignHPM	routed forcing signal from HPM to the secondary Heating Distribution Segment to force the consumers to increase energy consumption	DPT_ForceSign	21.100
LockSignHPM	routed locking signal from HPM to the secondary Heating Distribution Segment => consumers reduce energy consumption	DPT_LockSign	207.101
ForceSignHFDM	Forcing signal from HFDM in case of overheat/oversupply in the HFDM, to force the consumers to consume energy	DPT_ForceSign	21.100
LockSignHFDM	Locking signal from HFDM for loadmanagement in the Heat Distribution Segment, to force the consumers to reduce energy consumption	DPT_LockSign	207.101
TempFlowWaterDem AbsHFDM	Resulting flow temperature demand to be sent to preceding primary HFDM or HPM (absolute flow temperature) including temperature elevation 'TempFlowDiffFTC'	DPT_ TempFlowWaterDemAbs	210.100
CtrlSignPump	Command for SystemPump with bus interface	t.b.d, probably multiple or complex DPT	?
TempFlowWaterSetp	Flow temperature setpoint to be controlled by the FTC / LTE and S-interface	DPT_TempHVACAbs_Z	205.100 9.001
Inputs			
TempFlowWaterDemAbs	Flow temperature demands from allocated Consumer units (absolute temperature) => multiple datapoints from various Functional Blocks	DPT_TempFlowWater DemAbs	210.100
StatusHPM	Status information from 'Producer Manager'	DPT_StatusHPM	209.100
ForceSignHPM	Forcing signal from HPM due to overheat, to force the consumers to consume energy => to be routed to the secondary Heat Distribution Segment	DPT_ForceSign	21.100
LockSignHPM	Locking signal from HPM due to boiler overload, to force the consumers to reduce energy consumption => to be routed to the secondary Heat Distribution Segment	DPT_LockSign	207.101
ForceSignHFDM	Forcing signal from HFDM in the primary Heat Distribution Segment	DPT_ForceSign	21.100
LockSignHFDM	Locking signal from HFDM in the primary Heat Distribution Segment	DPT_LockSign	207.101
StatusFTC	Status information from Flow Temperature Controller	DPT_StatusWTC.	209.103
ChangeOverStatusWater	Status Information of changeover sensor / LTE and S-interface	DPT_Heat/Cool_Z DPT_Heat/Cool	200.100 01.100

Data Point	Description	Data Point Type	DPT N°
Parameters			
DistrSegmHPrimary	LTE zoning number of the primary Heat Distribution Segment	DPT_UcountValue8_Z	202.002
DistrSegmHSecondary	LTE zoning number of the secondary Heat Distribution Segment	DPT_UcountValue8_Z	202.002
PeripheralLinkPump	LTE zoning number Peripheral link to system pump in the secondary Heat Distribution Segment	DPT_UcountValue16_Z	203.012
PeripheralLinkFTC	LTE zoning number Peripheral link to FTC: pre-controller for the secondary Heat Distribution Segment	DPT_UcountValue16_Z	203.012
TempFlowWaterDiffFTC	Value to be added to resulting flow temperature demand so that the FTC has control margin	DPT_TempHVACRel_Z	205.101 *)
TempFlowWaterMax	Max. Flow temperature in the secondary Heat Distribution Segment	DPT_TempHVACAbs_Z	205.100
Diagnostic Data			
TempFlowWaterSetpAct	Actual calculated flow temperature setpoint	DPT_TempHVACAbs_Z	205.100

^{*)} Implementation of Properties using standard DPT see chapter 1.3.2

			STANDARD MODE			
		Basic FB	S-Mode	Standard Mode Interface	LTE-Mode	
Outputs	StatusHPM	NA 2)	NA	NA	M	
	ForceSignHFDM	NA	NA	NA	О	
	LockSignHFDM	NA	NA	NA	О	
	ForceSignHPM	NA	NA	NA	О	
	LockSignHPM	NA	NA	NA	О	
	TempFlowWaterDem AbsHFDM	NA 1)	NA	NA	M	
	CtrlSignPump	NA	NA	NA	О	
	TempFlowWaterSetp	(GO _b)		(GO)	О	
Inputs	TempFlowWaterDemAbs	NA 1)	NA	NA	M	
	StatusHPM	NA 1)	NA	NA	M	
	ForceSignHFDM	NA	NA	NA	О	
	LockSignHFDM	NA	NA	NA	О	
	ForceSignHPM	NA	NA	NA	О	
	LockSignHPM	NA	NA	NA	О	
	StatusFTC	NA	NA	NA	О	
	ChangeOverStatusWater	(GO _b)		(GO)	О	

¹⁾ mandatory in LTE Mode but the information is NA in the Basic FB and all other modes because the datapoint type is <u>today</u> not yet available in standard mode. Splitting of DPT is not possible because of necessary data consistency

Table 1: HFDM Runtime Interworking - dependence on Configuration Modes

²⁾ Reason: routing of datapoint is only useful in LTE-HEE, not necessary in standard mode

		Support
Parameter	DistrSegmHPrimary	$M^{1)}$ $NA^{2)}$
	DistrSegmHSecondary	M
	PeripheralLinkPump	О
	PeripheralLinkFTC	О

Table 2: HFDM LTE specific Properties

		Support
Parameter	TempFlowWaterDiffFTC	О
	TempFlowWaterMax	0
Diagnostic Data	TempFlowWaterSetpAct	О

Table 3: HFDM Standard Properties of Interface Objects (or memory mapped DP)

normal case for "stand alone" HFDM
 HFDM is the "first" HFDM and located together with the HPM in the same device

2.3.4.2 Output StatusHPM

FB:	HFDM	LTE Serve	er Output Name:	StatusHPM					ndatory 🖂		
Dosci	ription:								рионаі 🔝		
	Signal from HPM routed to the secondary Heat Distribution Segment. Data value is unchanged. See										
	chapter 2.3.1.4 and HPM specification										
DPT:	Name		DPT_StatusHPM DPT ID 209.100 Datatype format V ₁₆ B ₈								
Field	INAITIE		Description	ו ו זען		Range		COV	Default		
	PM speci		Description		T Sup. II	varige	- Office	001	Delault		
	nunicatio										
	ding Grou										
Clas		•	Туре				Default				
Ge	ographica	al 🗌	•								
Ар	plication	Specific⊠	DistrSegmH (sec	ondary)			1 or 2 (see (2.1)	examples	chapter		
Un	assigned		Broadcast	Configura	able 🗌		,				
DP /	Address:		IO Type(ID):	136 (HPM)	Prop	erty ID:	51			
LTE	-Services	s (event):	cov ⊠ ı	MinRepTime:	2)	10 s	sec Hea	rtbeat: 2)	15 min		
	oReport	Response	Output per defau	It communica	ting	Bindi	ing Group Wi	ildcard allo	wed \square		
	lling of the		Tx Prio:	High 🗌		No	rmal 🛛	Lov	νΠ		
sh:	all always ported) 1	-be	Transm after Pov		d Value [ct Value 🛚	Default \			
	oerty-Ser ividual ad		Read only [1)	Read/Wi	rite					
Excep	Exception Handling: Save at Powerdown							rdown			
	al Featur										
		the signal	in the HFDM (only	routing) ther	efore rea	d-acc	ess from the	HFDM is	not		
	oported			, .							
f tran	transmission depends on reception of the signal (routing functionality)										

2.3.4.3 Output ForceSignHPM

FB: HFDM LTE Ser	ver Output Name:	ForceSign	HPM			Mandatory Optional		
Descriptions						Optional 🗵		
Description:								
	Signal from HPM routed to the secondary Heat Distribution Segment. Data value is unchanged. See							
chapter 2.3.1.4 and HPM specification. Routing functionality is optional and may be enabled / disabled by								
a company specific parameter according to the installation needs.								
DPT : Name DPT_For	ceSign	DPT ID	21.100		atatype format	B ₈		
	Description		Sup.	Range	e Unit	COV Default		
see HPM specification								
Communication:								
Binding Group:								
Class	Туре				Default			
Geographical								
Application Specific⊠	DistrSegmH (secor	ndary)			1 or 2 (see ex 2.1)	kamples chapter		
Unassigned	Broadcast	Configura	ble 🗌					
DP Address:	IO Type(ID):	136 (HPM)		Prop	erty ID:	53		
LTE-Services (event):	COV 🛛 I	MinRepTime) :	10 s	sec Hea	rtbeat: 3 2) min		
InfoReport 🛛	Output per default	communicat	ing	Rind	ing Group Wild	deard allowed		
(LTE Read-Response				ыни	ing Group wild	icalu alloweu		
polling of the output	Tx Prio:	High 🗌		No	ormal 🛛	Low 🗌		
shall always be supported) 1)	Transm after Powe	rup: ²⁾ Stored	d Value		Act Value	Default Value		
Property-Service (individual access):	Read only 1)		Read/W	/rite				
Exception Handling:					Save	at Powerdown		
Special Features:								
HPM and the first HFDM a	are usually located in	the same d	evice =	> devi	ce – internal si	ignal only		
supported	, ,	σ,						
²⁾ transmission depends o	n reception of the sig	gnal (routing	functio	nality)				

2.3.4.4 Output LockSignHPM

FB: HFDM LTE S	erver Output Name:	LockSignF	IPM					datory 🗌	
Description:							<u> </u>	nionai 🖂	
	Signal from HPM routed to the secondary Heat Distribution Segment. Data value is unchanged. See								
	chapter 2.3.1.4 and HPM specification. Routing functionality is optional and may be enabled / disabled by								
a company specific parameter according to the installation needs.									
DPT: Name DPT_LockSign DPT ID 207.101 Datatype format U ₈ B ₍₈									
Field D	escription		Sup.	Rang			Ô۷	Default	
see HPM specification									
Communication:									
Binding Group:									
Class	Туре				Default				
Geographical									
Application Specific∑	pplication Specific⊠ DistrSegmH (secondary) 1 or 2 (see ex 2.1)						les cl	hapter	
Unassigned	Broadcast	Configura	ble 🗌						
DP Address:	IO Type(ID):	136 (HPM)		Prop	perty ID:	54			
LTE-Services (event)	COV 🛛	MinRepTime	e:	10	sec H	eartbea	ıt: 3	3 ²⁾ min	
InfoReport 🖂	Output per default	communicat	ing	Rinc	ding Group W	/ildcard	allov	uod 🗆	
(LTE Read-Response						riidcaid	anov	veu	
polling of the output	Tx Prio:	High 🗌		N	ormal 🛚		Low		
shall always be supported) 1)	Transm after Powe	erup: ²⁾ Stored	d Value		Act Value 🗌	Defa	ult Va	alue 🗌	
Property-Service (individual access):	Read only 1)]	Read/V	Vrite					
Exception Handling:	<u> </u>				Sa	ve at P	ower	down	
					<u>'</u>			·	
Special Features:									
HPM and the first HFDM	are usually located in	n the same d	evice =	> dev	ice – internal	signal	only		
1) no storage of the sign	al in the HFDM (only i	routing) there	efore re	ad-ac	cess from the	e HFDN	l is n	ot	
supported									
transmission depends on reception of the signal (routing functionality)									

2.3.4.5 Output LockSignHFDM

FB:	HFDM	LTE Se	ver Output Name: LockSignHFDM							datory 🔲		
Desc	ription:											
see c	hapter 2.3.	1.7 and d	locument [07]									
DPT:	Name	DPT_Lo	ckSign	DPT ID	207.10)1	Data	atype	format	U ₈ B ₈		
Field			Description		Sup.	Ra	inge		Unit	COV	Default	
PwrR	eduction		Requested power		M	0	100%	6	%	5	CS	
			-0% no reducti									
			 100% max. redu 									
Attrib			Bitset containing s						l			
- Loci	<request td="" <=""><td></td><td>indicates if power</td><td></td><td>M</td><td>tru</td><td>e/fals</td><td>se</td><td>bool</td><td>Y</td><td>false</td></request>		indicates if power		M	tru	e/fals	se	bool	Y	false	
			necessary (validity	OT								
Turn	•		PwrReduction) type of overload		O 3)	ari:	tical /	,	bool	N	uncritical	
- Тур	5		type of overload			_	critic		DOOI	IN	unchildai	
Comi	nunication	\•			<u>_</u>	un	CITTIC	ш		<u> <u> </u></u>		
	ding Group											
Clas			Туре				[Defa	ult			
Ge	eographical		,									
Ap	plication Sp	pecific $oxtime oxtime$	DistrSegmH (sec	DistrSegmH (secondary) 1 or 2 (see ex					2 (see ex	amples c	hapter	
			_					2.1)				
	nassigned		Broadcast									
	Address:			IO Type(ID): 144 (HFDM) Property ID: 52					- 1\			
	-Services			COV MinRepTime: 10 sec Heart			rtbeat: 3 1) min					
	oReport			Output per default communicating Binding Group			up Wildcard allowed					
	TE Read-Relling of the											
	all always b			Tx Prio: High ☐ Normal ⊠					Low			
	pported)) C	Transm after Pov	werup: 1)Store	d Value	=	Ac	t Val	ue 🗌 🏻 🏻 🗈	Default V	alue 🗌	
	perty-Serv		Read only	∑ ²⁾	Read/\	∧/rita	2					
_ `	ividual acc		rtead only		Ttoda, t	VIII			<u> </u>			
Exce	ption Hand	lling:							Save	at Power	down	
Snoc	ial Feature	o:										
			s re-transmitted pe	riodically (if n	o COV	٥٥٥١	ıred)	as lo	nna as th	e LockRe	anuest	
attribute is true. When the locking condition in the HFDM disappears, the LockRequest attribute changes to false and the signal is still repeated with the heartbeat-period during 9 minutes (3												
messages). Afterwards re-transmission is stopped until a new locking												
pr			necessary bus-load				J		• • •	`		
²⁾ Re	ead access	is possib	ole but in practice n	ot very useful								
			usually the type 'ur									
			l' LockSignHFDM a			ncipl	e it is	s allo	wed to se	end 'critic	cal'	
Lo	ckSignHFD	M and th	ne receivers shall re	eact according	gly							

2.3.4.6 Output ForceSignHFDM

FB: HFDM L	TE Se	rver Output Name:	jnHFDN	/			Mandatory ☐ Optional ⊠				
Description:			<u>.</u>					•			
see chapter 2.3.1.8 a	and do	cument [07]									
DPT : Name DPT	_Ford	ceSign	DPT ID	21.101		Datatype	e format	B ₈			
Field	Des	cription		Sup.	Rar	nge	Unit	COV	Default		
Attributes											
- ForceRequest	cons	cates if forced power sumption is necessa e remaining attrib)		M	true	e / false	bool	Y	false		
- Protection		cates that overheat is	s critical	М	true	e / false	bool	Υ	false		
- Oversupply	indic	cates that overheat is	s uncritical	М	true / false bool			Υ	false		
- Overrun		cates that remaining		М	true	e / false	bool	Υ	false		
	avai	lable in the heat-exc									
- DHWNorm 3)	Load	d DHW to 'Normal' L		0	true	e / false	bool	Υ	cs		
		e of overheat ('Prote	ction' or								
- DHWLegio ³⁾		ersupply') d DHW to 'LegioProt	tect' l evel	0	truc	e / false	bool	Y	cs		
DiffVLegio		ase of overheat ('Pro			liuc	, iaisc	DOOI	'	03		
		ersupply')									
- RoomHComf 3)		d Room Heating to '	0	true / false		bool	Υ	cs			
		el in case of overhea									
- RoomHMax ³⁾		otection' or 'Oversup d Room Heating with		0	truc	e / false	bool	Y	cs		
- Noomi liviax		imum flow temperat			liue / laise		DOOI	'	US		
		verheat ('Protection'									
		ersupply')									
Communication:											
Binding Group:											
Class		Type				Defa	ult				
Geographical											
Application Specif	fic⊠	DistrSegmH (secon	ndary)			1 or 2 2.1)	1 or 2 (see examples chapter 2.1)				
Unassigned		Broadcast	Configura	able 🗌							
DP Address:		IO Type(ID):	144 (HFDI MinRepTim			operty ID sec		53	4)		
LTE-Services (eve			tbeat: 3	3 1) min							
InfoReport (LTE Read-Respo		Output per default o	communica	ting	Bi	nding Gr	oup Wildo	ard allov	ved		
polling of the outp		Tx Prio:	High 🗌	Normal [•						
shall always be		Transm after Powe		-1 \ / - 1							
supported)		Transm aπer Powe	rup: Store	d value		Act Val	ue 🔲 L	efault Va	alue 🔲		
Property-Service (individual access	s):	Read only ²⁾		Read/V	Vrite						
Exception Handling							Save a	at Power	down		

Special Features:

- Heartbeat: the signal is re-transmitted periodically (if no COV occurred) as long as the ForceRequest attribute is true. When the forcing condition in the HFDM disappears, the ForceRequest attribute changes to false and the signal is still repeated with the heartbeat-period during 9 minutes (3 messages). Afterwards re-transmission is stopped until a new forcing condition appears (this procedure reduces unnecessary bus-load
- Read access is possible but in practice not very useful
- HFDM with higher functionality may indicate whether DHW or Room Heating should be activated in case of overheat (type 'Protection' or 'Oversupply') and in addition the load level is selected. With this feature "intelligent" load management is possible. If this function is not supported, the attributes DHWNorm, DHWLegio, RoomHComf and RoomHMax shall be set to an allowed and reasonable default value. At least one of these attributes shall be set to '1', see [07]

2.3.4.7 Output: TempFlowWaterDemAbsHFDM

FB:	HFDM	LT	E Serv	r Output Name: TempFlowWaterDemAbsHFDM								Mandatory ⊠¹) Optional □		
Desci	ription:													
		nal d	contain	s the calculat	ted resul	ting flow to	emperati	ure	dem	and (absolute	value) of	the	
secon	dary Hea	t Di	stributio	on Segment.	It is sent	t to the HF	DM (or I	HPN	/I) in	prim	ary Heat			
				ne resulting fl								L		
DPT:	Name			mpFlowWate	rDemA	DPT ID	210.10	0	Da	tatype	e format	V ₁₆ B ₁₆		
Field		bs		scription			Sup.	Da	nge		Unit	COV	Default	
	FlowDem			ulting flow ter	mn dem	and /	M		ten		°C	2	CS	
remp	riowbeiii			uested flow te			IVI		i teri nge	ıρ.			CS	
Attribu	Ites		164	dested now t	emperat	uie		Iai	ige					
- Dem			Val	idity of Temp	FlowDer	m	М	tru	e/fa	lse	bool	Υ	false	
Don	ivana			se means als			101	liu	C/ IU	100	5001	'	idioc	
				nand")	70 110 110	, at								
- Absl	_oadPrior	itv		olute load pr	iority if o	ne or	0	tru	e/fa	lse	bool	Υ	false	
		,		re consumer										
				ilable power	· / I									
- Shift	LoadPrio	rity		t load priority	: set e.g	. if HFDM	0	tru	e/fa	lse	bool	Υ	false	
		•		uests priority										
			ove	rload										
- Max	TempLimi	it	Ten	npFlowDem	npFlowDem contains max.					lse	bool	Υ	false	
				p. limit e.g. f										
	TempLimit	t		cold water or	NA	fals			bool	N	false			
- DHV	VReq			or multiple [DHW hav	ve heat	0	true/false		lse	bool	Υ	false	
			nand											
- Roo	mCtrlReq			or multiple r	0	true/fa		lse bool		Υ	false			
	_			uits have hea										
- Vent				at demand fro	0		e/fa		bool	Y	false			
- Aux	AllSeason	Red		nand from au	0	tru	e/fa	se	bool	Υ	false			
0 -1				sumer; all se		true/false			bool	\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	6 -1			
- Syst	emPumpl	Req		uest for wate	0	tru	е/та	ise	bool	Υ	false			
				nary distribut										
Emo	rgDem			mmon syster ulting emerge	0	tru	o/fo	loo	bool	Y	false			
- Eille	igbein			frost protection		true/fa		alse bool		I	idise			
- DHV	VLegioRe	<u></u>		nand from Di	0	true/fa		معا	bool	Υ	false			
- 1110	vegione	Ч		onella functio		liu	C/Ia	130	DOOI	'	laise			
				be 'true' if E										
Comr	nunicatio	n.	[01.11]	, 50 1140 112	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	1	<u> </u>	<u> </u>			<u>L</u>	<u></u>		
	ding Grou													
Clas				Туре						Defa	ult			
	eographica	al		71.										
	plication		cific X	DistrSegml	l (prima	ry)				1 or 3	31 (see e	examples	chapter	
	•	•	_		``	• /				2.1)	•	•	•	
Ur	assigned			Broadcast		Configur	able 🗌							
	Address:			IO Type(ID)		144 (HFD		Р	rope	erty ID):	51		
	-Services	s (e		COV 🖂		/IinRepTim		1	0 s	ec	Hea	rtbeat:	15 min	
InfoReport 🖂			Output per	Output per default communication					na Gr	oun Wild	card allov	Day		
	ΓE Read-l										•			
	lling of the		itput	Tx Prio:		High			No	mal [\times	Low	Ш	
	all always pported)	be		Transm after	er Powei	rup: Store	d Value		Α	ct Val	ue 🖂 🛚 I	Default Va	alue 🗌	
	perty-Ser	vice	9	_	K						,			
	ividual a			Read only	\boxtimes		Read/V	/Vrite	Э	L				
,														

Exception Handling:	Save at Powerdown
Special Features:	
 A temperature offset can be added to the calculated flow temperature to complete difference in a pre-controller (optional FTC). This offset is a configuration part of HPM and the first HFDM are usually located in the same device => device - ir 	rameter.
case	

2.3.4.8 Output CtrlSignPump

see example in HPM specification

2.3.4.9 Output TempFlowWaterSetp

Standard mode

DP I	Name:	Templ	FlowWa	aterS	Setp		Abbr.	:							Manda	tory			$ brack { m I}$
FB 1	Name:	HFDM Can be internal []					
	cription																		
	LTE-HEE																		
	apoint Typ	_																	
	Γ_Name:		_Value	_Ter	mp										_				
	Format:	F ₁₆											DPT_I		9.001				
Field	<u>d</u>	Desc	cription										Supp.		ange	Unit	Defa	ult	
_														fι	ıll range	°C	С	S	_
	ess Type																		
	Output																		
tl	$his \rightarrow M$			_	$nis \rightarrow 1$														
S	Spontaneo	us		OV:		\times	Δ-Val		_	1 °C		MinF	RepTim	ie:		10s			
				yclic		\times	Perio	<u>d:</u>	1	15 Mir	n								
	Request		\boxtimes																_
	nmunicati																		
	Group Obj			t										IV	landatory	/:			
	Default Gro	oup Ad	dress:																
	amics																		
F	Power dow	n: S	ave:																
F	Power up:	V	'alue:		No initi	alisa	tion:						lt value						
					Saved		•								for input				
				t on	bus (on	lly fo	r outpu	ıt):			R	ead	from b	us (o	nly for in	put):		\perp	
Exc	eption Ha	ndling	1																
Spe	cial Featu	ires																	

LTE-HEE mode:

LTE CI	ient Output Name:	TempFlow	WaterS	Setp				datory 🗌 otional 🔯
							-	
ptionally u	ised by the HFDM to	control an "i	ntellige	nt" flow	tempe	erature c	ontroller F	-TC
DPT_Te	empHVACAbs_Z	DPT ID	205.10	0 Da	tatype	format	$V_{16}Z_{8}$	
	Description		Sup.	Range	;	Unit	COV	Default
erSetp	temperature setpoii	nt	M	full ran	nge	°C	1	CS
	standard Command	d field				enum		
	normal Write		M					
ınds	not applicable		NA					
on:	-		-	-				
up:								
	Туре				Defau	ılt		
al								
Specific								
	Broadcast	Configura	ıble 🛚		1			
	IO Type(ID):	120 (FTC)		Prope	erty ID	:	52	
s (event):	COV 🛛	MinRepTime	e:	10 s	ec	Hea	rtbeat:	15 min
	Output per defaul	t communicat	ting	Bindi	ng Gro	oup Wild	card allov	ved
	Tx Prio:	High 🗌		No	rmal 🛭		Low	
	Transm after Pow	erup: Stored	Value	□ A	ct Valu	ıe 🛛 🏻 I	Default Va	alue 🗌
ndling:						Save	at Power	down
					•			
res:								
					•			
	erSetp ands on: up: Specific s (event):	pptionally used by the HFDM to DPT_TempHVACAbs_Z Description erSetp temperature setpoints standard Command normal Write not applicable Don: Up: Type Specific Broadcast IO Type(ID): s (event): COV Output per defaul Tx Prio: Transm after Powendling:	pptionally used by the HFDM to control an "in DPT_TempHVACAbs_Z DPT ID Description erSetp temperature setpoint standard Command field normal Write not applicable on: up: Type al Description Standard Command field normal Write not applicable on: up: Type al Description Type Type al Description Type Type al Description And	pptionally used by the HFDM to control an "intellige DPT_TempHVACAbs_Z DPT ID 205.10 Description Sup. erSetp temperature setpoint M standard Command field normal Write M NA on: up: Type al	pptionally used by the HFDM to control an "intelligent" flow DPT_TempHVACAbs_Z	pptionally used by the HFDM to control an "intelligent" flow temper DPT_TempHVACAbs_Z	pptionally used by the HFDM to control an "intelligent" flow temperature of DPT_TempHVACAbs_Z DPT ID 205.100 Datatype format Description Sup. Range Unit erSetp temperature setpoint M full range °C standard Command field normal Write M NA not applicable NA Default sal Default Specific DESCOV MINREPTIME: 10 Sec Heal Output per default communicating Default Default Specific Default COV MINREPTIME: 10 Sec Heal Output per default communicating Default Default Specific Default COV MINREPTIME: 10 Sec Heal Output per default communicating Default Default COV MINREPTIME: Solve MinRepTime: S	pptionally used by the HFDM to control an "intelligent" flow temperature controller in the properties of the properties

2.3.4.10 Input: TempFlowWaterDemAbs....

This is the common description for all demand signals from HFDM, HZC, HDTRT, DHWC, HDAUX, HDTAHU, RHDTTU, AHDTTU

FB:	HFDM	LTE Clien	t Input Name:		atory 🛚				
Desci	ription:			-					
These HZC, to cald	es input si DHW, HF culate the	DM etc. in resulting h	ain the actual wa the secondary D eat demand of th n consumers (Dh	istribution Segr ne Heat Distribu	ment. Th ition Seg	ese informat ment and to	ion are u create l	used in the	HFDM :
DPT:	Name		npFlowWater		210.100			\/ D	
טרו:	ivame	DemAbs	npriowwater	טו ואט	210.100	Datatype	ioimai	V ₁₆ B ₁₆	
Field		DemAds	Description		Sup.	Unit	Default		
	FlowDem	1	flow temperatur	e demand (setr	ooint)		M	°C	CS
Attribu		!	now temperatur	e demand (set)	Jonity		101		- 00
- Dem			Validity of Temp	oFlowDem field			М	bool	false
D0111	ı v alı a		(false means al					5001	iaioo
- Absl	_oadPrior	itv	absolute load p			nsumer(s)	0	bool	false
,		,	request all avai			(0)			10.100
			LockSignHFDM						
- Shift	LoadPrio	ritv	shift load priorit		W load I	has priority	0	bool	false
		,	in case of boiler						
- Max	TempLim	it	TempFlowDem				М	bool	false
	•		DHW load. Flow						
- MinT	empLimi	t	for cold water o				NA	bool	false
- DHV	VReq		Heat demand fr	om DHW => fo	r DHW p	reparation	0	bool	false
			during summer						
	mCtrlReq		Heat demand fr		ting		0	bool	false
 Vent 			Heat demand fr				0	bool	false
	AllSeasor		demand from a				0	bool	false
 Syst 	emPumpl	Req	request for water			ibution	0	bool	false
			segment (comn						
	rgDem		emergency hea				0	bool	false
- DHV	VLegioRe	q	demand from D				0	bool	false
			active (can only	be 'true' if DH\	NReq =	'true')			
	nunicatio								
	ding Gro	up:	1						
Clas			Туре			Default			
	ographic								
		Specific X	DistrSegmH (se			1 or 2 (see e	example	s chapter 2	2.1)
	assigned		Broadcast	Configurab					
DP /	Address:			144 (HFDN					
				145 (HDAL					
				151 (HDTF					
			IO Type(ID):	152 (HDTA		Property ID	:	51	
			- 71 - ()	153 (RHD	-1 - 3				
				154 (AHD)					
				160 (HZC)					
	C	(Info Domont Coli	177 (DHW					
	-Service	(event):	InfoReport Snit	ner on Binding		Min			
	oReport	(nollin ::):	Timeout:		31	Min			
		(polling):	Read Wildcard	/ Resp Sniffer o	n Bindir	ng Group: -	-		
Read – Response Read Wildcard / Resp Sniffer on Binding Group: Value after Powerup: Default Value								Ctoro - \ / -	
value	atter Po	werup:	Deta	ult Value 🛚				Stored Val	ue 🔛

Exception Handling:	Save at Powerdown
see chapter 2.3.1.1	
Special Features:	
see chapter 2.3.1.1	

2.3.4.11 Input StatusHPM

FB: HFDM	LTE Clie	ent Input Name:			tory 🔯 '' otional 🔲			
Description:								
This signal contactional	ains variou lity in the	ee chapter 2.3.1.4 is status information HFDM (company s	on of the hea		ion. Status⊢	IPM may	also usec	I for local
	DPT_Stat	tusHPM	DPT ID	209.100	Datatype	e format	$V_{16}B_{8}$	
Field		Description				Sup.	Unit	Default
TempFlowProdS	SegmH	common flow ten segment	nperature of	heat prod	luction	М	°C	CS
Attributes - TempFlowValid - Fault	i	validity of TempF one or more boild monitoring); man HFDM	er(s) have a f	failure (m		M M	bool bool	false false
- SummerMode		boiler / boiler seq summer/winter m				0	bool	false
- OffPerm		boilers are perma				0	bool	false
- NoHeatAvailab	le	failure) boiler / boiler seq heat	luence is ten	0	bool	false		
Communication	1:	-				-	•	
Binding Group	o :							
Class		Туре			Default			
Geographical								
Application S	pecific⊠	DistrSegmH (prin	nary)		1 or 31 (see	e example	es chapte	r 2.1)
Unassigned		Broadcast	Configura	ble 🗌				
DP Address:		IO Type(ID):	136 (HPN	1)	Property II	D:	51	
LTE-Service (event):	InfoReport Sniffe	er on Binding	g Group:				
InfoReport		Timeout:		31	Min			
LTE-Service () Read – Resp		Read Wildcard /	Resp Sniffer	on Bindir	ng Group:			
Value after Pow	erup:	Defaul	t Value 🛚		<u>-</u>	;	Stored Va	lue 🗌
Exception Hand	dling:				S	ave at Po	owerdown	
Special Feature								
		are usually locate	ed in the sam	e device	=> device -	internal	signal only	in this
case		<u>-</u>						

2.3.4.12 Input LockSignHPM

FB:	HF	-DM	LTE Clie	nt Input Name:											
Desc	ript	ion:	<u>L</u>		<u>-</u>						otional 🔯 2)				
			1.5 and do	cument [07]											
DPT:			DPT_Loc		DPT ID	207.10	1	Datatyp	e format	U ₈ B ₈					
Field				Description					Sup.	Unit	Default				
PwrR	Redu	ıction		Requested pow	er-consumption	on reduct	ion		M	%	CS				
				– 0 % no redu											
				– 100% max. re											
Attrib				Bitset containin											
 LockRequest indicates if power reduction is necessary (validity 									M	bool	false				
of PwrReduction)															
 Type type of overload critical/uncritical; value is only 									M	bool	uncritical				
meaningful if LockRequest=true										<u>L</u>					
		nication													
		g Grou	o:	T											
Cla				Туре			De	efault							
	_	raphical			10 11/ 1										
			pecific <u></u>	DistrSegmH (pr		e exampl	es chapt	er 2.1)							
		signed		Broadcast	Configura		_		_						
		dress:		IO Type(ID):	136 (HPN		Р	roperty II): 	54					
		ervice (e	<u> </u>	InfoReport Snit	fter on Bindin										
		eport		Timeout: 1)		7	Mi	n							
		ervice (j – Resp	oolling): onse⊡	Read Wildcard	/ Resp Sniffer	on Bindi	ng (Group:							
Value	e aft	ter Pow	erup:	Defa	ult Value 🛚			-		Stored V	′alue 🗌				
Exce	ptic	n Hand	lling:					S	ave at Po	owerdow	'n 🗌				
Spec	ial I	Feature	s:												
1) The	The signal is received on event and periodically (if no COV occurred) as long as the LockRequest														
attrib	ute	is true. \	When the	overload condition	on in the HPM	disappea	ars,	the Lock	Request	attribute	changes				
				be repeated by t											
				transmission is s	stopped until a	new ove	rloa	ad condit	ion appe	ars (this	procedure				
			ssary bus-												
	M aı	nd the fi	rst HFDM	are usually loca	ted in the sam	e device	=>	device –	internal	signal or	nly in this				
case	HPM and the first HFDM are usually located in the same device => device – internal signal only in this ase														

2.3.4.13 Input ForceSignHPM

FB:	HFDM	LTE Clien	t Input Name:	Man	Mandatory ☐ Optional ⊠ 33						
Desci	ription:									Ори	Ullai 🔼
		3 1 6 and do	ocument [07]								
DPT:	Name				DPT ID	21.10	00	Datatype	format	B ₈	
Field	Intamo		Description		D1 1 1D		,,,	Datatype	Sup.	Unit	Default
Attrib	utes		Bitset containin	a sta	atus info					0	20.00.0
1	eReques	t	indicates overh			in the H	IPM (validity of	М	bool	false
			remaining attrib				•				
- Prot	ection		indicates that o			ical, too	high	boiler	М	bool	false
			temp				Ū				
- Ove	rsupply		indicates that o	verh	eat is und	critical b	ut su	ıpply	M	bool	false
			temp is much h	ighe	r than rec	quested	by h	eat			
			demand								
- Ove	rrun		indicates that re			gy is av	/ailat	ole in the	M	bool	false
	2)		boiler(s) after lo								
- DHV	VNorm 2)		Load DHW to 'I			in case	of o	verheat	0	bool	false
D. 11	2)		('Protection' or								
- DHV	VLegio ²⁾		Load DHW to 'l					e of	0	bool	false
Dan		2)	overheat ('Prote							h a a l	falaa
- R00	mHComf	,	Load Room He					case of	0	bool	false
Poo	mHMax ²⁾		overheat ('Prote						0	bool	false
- 600	IIIIIIVIAX		Load Room He temperature in					ion' or		DOOI	laise
			'Oversupply')	case	oi oveiii	eat (Fi	Oleci	1011 01			
Comr	nunicatio	n:	С тогоарргу)	<u> </u>	<u> </u>	<u> </u>					
	ding Gro										
Clas			Туре				D	efault			
	eographic	al \square	71								
		Specific X	DistrSegmH (pr	imaı	ry)		1	or 31 (see	exampl	es chapte	r 2.1)
	nassigned		Broadcast		Configura	able 🗌		,			,
	Address:		IO Type(ID):		136 (HPI		F	Property ID) :	53	
LTE	-Service	(event):	InfoReport Sni	ffer	on Bindin	g Grou	p:				
Inf	oReport		Timeout: 1)				7 M	in			
LTE	-Service	(polling):	Read Wildcard	/ D o	on Sniffor	on Rin	dina	Group:			
	ead – Res				•	וום ווט	uirig	Group.			
	after Po		Defa	ult V	alue 🛚					Stored Va	
Exce	ption Har	ndling:						S	ave at Po	owerdown	
	ial Featur										
			event and perio								
			forcing condition								
			be repeated by t								
			transmission is	stopp	ped until a	a new to	orcin	g conditioi	n appear	s (this pro	cedure
	es unnece	essary bus-	ioad)	اه	hathar Di		000-	Hooting	الحايمطة		din anns
API	vi with nig	ner iunctior	nality may indica	ie Wi	nemer Dr	אר סו ל יייין אוס אר	toom	neating s	snoula be	e activated	ın case
3) MDM	verrieat. I	firet HEDM	are usually not o are usually loca	: bot	n the see	ally III t	.⊓e ⊓ 	LDINI PONICO	intornal	cianal anh	, in this
case	vi aliu lile	III OLI IF DIVI	are usually 100d	ı c u I	ii uie sall	ie devid	J C =>	uevice –	michial	aigilai Uili	y 111 ti 1115
case											

2.3.4.14 Input LockSignHFDM

FB:	HFDM	LTE Clie	nt Input Name:	t Input Name: LockSignHFDM									
Desci	iption:	<u> </u>		-					•				
This s	ignal is ger	nerated by	the preceding HF	DM in primar	y Heat D	Distr	ibution S	Segment.					
Handl	ing in the H	IFDM: see	e chapter 2.3.1.9 a	and document	[07]								
DPT:	Name	DPT_Loc		DPT ID	207.101	1	Datatype	e format	U ₈ B ₈				
Field			Description					Sup.	Unit	Default			
PwrRe	eduction		Requested powe		n reducti	ion		М	%	cs			
			-0% no reduc										
			- 100% max. red										
Attribu			Bitset containing			,	11. 11.		l				
- Loci	<request< td=""><td></td><td>indicates if power</td><td></td><td>necessa</td><td>ary (</td><td>validity</td><td>M</td><td>bool</td><td>false</td></request<>		indicates if power		necessa	ary (validity	M	bool	false			
Tyro	•		of PwrReduction)					O 2)	bool	uncritical			
– Тур	⊵ nunication		type of overload					10,	bool	unchical			
	nunication ding Group												
Clas		<i>,</i> .	Туре			Dei	fault						
	ographical		Туро			DC	iddit						
	plication Sp		DistrSegmH (prin	narv)		1							
	assigned		Broadcast										
	Address:		IO Type(ID):	Configurat 144 (HFDI		Pr	operty ID):	52				
LTE	-Service (e	event):	InfoReport Sniffe										
	oReport `	\boxtimes	Timeout: 1)			Mir	1						
LTE	-Service (p	olling):	Read Wildcard / I	Poen Sniffer	on Rindir	na G	Proup.						
Re	ad – Respo	onse			JII BIIIUII	ng C	oroup.						
	after Pow		Defaul	t Value 🛚				;	Stored V	'alue 🗌			
Excep	otion Hand	lling:					S	ave at Po	werdow	n 🗌			
	al Feature												
			event and period										
			uest attribute cha										
			period during 9 min						ssion is	stopped			
			on appears (this pr										
			can be normally i										
			ue varies. At the n					critical' L	_ockSigr	infulvi are			
KNOW	nown. But in principle it is allowed to implement 'critical' LockSignHFDM												

2.3.4.15 Input ForceSignHFDM

FB:	HFDM	LTE Clie	ent Input Name:			datory 🗌				
Desc	ription:			-						tional Z
		nerated by	the preceding HF	-DM in prima	ry Distrib	ution	Seame	nt		
			e chapter 2.3.1.10			atioi	Cogine			
DPT:		DPT For		DPT ID	21.101	Īr	Datatype	format	B ₈	
Field	Ivaille	DF I_FOI		טר דוט	21.101		Jalalype		Unit	Default
	utoo		Description					Sup.	UTIIL	Delault
Attrib			indicates if force	d		:_		N 4	bool	foloo
- Ford	eRequest		indicates if forced					М	bool	false
Drot	ootion		necessary (validi indicates that over			.HD)		N.4	bool	false
	ection							M	bool	
	rsupply		indicates that ove			ماماما	: a 4la a	M	bool	false
- Ove	rrun		indicates that ren			iabie	in the	M	bool	false
D. 1	VNorm 2)		heat-exchanger			c			L I	folos
- DHV	VINOrm /		Load DHW to 'No		n case or	rove	rneat	0	bool	false
D. W.	۸/۱: - 2)		('Protection' or 'C						L I	folos
- DHV	VLegio ²⁾		Load DHW to 'Le			ase c	DΤ	0	bool	false
D	(2)		overheat ('Protec						1 1	6 - 1
- Roo	mHComf 2)		Load Room Heat			ın ca	ase of	0	bool	false
_			overheat ('Protec							
- Roo	mHMax 2)		Load Room Heat				,	0	bool	false
			temperature in ca	ase of overne	eat ('Prote	ection	n' or			
_			'Oversupply')							
	munication									
	ding Group):	1_							
Clas			Туре			Defa	ault			
	eographical									
	plication S	pecific <u>⊠</u>	DistrSegmH (prin			1				
	nassigned		Broadcast	Configura						
	Address:		IO Type(ID):	144 (HFD		Pro	perty ID	:	53	
	:-Service (e		InfoReport Sniffe	er on Binding			-	-		
	oReport	\square	Timeout: 1)		7	Min				
	:-Service (p		Read Wildcard /	Resp Sniffer	on Bindir	na Gi	roup	_		
	ead – Resp			·	on Bindii	19 0	Toup.			
Value	after Pow	erup:	Defaul	lt Value ⊠					Stored Va	lue 🗌
Exception Handling:								ve at Po	owerdown	
Special Features: 1) The signal is received on event and periodically (if no COV occurred) as lon										
1) The	signal is re	eceived or	n event and period	lically (if no C	OV occu	rred)	as long	as the	ForceReq	uest
			forcing condition i							
to fals	se and the s	signal will	be repeated by the	e HFDM with	the hear	tbea	t-period	during 9	minutes	(3
			transmission is sto							
	es unneces					-			•	
				te whether D	HW or Ro	oom	Heating	should	be activat	ed in
²⁾ HFDM with higher functionality may indicate whether DHW or Room Heat case of overheat. These flags are usually not considered in the receiving H										

2.3.4.16 Input StatusFTC

FB:	HFDM	LTE Clie	nt Input Name:		Mandatory ☐ Optional ⊠						
Descr	iption:	÷		-						-	
		ains the cu	rrent flow tempera	atui	re and oth	er status	inforn	nation	of a Flow	/ Tempera	iture
Contro	oller										
DPT:	Name	DPT_Stat			DPT ID	209.103	B Da	atatype	format	$V_{16}B_8$	T
Field			Description						Sup.	Unit	Default
	Water		current flow temp	era	ature of F7	<u>-C</u>			M	°C	CS
Attribu											
	pWaterVal	id	validity of TempV						M	bool	false
- Faul			some failure in th	e F	FTC				M	bool	false
- CtrlS	Status		Controller status						0	bool	on
			on: FTC is working	ng ((default if ı	not suppo	orted)				
			off: FTC is stoppe	ed;	no contro	l of flow t	empe	rature			
	nunicatio										
	ding Grou	p:	T					1			
Clas			Туре					Defau	<u>ult </u>		
	ographica										
	plication S										
	assigned	\square	Broadcast		Configur			1			
	Address:		IO Type(ID):		120 (FTC)		Prop	erty ID):	51	
	-Service (InfoReport Sniffe	er (on Binding			-			
	oReport	\boxtimes	Timeout:			31	Min				
	-Service (Read Wildcard /	Re	sn Sniffer	on Rindin	na Gra	nun			
	ad – Resp					On Binan	19 0.0				
Value	after Pow	/erup:	Defaul	t V	alue 🛚					Stored Va	lue 🗌
Excep	otion Hand	dling:						Sa	ave at Po	werdown	
Speci	al Feature	es:									

2.3.4.17 Input ChangeOverStatusWater

Standard Mode:

DF	P Name:	Cha	ngeOverSta	atusWa	ter	Abbr.:			Manda	tory	
FE	3 Name:	HFC	M						Can be	interna	
	escription										
se	e LTE-HEE	Mod	le								
	tapoint Typ										
	PT_Name:		PT_Heat/Co	ol							
	PT Format:	B ₁						DPT_ID:	01.100		
Fie	eld	De	escription					Supp.	Range	Unit	Default
									cooling / heating	bool	heating
Αc	cess Type										
•	Input										
	$N \rightarrow this$			$1 \rightarrow th$	is 🛛						
	Spontaneo	us			Cyclically:			Time	-out:	31	
	Request				Polling:			Perio	d:		
Co	ommunicati	on 1	Гуре								
•	Group Obj	ect	Datapoint						Mandator	/:	
	Default Gro	up A	Address:								
Dy	namics										
	Power dow	n:	Save:								
	Power up:		Value:		nitialisation:		Defau	ılt value:			
				Save	d value:						
							Read	from bus	•		
Ex	ception Ha	ndli	ng								
Sp	ecial Featu	res									

LTE-HEE mode:

FB:	HFDM	LTE Clie	nt Input Name:		latory □ tional ⊠				
Desci	iption:							•	
overvi		chapter 2	ndicates the water 2. The HFDM is c 0)						1
i.e. Te and T	empFlowWa empFlowW	aterDemA aterSetp	bsHFDM Attribute are not applicable		Temp Co	ontroller FTC		signals are	e inactive
DPT:	Name	DPT_Hea	t/Cool_Z	DPT ID	200.100	Datatype	format	B ₁ Z ₈	
Field			Description				Sup.	Unit	Default
Heat/0	Cool		change over statu	ıs (0 = coolin	g, 1 = he	eating)	M	bool	heating
Status			standard Status a					bitset	
	ridden		sensor value over	rridden true /	false		0	bool	false
	her flags		not supported				NA	bool	
Comn	nunication	:							
Bind	ding Group):							
Clas	-		Туре			Default			
	ographical								
Ар	plication Sp	oecific⊠	DistrSegmH (sec	ondary)		1 or 2 (see 6	example	s chapter:	2.1)
Un	assigned		Broadcast	Configurat					
	Address:		IO Type(ID):	342 (WCC		Property ID	:	51	
	-Service (e	event):	InfoReport Sniffe	r on Binding			-		
	oReport	\boxtimes	Timeout:		31	Min			
	- Service (p ad – Respo		Read Wildcard / F	Resp Sniffer	on Bindiı	ng Group: -	-		
Value	after Pow	erup:	Default	: Value 🛚			;	Stored Va	lue 🗌
Excep	otion Hand	ling:				Sa	ave at Po	owerdown	
Speci	al Feature	s:							

2.3.4.18 Parameter DistrSegmHPrimary

FB:	HFDM	Proper	ty Name (<u>Server</u>):	Mandatory 🛛 3 Optional						
Desc	ription:								<u> </u>	<u> </u>
LTE z	oning infor	mation:	link with HFDM in t	he	primary He	eat Distrib	oution :	Segment or	the HPM	
DPT:	Name	DPT_Uc	countValue8_Z		DPT ID	202.002	Dat	atype forma	$t U_8Z_8$	
Field			Description				Sup.	Range	Unit	Default
Coun	terValue		Heat Distribution S	Seg	gment numb	oer	M	131		or 31 ²⁾ or NA ³⁾
	s OfService ther flags		zone active /inactive not supported, fixed to '0'					true/false	bitset	false
Command - NormalWrite - SetOSV & ResetOSV - all other commands			set zone inactive / active not supported						enum	
Comi	nunication	1:							-	-
	Address: he server)		IO Type(ID): Start-Index:		144 (HFDI 1	,	N° of	erty ID: elements	101 1	
Pro	perty acce	ss:	Read only			Read/W	rite	\boxtimes		
	tection		Read level				Write	level		
Exce	ption Hand	lling:	Value after Power	up:	Stored \	∕alue ⊠	Act V	alue 🔲 🏻 D	efault Valu	ıe 🗌
_	ial Feature									
²⁾ HF ³⁾ HF no	DM is the "	first" HFI first" HFI	alone" HFDM DM and is NOT loca DM and is located to	ate oge	d together ether with tl	with the I he HPM i	HPM in	the same d same device	evice : the para	meter is
HFDN	/IDP's on t	he prima	rv Heat Distribution	S	egment are	not LTE	comm	unicating if	zone is	

'OutOfService'

2.3.4.19 Parameter DistrSegmHSecondary

FB:	HFDM	Property Name (<u>Server</u>): DistrSegmHSecondary									Mandatory ⊠ Optional □		
Desci	iption:	÷			-							<u> </u>	
LTE z	one: link w	ith heat o	Ю	nsumers, demand	d tr	ansforme	rs or HFD	M i	n th	e secondary	γН	eat Distri	ibution
Segm	ent												
DPT:	Name	DPT_Uc	0	untValue8_Z		DPT ID	202.002	2	Dat	atype forma	ıt	U_8Z_8	
Field				escription				Sı	лр.	Range	Į	Jnit	Default
Count	erValue		Η	eat Distribution S	eg	ment num	ber	N	M	131	-	-	1 1) or 2 2)
Status	3										b	oitset	
- OutOfService - all other flags				zone active /inactive not supported, fixed to '0'					O IA	true/false			false
Command				not supported, into to s							e	enum	
_	nalWrite							ľ	M				
	SV & Res		set zone inactive / active						C				
	her comm		not supported					Ν	IA_				
	nunicatior	າ:											
	Address: \			IO Type(ID):		144 (HFD	M)			rty ID:		102	
	he server)		_	Start-Index:		1				elements		1	
	perty acce	ss:	_	Read only [Read/W	_		<u> </u>			
	ection		Ţ	Read level						level		-	
Excep	otion Hand	dling:	V	alue after Poweru	ıp:	Stored	Value ⊠	A	ct Va	alue 🔲 D	efa	ult Value	
Speci	al Feature	s:											
1) HFI	OM is the "	first" HFC	λ	1 and is located to	ge	ether with	the HPM	in tl	he s	ame device			
²⁾ all c	other cases	3			•								
See e	xamples c	hapter 2.	1										
	1 DP's on t fService'	he secon	d	ary Heat Distributi	ion	Segment	are not L	TE.	cor	nmunicating	j if	zone is	

2.3.4.20 Parameter PeripheralLinkPump

FB:	HFDM	Proper	ty Name (<u>Server</u>):	PeripheralLinkPump						Mandatory 📙	
							Op	otional 🛚			
Desci	iption:			-							
LTE z	oning num	ber Perip	oheral link to system	ηp	ump in the	seconda	ry Hea	t Distributio	n Se	gment	
DPT:	Name	DPT_U	JcountValue16_Z DPT ID 203.012 Datatype format								
Field			Description	Sup. Range Ur						it	Default
CounterValue			peripheral link num	nber M full							1
Status									bits	set	
- Out	OfService		zone active /inactiv	ed to '0' NA							false
- all of	her flags		not supported, fixed	d t	o '0'		NA				
Comn	nand							en	um		
- Norr	nalWrite			M							
- SetC	SV & Res	etOSV	set zone inactive /	ac	tive		0				
- all of	ther comma	ands	not supported	N							
Comr	nunication) :	-			-		-			-
DP A	Address:		IO Type(ID):		144 (HFDN	1)	Prope	rty ID:	10	3	
(in t	he server)		Start-Index:		1		N° of	elements	1		
Pro	perty acce	ss:	Read only			Read/Wi	rite	\boxtimes			
Prot	ection		Read level				Write	level			
Excep	otion Hand	lling:	Value after Poweru	ıp:	Stored V	alue 🛚	Act Va	alue 🔲 🏻 🖸	Defaul	lt Value	e 🗌
Speci	al Feature	s:									
HFDN	1 is not LTE	commu	unicating with the pu	m	p if zone is '	OutOfSe	ervice'				

2.3.4.21 Parameter PeripheralLinkFTC

FB:	HFDM	Proper	ty Name (<u>Server</u>):	Peripheral	LinkFTC			Man	datory 🗌	
			, (,						ptional 🖾	
Desci	ription:	-		-				-		
		FTC us	ed for control of the	flow tempe	rature in th	ne seco	ondary Heat	Distribution	n	
Segm	ent									
DPT:	DPT: Name DPT_UcountValue16_Z DPT ID 203.012 Datatype format U ₁₆ Z ₈									
Field			Description		Sup.	Range	Unit	Default		
Count	terValue		peripheral link num	nber						
Status	3							bitset		
	OfService		zone active /inactive			0	true/false		false	
- all of	ther flags		not supported, fixe	d to '0'		NA				
Comn								enum		
_	nalWrite					M				
	SV & Res		set zone inactive /	active		0				
- all of	ther comma	ands	not supported			NA				
Comr	nunicatior):								
	Address:		IO Type(ID):	144 (HF	OM)		erty ID:	104		
(in t	he server)		Start-Index:	1			elements	1		
Pro	perty acce	ss:	Read only		Read/W	rite	\boxtimes			
Prot	ection	Read level			Write	level				
Excep	Exception Handling: Value after Powerup: Stored Value Act Value Default Value									
				·						
Speci	ial Feature	s:								
HFDN	I is not LTE	commi	inicating with the F	TC if zone is	'OutOfSe	rvice'				

2.3.4.22 Parameter TempFlowWaterDiffFTC

FB:	HFDM	Proper	ty Name (<u>Server</u>):	Te	empFlow\		datory 🗌 otional 🔯			
Desci	ription:								<u> </u>	
	_	d to resi	ulting flow temperate	ure	e demand	in the prin	narv H	eat Distribution	n Seame	nt so that
	TC has som						,		5 5 5	
DPT:	Name	DPT_H\	ACTempRel_Z DPT ID 205.101 Datatype format V							
Field								Unit	Default	
Temp			temperature delta v	/al	ue		М	cs	°K	CS
Status	3								bitset	
- all fla	ags		not supported, fixed	d to	o '0'		NA			
Comn	nand								enum	
- Norr	nalWrite									
- all of	ther comma	ands	not supported	l						
Comr	nunication) :				-		-	-	-
DP /	Address:		IO Type(ID):		144 (HFD	M)	Prope	rty ID:	111	
(in t	he server)		Start-Index:		1		N° of	elements	1	
Pro	perty acce	ss:	Read only			Read/W	rite	\boxtimes		
Prot	ection		Read level				Write	level		
Excep	otion Hand	lling:	Value after Poweru	ıp:	Stored	Value 🛚	Act V	alue 🔲 De	fault Value	e 🗌
Speci	al Feature	s:								

2.3.4.23 Parameter TempFlowWaterMax

FB:	HFDM	Proper	ty	Name (<u>Server</u>):	T	empFlow\	NaterMa		Mandatory ☐ Optional 🖂			
Desci	ription:	<u>'</u>									<u>-</u>	
Flow 1	temperatur	e limitati	on	in the secondary	Н	eat Distrib	ution Seg	ment (in case of Fo	orcii	ng Signa	als)
DPT:	Name	DPT_H\	/ A	CTempAbs_Z DPT ID 205.100 Datatype format \								
Field				escription				Sup.	Range	U	Init	Default
Temp				emperature value				М	cs	٥	С	CS
Status											itset	
 OutOfService 				max limitation active /inactive					true/false			false
- all o	ther flags		not supported, fixed to '0'					NA				
Command										eı	num	
	nalWrite							M				
	SV & Res			et limitation param	net							
	ther comma		n	ot supported	NA					Ш		
	nunication) :										
	Address:			IO Type(ID):		144 (HFD	M)		erty ID:	1	12	
(in t	he server)			Start-Index:		1		N° of	<u>elements</u>	1		
	perty acce	ss:		Read only			Read/W	rite	\square			
Prot	ection			Read level				Write	level			
Exce	otion Hand	lling:	٧	alue after Poweru	ıp:	Stored	Value 🛚	Act V	alue 🔲 🏻 D	efa	ult Value	e 🗌
Speci	ial Feature	s:										
Limita	tion function	n is acti	va	ted or deactivated	d b	v the 'Out	OfService	' Statu	S		·	•

${\bf 2.3.4.24\ Diagnostic\ data\ TempFlowWaterSetpAct}$

FB:	HFDM	Proper	ty Name (<u>Server</u>):	T	empFlow W		Mandatory ☐ Optional ⊠			
Desci	ription:									ptional 🖂
		d flow ter	nperature setpoint in	า t	he seconda	rv Heat	Distrib	ution Seame	ent	
DPT:			/ACTempAbs Z			205.100		atype forma		
Field	1100000		Description					Range	Unit	Default
Temp			temperature value	M cs °C						
Status									bitset	
- Out	OfService		no resulting heat de	em	nand => no		0	true/false		true
			setpoint							
- Ove	ridden		external override of				0	true/false		false
- all of	her flags		not supported, fixed	d t	:o '0'		NA			
Comn	nand		standard Command	d f	ield				enum	
- Ove	ride & Rel	ease	override and releas	ind release setpoint						
- all of	her comm	ands	not supported	N						
Comr	nunication	า:				•		-	'	-
DP /	Address:		IO Type(ID):		144 (HFDN	/ 1)	Prope	rty ID:	110	
(in t	he server))	Start-Index:		1		N° of	elements	1	
Pro	perty acce	ss:	Read only			Read/W	rite	⊠ ¹⁾		
Prot	ection		Read level				Write	level		
Excep	otion Hand	dling:	Value after Poweru	ıp:	Stored V	/alue 🗌	Act Va	alue 🔲 D	efault Valu	ie 🛛
									·	
Speci	al Feature	s:								
1) opti	onal Write	access f	or Override / Releas	e i	function on	ly				

2.4 Functional Block: Flow Temperature Controller (FTC)

2.4.1 Functional Specification

This functional block controls the water flow temperature with the means of a valve, mixing valve, heat exchanger etc. The control algorithm is manufacturer specific (e.g. PI, PID, ...) and not described in this specification.

The FTC gets the flow temperature setpoint (signal TempFlowWaterSetp) from one directly related functional block (for example HFDM).

In LTE mode the FTC is linked using an Unassigned Peripheral tag.

The FTC provides a status information StatusFTC which contains the current flow temperature and further attributes.

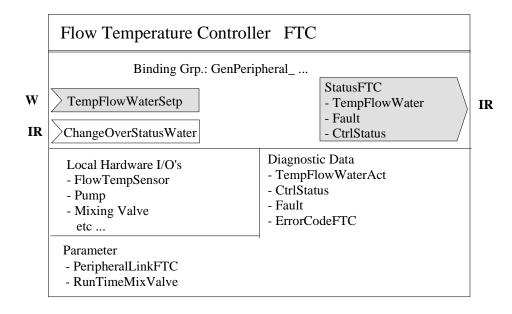
FTC in a changeover system: see also chapter 2.2

The optional input signal ChangeOverStatusWater reports the water change over status in a change over system. It indicates whether the heating sequence or cooling sequence in the FTC should be activated.

2.4.2 Constraints

The TempFlowWaterSetp signal shall be provided by <u>one</u> FB (1:1 link of FTC). Otherwise the actual temperature setpoint in the FTC will toggle.

2.4.2.1 Functional block diagram



2.4.3 Datapoint description

2.4.3.1 Overview

Data Point	Description	Data Point Type	DPT N°
Outputs			
StatusFTC	FTC status information from	DPT_StatusWTC.	209.103
- TempFlowWater	Current water flow temperature (S-interface)	DPT_Value_Temp	9.001
- Fault	FTC fault (S-interface)	DPT_Bool	1.002
- CtrlStatus	Controller status (S-interface)	DPT_Switch	1.001
Inputs			
TempFlowWaterSetp	Flow temperature setpoint value of the FTC / LTE and S-interface	DPT_TempHVACAbs_Z	205.100 9.001
ChangeOverStatusWater	Status Information of changeover sensor / LTE and S-interface	DPT_Heat/Cool_Z DPT_Heat/Cool	200.100 01.100
Parameters			
PeripheralLinkFTC	LTE zoning number Peripheral link of the FTC	DPT_UcountValue16_Z	203.012
RunTimeMixValve	run time of mixing valve [s]	DPT_TimePeriodSec	07.005
Diagnostic Data			
TempFlowWaterAct	Current flow temperature	DPT_TempHVACAbs_Z	205.100
CtrlStatus	Controller status: on: FTC is working / off: FTC is stopped	DPT_Switch	1.001
Fault	FTC failure	DPT_Bool	1.002
ErrorCodeFTC	company specific numeric error code	DPT_Value_2_Ucount	7.001

^{*)} Implementation of Properties using standard DPT see chapter 1.3.2

			STANDARD MODE	Ехте	
		Basic FB	S-Mode	Standard Mode Interface	LTE-Mode
Outputs	StatusFTC	NA	NA	NA	M
	- TempFlowWater	GO_b	GO	GO	NA
	- Fault	GO_b	GO	GO	NA
	- CtrlStatus	(GO _b)		(GO)	NA
Inputs	TempFlowWaterSetp	GO_b	GO	GO	M
	ChangeOverStatusWater	(GO _b)		(GO)	О

Table 4: FTC Runtime Interworking - dependence on Configuration Modes

		Support
Parameter	PeripheralLinkPump	M

Table 5: FTC LTE specific Properties

		Support
Parameter	RunTimeMixValve	О
		О
Diagnostic Data	TempFlowWaterAct	М
	CtrlStatus	О
	Fault	M
	ErrorCodeFTC	О

Table 6: FTC Standard Properties of Interface Objects (or memory mapped DP)

2.4.3.2 Output StatusFTC

Standard mode: NA => mapped to the datapoints TempFlowWater, Fault, CtrlStatus

LTE-HEE mode:

FB: FTC	LTE Serve	er Output Name:	StatusFTC						datory 🛚
Description:									
This signal cont	tains the cu	irrent flow tempera	ture and statu	us attrib	outes o	f the F	TC which	may be	used in
	tional block	k for optimized cor	itrol loop mec	hanism	s or as	a diag	gnostic val	lue for	
visualization.									
DPT : Name	DPT_Stat		DPT ID	209.10				V ₁₆ B ₈	
Field		Description		Sup.	Range		Unit	COV	Default
TempWater		current flow temp		M	full ra	nge	°C	0.5	CS
Attributes		Bitset containing							
-TempWaterVa	ılid	validity of TempW		M	true/fa		bool	Y	false
Fault		some failure in th	e failure in the FTC M true/false bool						false
– CtrlStatus		Controller status		0	true/fa	alse	bool	Υ	on
		on: FTC is working							
		(default if not							
		off: FTC is stopped; no control							
		of flow tempe	rature						
Communicatio	n:				_				
Binding Grou	ıp:								
Class		Туре				Defau	ult		
Geographica	al 🗌								
Application S	Specific								
Unassigned	\boxtimes	Broadcast	Configura	ıble 🛚		1			
DP Address:		IO Type(ID):	120 (FTC)		Prop	erty ID		51	
LTE-Services	(event):	COV 🛛	MinRepTime		10 s	sec	Heartl	beat:	15 min
InfoReport	\boxtimes	Output per defaul	t communicat	ing	Bind	ina Gr	oup Wildc	ard allow	wod \square
(LTE Read-F								aru alluv	veu 🗀
polling of the		Tx Prio:	High 🗌		No	rmal 🏻	\boxtimes	Low	
shall always	be	Transm after Pow	verun: Stored	Value		ct Val	ue 🕅 D	efault Va	alue 🗆
supported)		Transmatter r ov	rerup: Otoreu	value	<u></u>	tot vai		Ciddit VC	
Property-Ser		Read only	abla	Read/V	Vrite				
(individual ac							· · · · · · · · · · · · · · · · · · ·		
Exception Han	dling:						Save a	t Powero	down
Special Featur	es:								

2.4.3.3 Output TempFlowWater

Standard mode

DF	Name:	Tem	npFlow	Water		Abbr.:						Manda	tory		\boxtimes
FΒ	Name:	FTC	;									Can be	intern	al	
De	scription														
Cu	rrent flow to	empe	erature	!											
Da	tapoint Ty	ре													
DF	PT_Name:	DF	PT_Val	ue_Te	mp										
DPT Format: F ₁₆ DPT_ID: 9.001															
Field Description										Supp.		ange	Unit	Defau	ılt
									ful	I range	°C	CS	;		
Ac	cess Type														
♦	Output														
	$this \to M$		1)	tl	his \rightarrow 1										
Spontaneous COV: Δ-Value: 0.5 K MinRepTime: 10s															
				Cyclic	oxtime	Period:	15	Min							
	Request														
Co	mmunicati	ion 1	Гуре												
♦	Group Ob	ject l	Datapo	oint							Ma	andatory	<i>ı</i> : 🛛		
	Default Gro	oup /	Addres	s:	-										
Dy	namics														
	Power dow	'n:	Save:												
	Power up:		Value	:	No initialisa			_		ılt value:					
					Saved value			_		ıl value (n					
	Transmit on bus (only for output): Read from bus (only for input):														
Ex	ception Ha	ndli	ng												
_	ecial Featu														
') t	his datapoii	nt is	also in	teresti	ng for visual	isation an	d not (only	used	d in the as	ssoc	ciated FF	В		

LTE-HEE mode: NA

2.4.3.4 Output Fault

Standard mode

DP Name:	Fa	ault			Abbr.:				Manda	tory	\boxtimes
FB Name:	FT	С							Can be	intern	al 🗌
Description											
reports a fail	ure (of the F7	ГС								
Datapoint T	уре										
DPT_Name:		OPT_Bo	ol								
DPT Format:	PT Format: B ₁ DPT_ID: 1.002										
Field	Field Description								Range	Unit	Default
											false
Access Type	е										
◆ Output											
this \rightarrow M		□ 1)	th	nis → 1							
Spontane	ous		COV:		Δ-Value:		Minl	RepTime:		10s	
	Cyclic Period: 15 Min										
Request											
Communica	tion	Туре									
♦ Group O	bjec	t Datapo	oint						Mandatory	/:	
Default G	roup	Addres	ss:							-	
Dynamics											
Power do	wn:	Save:									
Power up	:	Value):	No initialisa	ition:		Defau	ılt value:			
				Saved valu	e:		Actua	l value (n	ot for input)):	
		Trans	mit on	bus (only fo	r output):		Read	from bus	(only for in	put):	
Exception H	and	lling									
Special Feat	ure	s									
1) this datapo	int i	s also in	terestir	ng for visual	isation and	d not on	ly used	l in the as	sociated FE	3	

LTE-HEE mode: NA

2.4.3.5 Output CtrlStatus

Standard mode

DF	Name:	CtrlS	Status				Abbr.:				Manda	tory	
FB	Name:	FTC	;								Can be	interna	al 🗌
De	scription												
	ntroller stat												
	: FTC is wo												
	: FTC is sto		d; no c	ontrol o	of flow te	emper	rature						
	tapoint Typ												
	PT_Name:	_	PT_Sw	itch									
	T Format:	B ₁								DPT_ID:		1	
Fie	eld	De	escripti	on						Supp.	Range	Unit	Default
													on
Ac	cess Type												
♦	Output					_							
	this \rightarrow M		1 1)		$nis \rightarrow 1$	L							
	Spontaneo	us		COV:			Δ-Value			RepTime:		10s	
				Cyclic	; [Period:	15 N	1in				
	Request												
Co	mmunicati	on T	Гуре										
•	Group Ob										Mandatory	/: 🖂	
	Default Gro	oup A	Addres	s: -	-								
Dy	namics												
	Power dow	n:	Save:										
	Power up:		Value	:	No initia					ult value:			
					Saved						ot for input)		
				mit on	bus (on	ly for	output):		Read	from bus	(only for in	put):	
Ex	ception Ha	ndli	ng										
	ecial Featu												
1) t	his datapoir	nt is a	also in	terestii	ng for vi	sualis	ation an	d not or	nly used	d in the as	sociated Fl	3	

LTE-HEE mode: NA

2.4.3.6 Input TempFlowWaterSetp

Standard mode:

DF	Name:	Tem	FlowWat	erSetp		Abbr.:					Mano	datory	y		\boxtimes
FB	Name:	FTC									Can I	be in	terna	al	\boxtimes
	scription														
se	e LTE-HEE	mode	9												
	tapoint Typ														
	PT_Name:		T_Value_	Temp											
DF	PT Format:	F ₁₆							_	T_ID:		_			
Fie	eld	Des	scription						Su	pp.	Range		nit	Defa	ult
											full range	e °C)	С	s
Ac	cess Type														
•	Input														
	$N \rightarrow this$			$1 \rightarrow th$	is	\boxtimes									
	Spontaneo	us			Cyclic					Time	-out:	31	l mir)	
	Request				Polling	g:				Perio	d:				
Co	mmunicati	on T	ype												
♦	Group Ob	ject D	atapoint								Mandato	ory:			
	Default Gro	oup A	ddress:												
Dy	namics														
	Power dow	n:	Save:												
	Power up:		Value:	No in	itialisa	tion:		Defau							
					d value						ot for inpu				
			Transmit	on bus (only fo	r output)	: [Read	fror	n bus	(only for	input):		
	ception Ha		ıg												
	e LTE Mode														
Sp	ecial Featu	res													

LTE-HEE mode:

FB:	FTC	LTE Serve	er Input Name:	Ter	mpFlowWa	aterSetp)				latory tional	\boxtimes
Desc	ription:											
This i	nputs con	tains the re	quested flow ten	nper	ature setpo	oint. The	FTC w	vill con	trol the t	low tempe	erature	
accor	dingly usi	ng a manuf	acturer specific of	contr	ol-loop me	chanism	١.					
DPT:	Name	DPT_Ten	npHVACAbs_Z		DPT ID	205.100) Da	ıtatype	format	$V_{16}Z_{8}$		
Field			Description						Sup.	Unit	Defa	ult
Temp	FlowWate	erSetp	temperature se						M	°C	cs	
Comr			standard Comm							enum		
- Writ	е		normal Write (ru						M			
	rride & Re		override and re	leas	e setpoint	(by a too	l)		0			
- othe	er Comma	nds	not applicable						NA			
Comi	municatio	n:	-						-	-	_	
Bin	ding Gro	up:										
Clas	SS		Туре				Defau	lt				
	eographic											
Ap	plication	Specific										
Ur	nassigned	\boxtimes	Broadcast		Configur	able 🛚		1				
	Address:		IO Type(ID):		120 (FTC)		Prope	erty ID):	52		
	-Service		Timeout:			31	Min					
	rite	🗵										
	perty-Ser		Read only	П		Read/W	/rite	\boxtimes				
	lividual a		,							0, 1),	. —	
		werup: 1)	Defa	ult V	alue 🛚					Stored Va	lue 📙	
	ption Har									owerdown		
			haviour of the F	ΓC if	no valid s	etpoint is	s availa	able in	case of	power-up	or	
	eiver-time											
_	ose the va	-										
	en the va											
		position un	changed									
	se default											
	ial Featur											
This i	nput can I	oe internal (1:1 link with ass	ocia	ted FB)							

2.4.3.7 Input ChangeOverStatusWater

Standard Mode:

DP	Name:	Cha	ngeOverSta	<u>atusWa</u>	iter	Abbr.:			Manda	tory	
FΒ	Name:	FTC	•						Can be	internal	
Des	scription										
	LTE-HEE		le								
	apoint Typ										
	T_Name:	DF	PT_Heat/Co	ol							
	T Format:	B ₁						DPT_ID:			T
Fie	ld	De	escription					Supp.	Range	Unit	Default
									cooling / heating	bool	heating
Acc	cess Type										
•	Input										
	$N \rightarrow this$			$1 \rightarrow th$	nis 🛛						
,	Spontaneo	us	\square		Cyclically:			Time	-out:	31	
	Request				Polling:			Perio	d:		
Co	mmunicati	on 1	Гуре								
*	Group Obj								Mandatory	/: X	
	Default Gro	oup A	Address:								
Dyı	namics										
	Power dow	n:	Save:								
	Power up:		Value:		nitialisation:		Defau	ılt value:			
				Save	ed value:						
							Read	from bus			
Exc	ception Ha	ndli	ng								
Spe	ecial Featu	res									

LTE-HEE mode:

FB:	FTC	LTE Clie	nt Input Name:	ChangeOv	erStatus	Water			datory ∐ otional ⊠
Desci	iption:	-							
This o	ptional inp	ut signal ir	ndicates the water	change ove	r status ii	n a change	over syste	em. For a	n
overvi	ew refer to	chapter 2	.2. Depending on	this input the	FTC wil	I activate t	he heating	sequence	e or
coolin	g sequence	Э.							
DPT:	Name	DPT_Hea	t/Cool_Z	DPT ID	200.100	Dataty	pe format	$B_1 Z_8$	
Field			Description				Sup.	Unit	Default
Heat/0	Cool		change over statu	ıs (0 = coolir	ng, 1 = he	eating)	M	bool	heating
Status	5		standard Status a	ttributes				bitset	
- Ove	ridden		sensor value over	ridden true <i>i</i>	false		0	bool	false
- all ot	her flags		not supported				NA	bool	
Comn	nunication	:					_	_	
Bind	ding Group):							
Clas	S		Type			Default			
	ographical								
Ар	plication Sp	oecific							
Un	assigned	\boxtimes	Broadcast	Configura	ble 🛛	1			
DP /	Address:		IO Type(ID):	342 (WC0	DS)	Property	ID:	51	
LTE	-Service (e	event):	InfoReport Sniffe	r on Binding	Group:				
Inf	oReport	\boxtimes	Timeout:		31	Min			
	- Service (p ad – Respo		Read Wildcard / F	Resp Sniffer	on Bindiı	ng Group:			
Value	after Pow	erup:	Default	∶Value ⊠			(Stored Va	lue 🗌
Excep	tion Hand	ling:					Save at Po	werdown	
		_							·
Speci	al Feature	s:							

${\bf 2.4.3.8} \quad {\bf Parameter\ Peripheral LinkFTC}$

FB:	FTC	Property	Name (<u>Server</u>):	PeripheralL	inkFTC				datory 🗌	
Descr	iption:									
LTE z	oning nur	nber Peri	oheral link FTC <->	associated F	В					
DPT:	Name	DPT_U	countValue16_Z	DPT ID	203.012	Dat	atype format	U ₁₆ Z ₈		
Field			Description			Sup.	Range	Unit	Default	
Count	erValue		peripheral link num	nber		M	full		1	
Status	3							bitset		
	OfService		zone active /inactiv	-		0	true/false		false	
- all ot	her flags		not supported, fixe	d to '0'		NA				
Comm	nand							enum		
	nalWrite					M				
1	SV & Re		set zone inactive /	active		0				
- all ot	her comn	nands	not supported			NA				
Comn	nunicatio	n:	-		<u>.</u>		-	•	-	
DP A	Address:		IO Type(ID):	120 (FTC)		Prope	rty ID:	101		
(in tl	he serve	r)	Start-Index:	1		N° of	elements	1		
Prop	perty acc	ess:	Read only		Read/W	rite	\boxtimes			
Prot	ection		Read level			Write	level			
Excep	otion Har	dling:	Value after Poweru	ıp: Stored '	√alue ⊠	Act V	alue 🔲 De	fault Valu	е 🗌	
			·				·			
Speci	al Featur	es:								
FTC is	C is not LTE communicating if zone is 'OutOfService'									

2.4.3.9 Parameter RunTimeMixValve

FB:	FTC	Property	Name (Server):	R	unTimeM	lixValve			Ma	ındatory 🔲 📗
			,,						(Optional 🖂
Doco	ription:			_					-	-
Run ti	ime of mix	ring valve								
DPT:	Name	DPT_Tin	nePeriodSec		DPT ID	7.005	Dat	atype format	U ₁₆	
Field			Description				Sup.	Range	Unit	Default
								065535 s	s	cs
Comr	nunicatio	n:					-	-	-	-
DP A	Address:		IO Type(ID):		120 (FTC	3)	Prope	rty ID:	110	
(in t	he serve	r)	Start-Index:		1		N° of	elements	1	
Pro	perty acc	ess:	Read only			Read/W	/rite	\boxtimes		
Prof	tection		Read level				Write	level		
Exce	otion Han	dling:	Value after Powerd	up:	Stored	Value 🛚	Act Va	alue 🗌 🛮 De	fault Va	lue 🗌
									_	_
Speci	ial Featur	es:								

2.4.3.10 Diagnostic data TempFlowWaterAct

FB:	FTC	Property	Name (<u>Server</u>):	Te	empFlow W	VaterAct				datory 🛚
Desci	iption:								<u> </u>	otional
	emperatu	ıre								
	Name		/ACTaman Aba. 7		DPT ID	205.100	Dat	ati in a famoat	1/ 7	
DPT:	iname	IDPI_H	/ACTempAbs_Z		טו ואט	205.100		atype format		1
Field			Description					Range	Unit	Default
Temp			temperature value				M	CS	° C	cs
Status	3								bitset	
- Faul	t		temperature corrup	te	d, sensor fa	ailure	M	true/false		false
- InAla	arm		critical limit is reach				0	true/false		false
	nUnAck		alarm acknowledge				Ō	ack/unack		unack
	her flags		not supported, fixed				NA			
Comn			standard Comman						enum	
- Alarr			alarm acknowledge		icia		0		CHam	
	her comn	nondo		•			NA			
			not supported				INA		<u> </u>	<u> </u>
	nunicatio									
DP /	Address:		IO Type(ID):		120 (FTC)			rty ID:	111	
(in t	he serve	r)	Start-Index:		1		N° of	elements	1	
Prop	perty acc	ess:	Read only			Read/Wi	rite	\boxtimes 1)		
Prot	ection		Read level				Write	level		
Excep	otion Har	ndling:	Value after Poweru	ıp:	Stored \	/alue 🔲	Act Va	alue 🛛 De	fault Valu	e 🗌
Speci	al Featur	es:								
1) optio	onal Write	access f	or Alarm acknowled	qе	ment only					

2.4.3.11 Diagnostic data CtrlStatus

FB:	FTC	Property	Name (<u>Server</u>):	С	trlStatus						ndatory 🗌 Optional 🖂
Desc	ription:	-		-						-	
Contr	oller statu	IS									
on: F	TC is worl	king (defau	ult if not supported	l)							
off: F	TC is stop	ped; no co	ontrol of flow temp	erat	ture						
DPT:	Name	DPT_Sw	/itch		DPT ID	1.001		Dat	atype format	B ₁	
Field			Description				Sι	ıp.	Range	Unit	Default
									on/off	bool	on
Com	municatio	on:								÷	÷
DP	Address:		IO Type(ID):		120 (FTC)		Pr	ope	rty ID:	112	
(in t	the serve	r)	Start-Index:		1		N°	of (elements	1	
Pro	perty acc	ess:	Read only	\boxtimes		Read/W	rite				
Pro	tection		Read level				W	rite	level		
Exce	ption Har	ndling:	Value after Powe	rup:	Stored	Value 🗌	Αc	t Va	alue 🗵 🛮 De	efault Val	lue 🗌
		-									
Spec	ial Featu	es:									

2.4.3.12 Diagnostic data Fault

FB:	FTC	Property	Name (<u>Server</u>):	Fa	ult						ndatory 🛚
											Optional 🗌
Desc	ription:										
FTC f	ailure										
DPT:	Name	DPT_Boo	ol		DPT ID	1.002	Da	atatype	e format	B ₁	
Field			Description				Sup.	Ran	ge	Unit	Default
								true	/false	bool	false
Comr	nunicatio	n:									
DP .	Address:		IO Type(ID):	1	120 (FTC)		Prop	erty ID):	113	
(in t	he serve	r)	Start-Index:	1	1		N° o	f elem	ents	1	
Pro	perty acc	ess:	Read only	\boxtimes		Read/W	rite				
Prof	tection		Read level	-	· -		Write	elevel			
Exce	ption Har	ndling:	Value after Powerd	лр:	Stored \	√alue 🔲	Act \	/alue	⊠ De	fault Val	ue 🗌
	•							•			
Speci	ial Featur	es:			_	-					_
			·								

2.4.3.13 Diagnostic data ErrorCodeFTC

FB:	FTC	Property	Name (<u>Server</u>):	Er	rorCodeF	TC						datory 🗌 otional 🖂
Desci	ription:	-		-							<u> </u>	
Comp	any spe	cific numer	ic 16 bit error code									
DPT:	Name	DPT_Va	alue_2_Ucount		DPT ID	7.001		Data	atype form	at	U ₁₆	
Field			Description				Su	p.	Range		Unit	Default
									full range			CS
Comr	nunicati	on:	-									
DP A	Address	:	IO Type(ID):	•	120 (FTC)		Pro	ре	rty ID:		114	
(in t	he serve	er)	Start-Index:	•	1		N°	of e	elements		1	
Pro	perty ac	cess:	Read only	\boxtimes		Read/W	rite					
Prot	tection		Read level	-	-		Wri	ite I	level			
Exce	ption Ha	ndling:	Value after Poweru	ıp:	Stored \	√alue 🗌	Act	t Va	alue 🛛 🔝	Def	ault Value	e 🗌
Speci	ial Featu	res:			_				_			