Application Description

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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.

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	[BKY] HFDM: inclusion of new attribute DHWLegioReq in DPT_TempFlowWaterDemAbs (210.100) Amended section 'Routing of HPM signals'
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"
[08] 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"

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Contents

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	EXTENDED MODE	
		Basic FB	**S-Mode**	**Standard Mode Interface**	**LTE-Mode**
Inputs	Inp1	**NA**	NA	NA	M
	Inp2	**NA**	NA	NA	O
	Inp3	**(GO_b)**		(GO)	O
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 today 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 today 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$^{HVAC\text{-}LTE}$**
  - ⇨ 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$^{HVAC\text{-}LTE}$ + 10000d
    (e.g. BUC$^{HVAC\text{-}LTE}$ = 128 => BUC^{standardDPT} = 10128)
  - ⇨ It is allowed to implement in a device both Interface Object Types IO Type$^{HVAC\text{-}LTE}$ 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			
	Property based		**Group Object**	**Memory mapped**
	HVAC-LTE style	**Standard DPT**		
IO Type	IO Type$^{HVAC\text{-}LTE}$ e.g. BUC=128	IO Type$^{HVAC\text{-}LTE}$ + 10000 e.g. BUC=10128		
Property ID	Property ID x	=> same Property ID x		
DPT	if standard DPT	=> same standard DPT	=> same standard DPT	company specific
	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$^{HVAC\text{-}LTE}$.

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]

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
WHPC	Water Heat Pump Control

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

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
WSS	Wind Speed Sensor

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)
W	LTE Write Input / Output

2 Functional Blocks: Heat distribution and flow demand management

2.1 Aims and Objectives

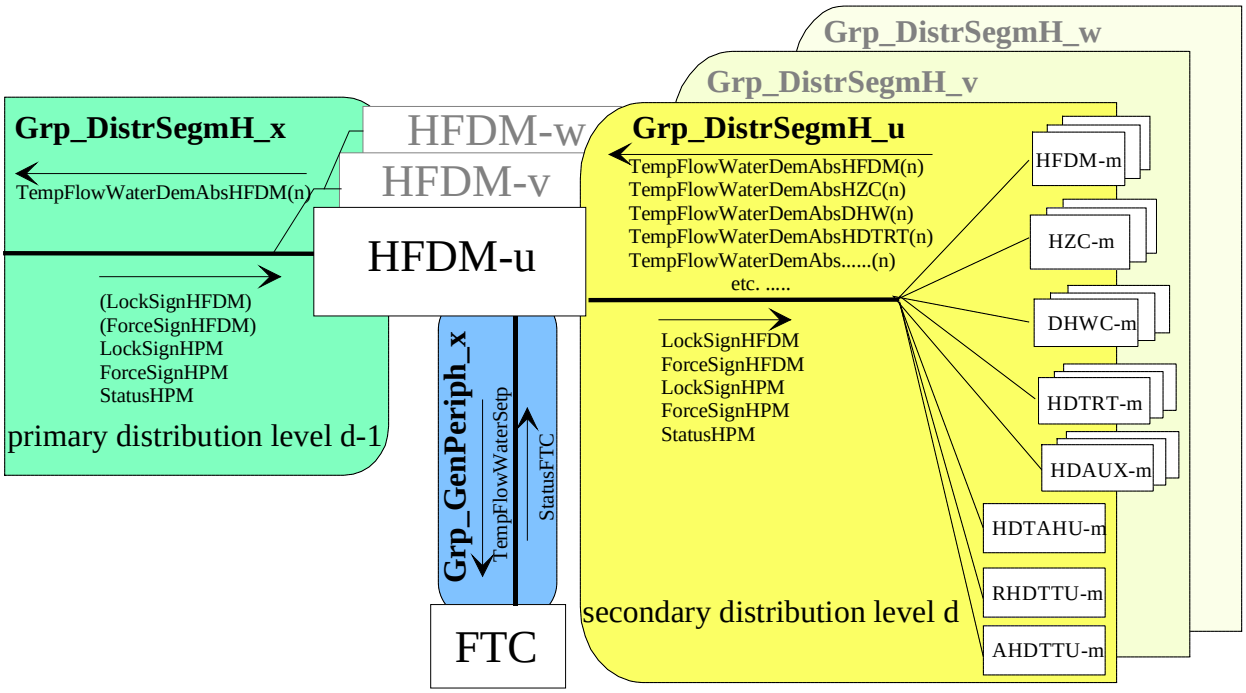


Figure 1 Heat Distribution levels (simplified)

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).

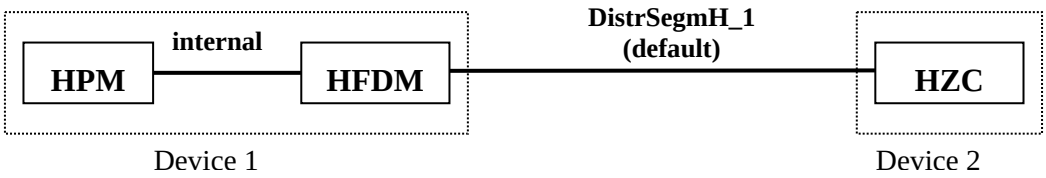
The Functional Blocks HFDM, HZC, HDTRT, DHWC, HDAUX have a N:1 relation with the HFDM. I.e. multiple instances of these Functional Block exist in a Distribution Segment and therefore multiple heat demand signals are received in the HFDM.

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.

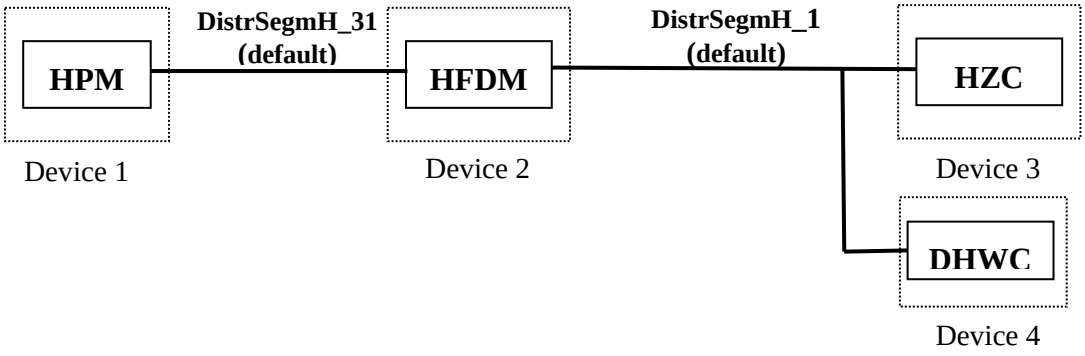
The hot water flow temperature in the secondary Heat Distribution Segment is usually pre-controlled by an FTC according to the resulting heat demand of the consumers in the Heat Distribution Segment. The Flow Temperature Controller and the Heating Flow Demand Manager have a 1:1 relationship and are often 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.

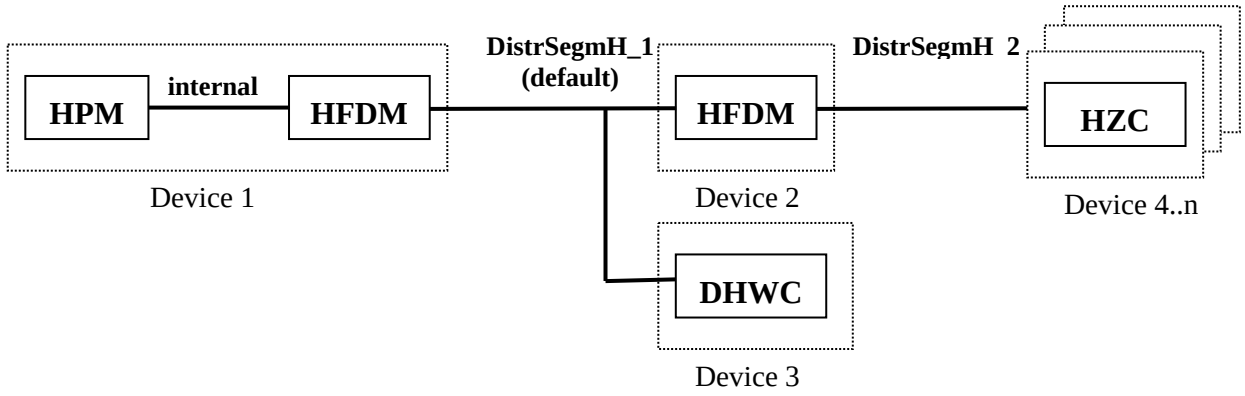
Example 1: simple system (e.g. single family home) “plug & play” LTE zoning
- system has only one heat distribution level
- HPM and HFDM are located in the same device
- a Heating Zone Controller HZC is directly connected to the heat production system.



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 first HFDM 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).

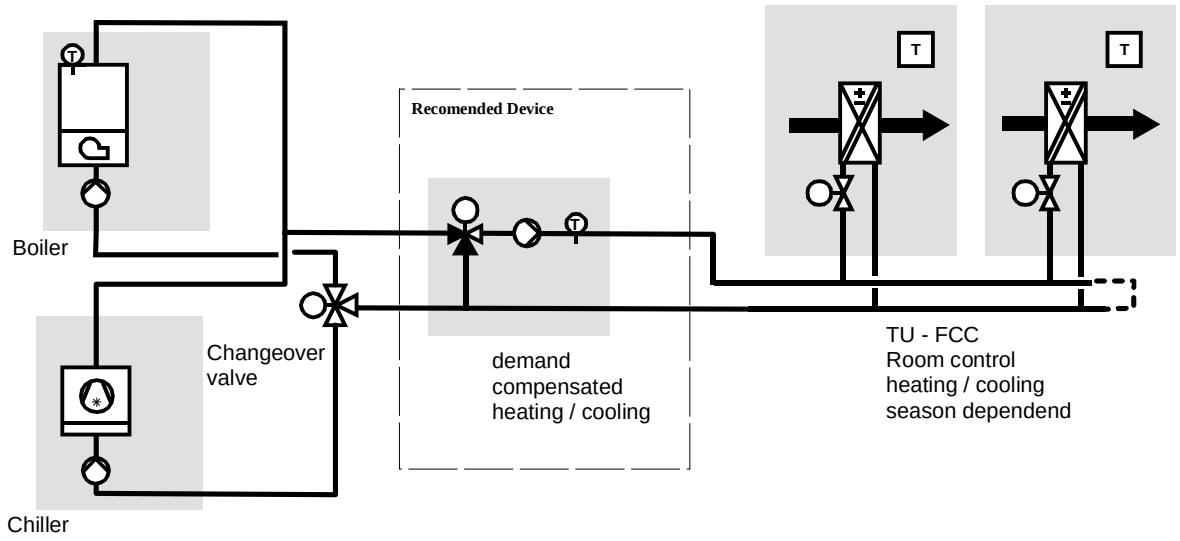
The HFDM also handles load management functions between the consumers in the secondary Heat Distribution Segment. The flow temperature demand signals from the consumers may contain some load priority information which is collected in the HFDM. If load priority is requested by some consumers, the HFDM 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...

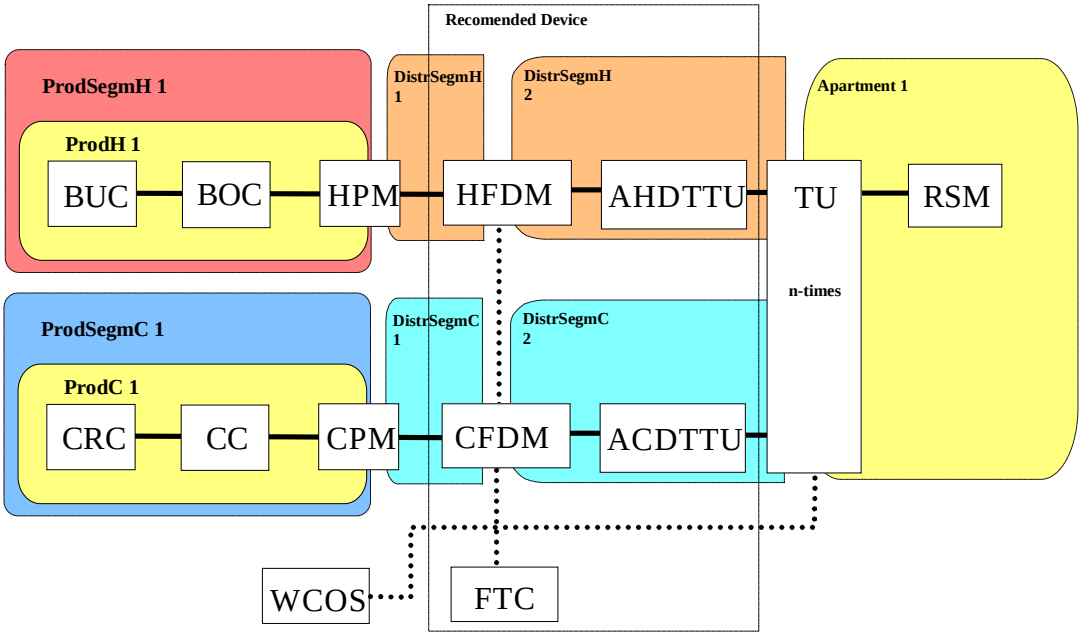
The HFDM has also "router" functionality for forcing, locking and status signals from HPM: these signals from HPM are received from the primary heat Distribution Segment and transparently routed by the HFDM to the secondary Heat Distribution Segment.

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 ≥ 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 $N \geq 4$
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 2nd 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
B	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 lowest **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 lowest **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 highest **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 highest **TempFlowDem** value
=> will be removed by a signal having Feature **B** with a lower **TempFlowDem** value
(max. temperature limitation !)

e) An existing entry in the list with Feature **C** and the lowest **TempFlowDem** value
=> will be removed by a signal having Feature **D**

f) An existing entry in the list with Feature **C** and the lowest **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 highest **TempFlowDem** value
=> will be removed by a signal having Feature **D** with a lower **TempFlowDem** value
(max. temperature limitation !)

Handling of the Attributes Lists: (recommendation, manufacturer specific solution)
For each of the attributes
- ShiftLoadPriority
- DHWReq
- RoomHeatingReq
- VentReq
- AuxAllSeasonReq
- SystemPumpReq
- EmergDem
- DHWLegioReq

a separate list exists with the following structure

List for Attribute				
Entry N°	Attrib value true/false	Source FB Type and Instance	Source Individual Addr	Timeout
1				
2				
...				
N ≥ 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.

2. check the attribute value of the received signal
Signals with attribute value = false are ignored and not further processed

Signals 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 lowest **TempFlowDem** value (max. temperature limitation !). If no entries with feature D => check feature C
   2. From all entries with feature **C** take the one with the highest **TempFlowDem** value If no entries with feature D => check feature B
      3. From all entries with feature **B** take the one with the lowest **TempFlowDem** value If no entries with feature D => check feature A
         4. From all entries with feature **A** take the one with the highest **TempFlowDem** value If no entries with feature A => 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 without 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 and some consumers request shift load priority. 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	EXTENDED MODE	
		Basic FB	**S-Mode**	**Standard Mode Interface**	**LTE-Mode**
Outputs	StatusHPM	**NA** [2)]	NA	NA	M
	ForceSignHFDM	**NA**	NA	NA	O
	LockSignHFDM	**NA**	NA	NA	O
	ForceSignHPM	**NA**	NA	NA	O
	LockSignHPM	**NA**	NA	NA	O
	TempFlowWaterDem AbsHFDM	**NA** [1)]	NA	NA	M
	CtrlSignPump	**NA**	NA	NA	O
	TempFlowWaterSetp	**(GO_b)**		(GO)	O
Inputs	TempFlowWaterDemAbs...	**NA** [1)]	NA	NA	M
	StatusHPM	**NA** [1)]	NA	NA	M
	ForceSignHFDM	**NA**	NA	NA	O
	LockSignHFDM	**NA**	NA	NA	O
	ForceSignHPM	**NA**	NA	NA	O
	LockSignHPM	**NA**	NA	NA	O
	StatusFTC	**NA**	NA	NA	O
	ChangeOverStatusWater	**(GO_b)**		(GO)	O

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

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

Table 1: HFDM Runtime Interworking - dependence on Configuration Modes

		Support
Parameter	DistrSegmHPrimary	M [1] NA [2]
	DistrSegmHSecondary	M
	PeripheralLinkPump	O
	PeripheralLinkFTC	O

[1] normal case for “stand alone” HFDM
[2] HFDM is the “first” HFDM and located together with the HPM in the same device

Table 2: HFDM LTE specific Properties

		Support
Parameter	TempFlowWaterDiffFTC	O
	TempFlowWaterMax	O
Diagnostic Data	TempFlowWaterSetpAct	O

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

2.3.4.2 Output StatusHPM

Standard mode: NA

LTE-HEE mode:

FB: HFDM	**LTE Server Output Name:** StatusHPM	Mandatory ☒ 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

DPT:	Name	DPT_StatusHPM	DPT ID	209.100	Datatype format	$V_{16}B_8$

Field	Description	Sup.	Range	Unit	COV	Default
see HPM specification						

Communication:

Binding Group:

Class	Type	Default
Geographical ☐		
Application Specific ☒	DistrSegmH (secondary)	1 or 2 (see examples chapter 2.1)
Unassigned ☐	Broadcast ☐ Configurable ☐	

DP Address:	IO Type(ID):	136 (HPM)	Property ID:	51
LTE-Services (event): InfoReport ☒ (~~LTE Read-Response polling of the output shall always be supported~~) [1]	COV ☒ MinRepTime: [2]	10 sec	Heartbeat: [2]	15 min
	Output per default communicating ☐		Binding Group Wildcard allowed ☐	
	Tx Prio:	High ☐	Normal ☒	Low ☐
	Transm after Powerup: Stored Value ☐	Act Value ☒	Default Value ☐	
Property-Service (individual access):	Read only ☐ [1]	Read/Write ☐		

Exception Handling: Save at Powerdown ☐

--

Special Features:

[1] no storage of the signal in the HFDM (only routing) therefore read-access from the HFDM is not supported

[2] transmission depends on reception of the signal (routing functionality)

2.3.4.3 Output ForceSignHPM

Standard mode: NA

LTE-HEE mode:

FB: HFDM	**LTE Server Output Name:** ForceSignHPM	Mandatory ☐ 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_ForceSign	DPT ID	21.100	Datatype format	B_8

Field	Description	Sup.	Range	Unit	COV	Default
see HPM specification						

Communication:

Binding Group:

Class	Type	Default
Geographical ☐		
Application Specific ☒	DistrSegmH (secondary)	1 or 2 (see examples chapter 2.1)
Unassigned ☐	Broadcast ☐ Configurable ☐	

DP Address:	IO Type(ID):	136 (HPM)	Property ID:	53
LTE-Services (event): InfoReport ☒ (~~LTE Read-Response polling of the output shall always be supported~~) [1]	COV ☒	MinRepTime: 10 sec	Heartbeat: 3 [2] min	
	Output per default communicating ☐		Binding Group Wildcard allowed ☐	
	Tx Prio:	High ☐	Normal ☒	Low ☐
	Transm after Powerup: [2] Stored Value ☐	Act Value ☐	Default Value ☐	
Property-Service (individual access):	Read only [1] ☐	Read/Write ☐		

Exception Handling: Save at Powerdown ☐

--

Special Features:

HPM and the first HFDM are usually located in the same device => device – internal signal only

[1] no storage of the signal in the HFDM (only routing) therefore read-access from the HFDM is not supported

[2] transmission depends on reception of the signal (routing functionality)

2.3.4.4 Output LockSignHPM

Standard mode: NA

LTE-HEE mode:

FB: **HFDM**	**LTE Server Output Name:** **LockSignHPM**	Mandatory ☐ 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_LockSign	DPT ID	207.101	Datatype format	$U_8B_{(8}$

Field	Description	Sup.	Range	Unit	COV	Default
see HPM specification						

Communication:			
Binding Group:			
Class	Type		Default
Geographical ☐			
Application Specific ☒	DistrSegmH (secondary)		1 or 2 (see examples chapter 2.1)
Unassigned ☐	Broadcast ☐	Configurable ☐	
DP Address:	IO Type(ID): 136 (HPM)	Property ID: 54	
LTE-Services (event):	COV ☒	MinRepTime: 10 sec	Heartbeat: 3 [2] min
InfoReport ☒ (~~LTE Read-Response polling of the output shall always be supported~~) [1]	Output per default communicating ☐	Binding Group Wildcard allowed ☐	
	Tx Prio: High ☐	Normal ☒	Low ☐
	Transm after Powerup: [2] Stored Value ☐	Act Value ☐	Default Value ☐
Property-Service (individual access):	Read only [1] ☐	Read/Write ☐	

Exception Handling:	Save at Powerdown ☐
--	

Special Features:
HPM and the first HFDM are usually located in the same device => device – internal signal only [1] no storage of the signal in the HFDM (only routing) therefore read-access from the HFDM is not supported [2] transmission depends on reception of the signal (routing functionality)

2.3.4.5 Output LockSignHFDM

Standard mode: NA

LTE-HEE mode:

FB: HFDM	**LTE Server Output Name:** LockSignHFDM	Mandatory ☐ Optional ☒

Description:

see chapter 2.3.1.7 and document [07]

DPT:	Name	DPT_LockSign	DPT ID	207.101	Datatype format	U_8B_8

Field	Description	Sup.	Range	Unit	COV	Default
PwrReduction	Requested power reduction – 0 % no reduction – 100% max. reduction	M	0..100%	%	5	cs
Attributes - LockRequest	Bitset containing status info indicates if power reduction is necessary (validity of PwrReduction)	M	true/false	bool	Y	false
- Type	type of overload	O [3]	critical / uncritical	bool	N	uncritical

Communication:

Binding Group:

Class	Type	Default
Geographical ☐		
Application Specific ☒	DistrSegmH (secondary)	1 or 2 (see examples chapter 2.1)
Unassigned ☐	Broadcast ☐ Configurable ☐	

DP Address:	IO Type(ID):	144 (HFDM)	Property ID:	52
LTE-Services (event): InfoReport ☒ (LTE Read-Response polling of the output shall always be supported)	COV ☒	MinRepTime: 10 sec	Heartbeat: 3 [1] min	
	Output per default communicating ☐		Binding Group Wildcard allowed ☐	
	Tx Prio:	High ☐	Normal ☒	Low ☐
	Transm after Powerup: [1]	Stored Value ☐	Act Value ☐	Default Value ☐
Property-Service (individual access):	Read only ☒ [2]		Read/Write ☐	

Exception Handling: Save at Powerdown ☐

--

Special Features:

[1] Heartbeat: the signal is re-transmitted periodically (if no COV occured) as long as the LockRequest 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 condition appears (this procedure reduces unnecessary bus-load).

[2] Read access is possible but in practice not very useful

[3] LockSignHFDM have usually the type 'uncritical' – only the % value varies. At the moment no useful applications for 'critical' LockSignHFDM are known. But in principle it is allowed to send 'critical' LockSignHFDM and the receivers shall react accordingly

2.3.4.6 Output ForceSignHFDM

Standard mode: NA

LTE-HEE mode:

FB: HFDM	**LTE Server Output Name:** ForceSignHFDM	Mandatory ☐ Optional ☒

Description:

see chapter 2.3.1.8 and document [07]

DPT:	Name	DPT_ForceSign	DPT ID	21.101	Datatype format	B_8

Field	Description	Sup.	Range	Unit	COV	Default
Attributes						
- ForceRequest	indicates if forced power consumption is necessary (validity of the remaining attrib)	M	true / false	bool	Y	false
- Protection	indicates that overheat is critical	M	true / false	bool	Y	false
- Oversupply	indicates that overheat is uncritical	M	true / false	bool	Y	false
- Overrun	indicates that remaining energy is available in the heat-exchanger after load shutdown	M	true / false	bool	Y	false
- DHWNorm [3)]	Load DHW to 'Normal' Level in case of overheat ('Protection' or 'Oversupply')	O	true / false	bool	Y	cs
- DHWLegio [3)]	Load DHW to 'LegioProtect' Level in case of overheat ('Protection' or 'Oversupply')	O	true / false	bool	Y	cs
- RoomHComf [3)]	Load Room Heating to 'Comfort' Level in case of overheat ('Protection' or 'Oversupply')	O	true / false	bool	Y	cs
- RoomHMax [3)]	Load Room Heating with maximum flow temperature in case of overheat ('Protection' or 'Oversupply')	O	true / false	bool	Y	cs

Communication:

Binding Group:

Class	Type	Default
Geographical ☐		
Application Specific ☒	DistrSegmH (secondary)	1 or 2 (see examples chapter 2.1)
Unassigned ☐	Broadcast ☐ Configurable ☐	

DP Address:	IO Type(ID): 144 (HFDM)	Property ID: 53
LTE-Services (event): InfoReport ☒ (LTE Read-Response polling of the output shall always be supported)	COV ☒ MinRepTime: 10 sec	Heartbeat: 3 [1)] min
	Output per default communicating ☐	Binding Group Wildcard allowed ☐
	Tx Prio: High ☐	Normal ☒ Low ☐
	Transm after Powerup: [1)] Stored Value ☐ Act Value ☐ Default Value ☐	
Property-Service (individual access):	Read only [2)] ☒	Read/Write ☐

Exception Handling: Save at Powerdown ☐

--

Special Features:

1) 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
2) Read access is possible but in practice not very useful
3) 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

Standard mode: NA

LTE-HEE mode:

FB: **HFDM**	**LTE Server Output Name:** **TempFlowWaterDemAbsHFDM**	Mandatory ☒[1)] Optional ☐

Description:

This output signal contains the calculated resulting flow temperature demand (absolute value) of the secondary Heat Distribution Segment. It is sent to the HFDM (or HPM) in primary Heat Distribution Segment. Calculation of the resulting flow temperature demand: see chapter 2.3.1.1.

DPT:	Name	DPT_TempFlowWaterDemAbs	DPT ID	210.100	Datatype format	$V_{16}B_{16}$

Field	Description	Sup.	Range	Unit	COV	Default
TempFlowDem	resulting flow temp. demand / requested flow temperature	M	full temp. range	°C	2	cs
Attributes						
- DemValid	Validity of TempFlowDem (false means also “no heat demand”)	M	true/false	bool	Y	false
- AbsLoadPriority	absolute load priority if one or more consumer(s) request all available power	O	true/false	bool	Y	false
- ShiftLoadPriority	shift load priority: set e.g. if HFDM requests priority in case of boiler overload	O	true/false	bool	Y	false
- MaxTempLimit	TempFlowDem contains max. temp. limit e.g. for DHW load	O	true/false	bool	Y	false
- MinTempLimit	for cold water only	NA	false	bool	N	false
- DHWReq	one or multiple DHW have heat demand	O	true/false	bool	Y	false
- RoomCtrlReq	one or multiple room heating circuits have heat demand	O	true/false	bool	Y	false
- VentReq	Heat demand from Ventilation	O	true/false	bool	Y	false
- AuxAllSeasonReq	demand from auxiliary heat consumer; all season	O	true/false	bool	Y	false
- SystemPumpReq	request for water circulation in the primary distribution segment (common system pump on)	O	true/false	bool	Y	false
- EmergDem	resulting emergency heat demand for frost protection	O	true/false	bool	Y	false
- DHWLegioReq	demand from DHW while legionella function is active (can only be ‘true’ if DHWReq = ‘true’)	O	true/false	bool	Y	false

Communication:

Binding Group:		
Class	Type	Default
Geographical ☐		
Application Specific ☒	DistrSegmH (primary)	1 or 31 (see examples chapter 2.1)
Unassigned ☐	Broadcast ☐ Configurable ☐	
DP Address:	IO Type(ID): 144 (HFDM)	Property ID: 51
LTE-Services (event): InfoReport ☒ (LTE Read-Response polling of the output shall always be supported)	COV ☒ MinRepTime: 10 sec	Heartbeat: 15 min
	Output per default communicating ☐	Binding Group Wildcard allowed ☐
	Tx Prio: High ☐	Normal ☒ Low ☐
	Transm after Powerup: Stored Value ☐	Act Value ☒ Default Value ☐
Property-Service (individual access):	Read only ☒	Read/Write ☐

Exception Handling:	Save at Powerdown ☐
--	
Special Features:	
- A temperature offset can be added to the calculated flow temperature to compensate temperature difference in a pre-controller (optional FTC). This offset is a configuration parameter. 1) HPM and the first HFDM are usually located in the same device => device – internal signal only in this case	

2.3.4.8 Output CtrlSignPump

see example in HPM specification

2.3.4.9 Output TempFlowWaterSetp

Standard mode

DP Name:	TempFlowWaterSetp	Abbr.:	--	Mandatory	☐
FB Name:	HFDM			Can be internal	☐

Description
see LTE-HEE mode

Datapoint Type					
DPT_Name:	DPT_Value_Temp				
DPT Format:	F_{16}	DPT_ID:	9.001		
Field	Description	Supp.	Range	Unit	Default
			full range	°C	cs

Access Type							
♦ Output							
this → M	☐	this → 1	☒				
Spontaneous	☒	COV:	☒	Δ-Value:	1 °C	MinRepTime:	10s
		Cyclic	☒	Period:	15 Min		
Request	☒						

Communication Type		
♦ Group Object Datapoint	Mandatory:	☐
Default Group Address:	--	

Dynamics						
Power down:	Save:	☐				
Power up:	Value:	No initialisation:	☐	Default value:		☐
		Saved value:	☐	Actual value (not for input):		☒
	Transmit on bus (only for output):		☐	Read from bus (only for input):		☐

Exception Handling
--

Special Features
--

LTE-HEE mode:

FB: **HFDM**	**LTE Client Output Name:** **TempFlowWaterSetp**	Mandatory ☐ Optional ☒

Description:

This signal is optionally used by the HFDM to control an “intelligent” flow temperature controller FTC

DPT:	Name	DPT_TempHVACAbs_Z	DPT ID	205.100	Datatype format	$V_{16}Z_8$

Field	Description	Sup.	Range	Unit	COV	Default
TempFlowWaterSetp	temperature setpoint	M	full range	°C	1	cs
Command - Write - other Commands	standard Command field normal Write not applicable	 M NA		enum		

Communication:

Binding Group:

Class	Type	Default
Geographical ☐		
Application Specific ☐		
Unassigned ☒	Broadcast ☐ Configurable ☒	1

DP Address:	IO Type(ID):	120 (FTC)	Property ID:	52
LTE-Services (event):	COV ☒	MinRepTime: 10 sec	Heartbeat:	15 min
Write ☒	Output per default communicating ☐		Binding Group Wildcard allowed ☐	
	Tx Prio:	High ☐	Normal ☒	Low ☐
	Transm after Powerup:	Stored Value ☐	Act Value ☒	Default Value ☐

Exception Handling: Save at Powerdown ☐

--

Special Features:

--

2.3.4.10 Input: TempFlowWaterDemAbs....

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

Standard mode: NA

LTE-HEE mode:

FB:	**HFDM**	**LTE Client Input Name:**	**TempFlowWaterDemAbs.....**	Mandatory ☒ Optional ☐

Description:

Theses input signals contain the actual water flow temperature demand (absolute value) from HDTRT, HZC, DHW, HFDM etc. in the secondary Distribution Segment. These information are used in the HFDM to calculate the resulting heat demand of the Heat Distribution Segment and to create locking signals for load management between consumers (DHW priority) as described in chapter 2.3.1.1

DPT:	Name	DPT_TempFlowWaterDemAbs	DPT ID	210.100	Datatype format	$V_{16}B_{16}$

Field	Description	Sup.	Unit	Default
TempFlowDem	flow temperature demand (setpoint)	M	°C	cs
Attributes				
- DemValid	Validity of TempFlowDem field (false means also “no heat demand”)	M	bool	false
- AbsLoadPriority	absolute load priority if one or more consumer(s) request all available power => evtl. LockSignHFDM	O	bool	false
- ShiftLoadPriority	shift load priority: set e.g. if DHW load has priority in case of boiler overload => evtl. LockSignHPM	O	bool	false
- MaxTempLimit	TempFlowDem contains max. temp. limit e.g. for DHW load. Flow temp must be limited to max level	M	bool	false
- MinTempLimit	for cold water only	NA	bool	false
- DHWReq	Heat demand from DHW => for DHW preparation during summer	O	bool	false
- RoomCtrlReq	Heat demand from Room Heating	O	bool	false
- VentReq	Heat demand from Ventilation	O	bool	false
- AuxAllSeasonReq	demand from auxiliary heat consumer; all season	O	bool	false
- SystemPumpReq	request for water circulation in the distribution segment (common system pump on)	O	bool	false
- EmergDem	emergency heat demand for frost protection	O	bool	false
- DHWLegioReq	demand from DHW while legionella function is active (can only be ‘true’ if DHWReq = ‘true’)	O	bool	false

Communication:

Binding Group:

Class	Type	Default
Geographical ☐		
Application Specific ☒	DistrSegmH (secondary)	1 or 2 (see examples chapter 2.1)
Unassigned ☐	Broadcast ☐ Configurable ☐	

DP Address:	IO Type(ID):	144 (HFDM) 145 (HDAUX) 151 (HDTRT) 152 (HDTAHU) 153 (RHDTTU) 154 (AHDTTU) 160 (HZC) 177 (DHWC)	Property ID:	51

LTE-Service (event): InfoReport ☒	InfoReport Sniffer on Binding Group: --
	Timeout: 31 Min
LTE-Service (polling): Read – Response ☐	Read Wildcard / Resp Sniffer on Binding Group: --

Value after Powerup: Default Value ☒ Stored Value ☐

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

Standard mode: NA

LTE-HEE mode:

FB: **HFDM**	**LTE Client Input Name:** **StatusHPM**	Mandatory ☒ [1] Optional ☐

Description:

Routing of HPM signals: see chapter 2.3.1.4
This signal contains various status information of the heat production. StatusHPM may also used for local control functionality in the HFDM (company specific solution)

DPT:	Name	DPT_StatusHPM	DPT ID	209.100	Datatype format	$V_{16}B_8$

Field	Description	Sup.	Unit	Default
TempFlowProdSegmH	common flow temperature of heat production segment	M	°C	cs
Attributes				
- TempFlowValid	validity of TempFlowProdSegmH	M	bool	false
- Fault	one or more boiler(s) have a failure (mainly for monitoring); manufacturer specific reaction in the HFDM	M	bool	false
- SummerMode	boiler / boiler sequence switched off due to local summer/winter mode (mainly for monitoring)	O	bool	false
- OffPerm	boilers are permanently off (manual switch or failure)	O	bool	false
- NoHeatAvailable	boiler / boiler sequence is temporary not producing heat	O	bool	false

Communication:

Binding Group:

Class	Type	Default
Geographical ☐		
Application Specific ☒	DistrSegmH (primary)	1 or 31 (see examples chapter 2.1)
Unassigned ☐	Broadcast ☐ Configurable ☐	

DP Address:	IO Type(ID):	136 (HPM)	Property ID:	51
LTE-Service (event): InfoReport ☒	InfoReport Sniffer on Binding Group:			--
	Timeout:	31	Min	
LTE-Service (polling): Read – Response ☐	Read Wildcard / Resp Sniffer on Binding Group:			--

Value after Powerup: Default Value ☒ Stored Value ☐

Exception Handling: Save at Powerdown ☐

--

Special Features:

[1] HPM and the first HFDM are usually located in the same device => device – internal signal only in this case

2.3.4.12 Input LockSignHPM

Standard mode: NA

LTE-HEE mode:

FB: HFDM	**LTE Client Input Name:** LockSignHPM	Mandatory ☐ Optional ☒ [2]

Description:

see chapter 2.3.1.5 and document [07]

DPT:	Name	DPT_LockSign	DPT ID	207.101	Datatype format	U_8B_8

Field	Description	Sup.	Unit	Default
PwrReduction	Requested power-consumption reduction – 0 % no reduction – 100% max. reduction	M	%	cs
Attributes – LockRequest	Bitset containing status info indicates if power reduction is necessary (validity of PwrReduction)	M	bool	false
– Type	type of overload critical/uncritical; value is only meaningful if LockRequest=true	M	bool	uncritical

Communication:

Binding Group:

Class	Type	Default
Geographical ☐		
Application Specific ☒	DistrSegmH (primary)	1 or 31 (see examples chapter 2.1)
Unassigned ☐	Broadcast ☐ Configurable ☐	

DP Address:	IO Type(ID):	136 (HPM)	Property ID:	54
LTE-Service (event):	InfoReport Sniffer on Binding Group:			--
InfoReport ☒	Timeout: [1]	7	Min	
LTE-Service (polling): Read – Response ☐	Read Wildcard / Resp Sniffer on Binding Group:			--

Value after Powerup: Default Value ☒ Stored Value ☐

Exception Handling: Save at Powerdown ☐

--

Special Features:

[1] The signal is received on event and periodically (if no COV occurred) as long as the LockRequest attribute is true. When the overload condition in the HPM disappears, the LockRequest attribute changes to false and the signal will be repeated by the HPM with the heartbeat-period during 9 minutes (3 messages). Afterwards re-transmission is stopped until a new overload condition appears (this procedure reduces unnecessary bus-load)

[2] HPM and the first HFDM are usually located in the same device => device – internal signal only in this case

2.3.4.13 Input ForceSignHPM

Standard mode: NA

LTE-HEE mode:

FB: **HFDM**	**LTE Client Input Name:** **ForceSignHPM**	Mandatory ☐ Optional ☒ 3)

Description:

see chapter 2.3.1.6 and document [07]

DPT:	Name	DPT_ForceSign	DPT ID	21.100	Datatype format	B_8

Field	Description	Sup.	Unit	Default
Attributes	Bitset containing status info			
- ForceRequest	indicates overheat condition in the HPM (validity of remaining attributes)	M	bool	false
- Protection	indicates that overheat is critical, too high boiler temp	M	bool	false
- Oversupply	indicates that overheat is uncritical but supply temp is much higher than requested by heat demand	M	bool	false
- Overrun	indicates that remaining energy is available in the boiler(s) after load shutdown	M	bool	false
- DHWNorm 2)	Load DHW to 'Normal' Level in case of overheat ('Protection' or 'Oversupply')	O	bool	false
- DHWLegio 2)	Load DHW to 'LegioProtect' Level in case of overheat ('Protection' or 'Oversupply')	O	bool	false
- RoomHComf 2)	Load Room Heating to 'Comfort' Level in case of overheat ('Protection' or 'Oversupply')	O	bool	false
- RoomHMax 2)	Load Room Heating with maximum flow temperature in case of overheat ('Protection' or 'Oversupply')	O	bool	false

Communication:

Binding Group:

Class	Type	Default
Geographical ☐		
Application Specific ☒	DistrSegmH (primary)	1 or 31 (see examples chapter 2.1)
Unassigned ☐	Broadcast ☐ Configurable ☐	

DP Address:	IO Type(ID):	136 (HPM)	Property ID:	53
LTE-Service (event):	InfoReport Sniffer on Binding Group:		--	
InfoReport ☒	Timeout: 1)	7	Min	
LTE-Service (polling): Read – Response ☐	Read Wildcard / Resp Sniffer on Binding Group:		--	

Value after Powerup: Default Value ☒ Stored Value ☐

Exception Handling: Save at Powerdown ☐

--

Special Features:

1) The signal is received on event and periodically (if no COV occurred) as long as the ForceRequest attribute is true. When the forcing condition in the HPM disappears, the ForceRequest attribute changes to false and the signal will be repeated by the HPM 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)

2) HPM with higher functionality may indicate whether DHW or Room Heating should be activated in case of overheat. These flags are usually not considered locally in the HFDM

3) HPM and the first HFDM are usually located in the same device => device – internal signal only in this case

2.3.4.14 Input LockSignHFDM

Standard mode: NA

LTE-HEE mode:

FB: HFDM	**LTE Client Input Name:** LockSignHFDM	Mandatory ☐ Optional ☒

Description:

This signal is generated by the preceding HFDM in primary Heat Distribution Segment.
Handling in the HFDM: see chapter 2.3.1.9 and document [07]

DPT:	Name	DPT_LockSign	DPT ID	207.101	Datatype format	U_8B_8

Field	Description	Sup.	Unit	Default
PwrReduction	Requested power-consumption reduction – 0 % no reduction – 100% max. reduction	M	%	cs
Attributes – LockRequest	Bitset containing status info indicates if power reduction is necessary (validity of PwrReduction)	M	bool	false
– Type	type of overload	O [2)]	bool	uncritical

Communication:

Binding Group:

Class	Type	Default
Geographical ☐		
Application Specific ☒	DistrSegmH (primary)	1
Unassigned ☐	Broadcast ☐ Configurable ☐	

DP Address:	IO Type(ID):	144 (HFDM)	Property ID:	52
LTE-Service (event):	InfoReport Sniffer on Binding Group:			--
InfoReport ☒	Timeout: [1)]	7	Min	
LTE-Service (polling): Read – Response ☐	Read Wildcard / Resp Sniffer on Binding Group:			--

Value after Powerup: Default Value ☒ Stored Value ☐

Exception Handling: Save at Powerdown ☐

--

Special Features:

[1)] The signal is received on event and periodically (if no COV occurred) as long as the LockRequest attribute is true. If LockRequest attribute changes to false, the signal is still repeated by the preceding HFDM with the heartbeat-period during 9 minutes (3 messages). Afterwards re-transmission is stopped until a new locking condition appears (this procedure reduces unnecessary bus-load)

[2)] the value of this attribute can be normally ignored by the HFDM. LockSignHFDM have usually the type 'uncritical' – only the % value varies. At the moment no useful applications for 'critical' LockSignHFDM are known. But in principle it is allowed to implement 'critical' LockSignHFDM

2.3.4.15 Input ForceSignHFDM

Standard mode: NA

LTE-HEE mode:

FB: HFDM	**LTE Client Input Name:** ForceSignHFDM	Mandatory ☐ Optional ☒

Description:

This signal is generated by the preceding HFDM in primary Distribution Segment.
Handling in the HFDM: see chapter 2.3.1.10 and document [07]

DPT:	Name	DPT_ForceSign	DPT ID	21.101	Datatype format	B_8

Field	Description	Sup.	Unit	Default
Attributes				
- ForceRequest	indicates if forced power consumption is necessary (validity of the remaining attrib)	M	bool	false
- Protection	indicates that overheat is critical	M	bool	false
- Oversupply	indicates that overheat is uncritical	M	bool	false
- Overrun	indicates that remaining energy is available in the heat-exchanger after load shutdown	M	bool	false
- DHWNorm [2)]	Load DHW to 'Normal' Level in case of overheat ('Protection' or 'Oversupply')	O	bool	false
- DHWLegio [2)]	Load DHW to 'LegioProtect' Level in case of overheat ('Protection' or 'Oversupply')	O	bool	false
- RoomHComf [2)]	Load Room Heating to 'Comfort' Level in case of overheat ('Protection' or 'Oversupply')	O	bool	false
- RoomHMax [2)]	Load Room Heating with maximum flow temperature in case of overheat ('Protection' or 'Oversupply')	O	bool	false

Communication:

Binding Group:

Class	Type	Default
Geographical ☐		
Application Specific ☒	DistrSegmH (primary)	1
Unassigned ☐	Broadcast ☐ Configurable ☐	

DP Address:	IO Type(ID):	144 (HFDM)	Property ID:	53
LTE-Service (event):	InfoReport Sniffer on Binding Group:			--
InfoReport ☒	Timeout: [1)]	7 Min		
LTE-Service (polling): Read – Response ☐	Read Wildcard / Resp Sniffer on Binding Group:			--

Value after Powerup: Default Value ☒ Stored Value ☐

Exception Handling: Save at Powerdown ☐

Special Features:

[1)] The signal is received on event and 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 will be repeated by the HFDM 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)

[2)] HFDM with higher functionality may indicate whether DHW or Room Heating should be activated in case of overheat. These flags are usually not considered in the receiving HFDM

2.3.4.16 Input StatusFTC

Standard mode: NA

LTE-HEE mode:

FB:	**HFDM**	**LTE Client Input Name:**	**StatusFTC**	Mandatory ☐ Optional ☒

Description:

This signal contains the current flow temperature and other status information of a Flow Temperature Controller

DPT:	Name	DPT_StatusWTC	DPT ID	209.103	Datatype format	$V_{16}B_8$

Field	Description	Sup.	Unit	Default
TempWater	current flow temperature of FTC	M	°C	cs
Attributes				
- TempWaterValid	validity of TempWater field	M	bool	false
- Fault	some failure in the FTC	M	bool	false
- CtrlStatus	Controller status on: FTC is working (default if not supported) off: FTC is stopped; no control of flow temperature	O	bool	on

Communication:

Binding Group:

Class	Type	Default
Geographical ☐		
Application Specific ☐		
Unassigned ☒	Broadcast ☐ Configurable ☒	1

DP Address:	IO Type(ID):	120 (FTC)	Property ID:	51
LTE-Service (event):	InfoReport Sniffer on Binding Group:			--
InfoReport ☒	Timeout:	31 Min		
LTE-Service (polling): Read – Response ☐	Read Wildcard / Resp Sniffer on Binding Group:			--

Value after Powerup: Default Value ☒ Stored Value ☐

Exception Handling: Save at Powerdown ☐

--

Special Features:

--

2.3.4.17 Input ChangeOverStatusWater

Standard Mode:

DP Name:	ChangeOverStatusWater	Abbr.:	---	Mandatory	☐
FB Name:	HFDM			Can be internal	☒

Description

see LTE-HEE Mode

Datapoint Type

DPT_Name:	DPT_Heat/Cool				
DPT Format:	B_1	DPT_ID:	01.100		
Field	Description	Supp.	Range	Unit	Default
			cooling / heating	bool	heating

Access Type

♦ Input

N → this	☐	1 → this	☒			
Spontaneous	☒	Cyclically:	☒	Time-out:	31	
Request	☐	Polling:	☐	Period:		

Communication Type

♦ Group Object Datapoint		Mandatory:	☒
Default Group Address:	---		

Dynamics

Power down:	Save:	☐			
Power up:	Value:	No initialisation:	☐	Default value:	☒
		Saved value:	☐		
				Read from bus:	☐

Exception Handling

--

Special Features

--

LTE-HEE mode:

FB: HFDM	**LTE Client Input Name:** ChangeOverStatusWater	Mandatory ☐ Optional ☒

Description:

This optional input signal indicates the water change over status in a change over system. For an overview refer to chapter 2.2. The HFDM is deactivated whenever this input is set as cooling (ChangeOverStatusWater = 0).
I.e. TempFlowWaterDemAbsHFDM Attribute DemValid = no demand, Force and Lock signals are inactive and TempFlowWaterSetp are not applicable for the Flow Temp Controller FTC.

DPT:	Name	DPT_Heat/Cool_Z	DPT ID	200.100	Datatype format	B_1 Z_8

Field	Description	Sup.	Unit	Default
Heat/Cool	change over status (0 = cooling, 1 = heating)	M	bool	heating
Status	standard Status attributes		bitset	
- Overridden	sensor value overridden true / false	O	bool	false
- all other flags	not supported	NA	bool	

Communication:

Binding Group:

Class	Type	Default
Geographical ☐		
Application Specific ☒	DistrSegmH (secondary)	1 or 2 (see examples chapter 2.1)
Unassigned ☐	Broadcast ☐ Configurable ☐	

DP Address:	IO Type(ID):	342 (WCOS)	Property ID:	51
LTE-Service (event): InfoReport ☒	InfoReport Sniffer on Binding Group:			--
	Timeout:	31	Min	
LTE-Service (polling): Read – Response ☐	Read Wildcard / Resp Sniffer on Binding Group:			--

Value after Powerup: Default Value ☒ Stored Value ☐

Exception Handling: Save at Powerdown ☐

Special Features:

2.3.4.18 Parameter DistrSegmHPrimary

FB: HFDM	Property Name (Server): DistrSegmHPrimary	Mandatory ☒ [3] Optional ☐

Description:

LTE zoning information : link with HFDM in the primary Heat Distribution Segment or the HPM

DPT:	Name	DPT_UcountValue8_Z	DPT ID	202.002	Datatype format	U_8Z_8

Field	Description	Sup.	Range	Unit	Default
CounterValue	Heat Distribution Segment number	M	1..31	--	1 [1] or 31 [2] or NA [3]
Status - OutOfService - all other flags	 zone active /inactive not supported, fixed to '0'	 O NA	 true/false	bitset	 false
Command - NormalWrite - SetOSV & ResetOSV - all other commands	 set zone inactive / active not supported	 M O NA		enum	

Communication:

DP Address: (in the server)	IO Type(ID):	144 (HFDM)	Property ID:	101
	Start-Index:	1	N° of elements	1
Property access:	Read only ☐		Read/Write ☒	
Protection	Read level	--	Write level	--

Exception Handling: Value after Powerup: Stored Value ☒ Act Value ☐ Default Value ☐

--

Special Features:

[1] normal case for "stand alone" HFDM

[2] HFDM is the "first" HFDM and is NOT located together with the HPM in the same device

[3] HFDM is the "first" HFDM and is located together with the HPM in the same device : the parameter is not available

See examples chapter 2.1

HFDM DP's on the primary Heat Distribution Segment are not LTE communicating if zone is 'OutOfService'

2.3.4.19 Parameter DistrSegmHSecondary

FB: HFDM	Property Name (Server): DistrSegmHSecondary	Mandatory ☒ Optional ☐

Description:

LTE zone: link with heat consumers, demand transformers or HFDM in the secondary Heat Distribution Segment

DPT:	Name	DPT_UcountValue8_Z	DPT ID	202.002	Datatype format	U_8Z_8

Field	Description	Sup.	Range	Unit	Default
CounterValue	Heat Distribution Segment number	M	1..31	--	1 [1] or 2 [2]
Status - OutOfService - all other flags	 zone active /inactive not supported, fixed to '0'	 O NA	 true/false	bitset	 false
Command - NormalWrite - SetOSV & ResetOSV - all other commands	 set zone inactive / active not supported	 M O NA		enum	

Communication:

DP Address: (in the server)	IO Type(ID): Start-Index:	144 (HFDM) 1	Property ID: N° of elements	102 1
Property access:	Read only ☐		Read/Write ☒	
Protection	Read level	--	Write level	--

Exception Handling: Value after Powerup: Stored Value ☒ Act Value ☐ Default Value ☐

--

Special Features:

[1] HFDM is the "first" HFDM and is located together with the HPM in the same device
[2] all other cases
See examples chapter 2.1

HFDM DP's on the secondary Heat Distribution Segment are not LTE communicating if zone is 'OutOfService'

2.3.4.20 Parameter PeripheralLinkPump

FB: HFDM	Property Name (Server): PeripheralLinkPump	Mandatory ☐ Optional ☒

Description:

LTE zoning number Peripheral link to system pump in the secondary Heat Distribution Segment

DPT:	Name	DPT_UcountValue16_Z	DPT ID	203.012	Datatype format	$U_{16}Z_8$

Field	Description	Sup.	Range	Unit	Default
CounterValue	peripheral link number	M	full	--	1
Status - OutOfService - all other flags	 zone active /inactive not supported, fixed to '0'	 O NA	 true/false	bitset	 false
Command - NormalWrite - SetOSV & ResetOSV - all other commands	 set zone inactive / active not supported	 M O NA		enum	

Communication:

DP Address: (in the server)	IO Type(ID):	144 (HFDM)	Property ID:	103
	Start-Index:	1	N° of elements	1
Property access:	Read only ☐		Read/Write ☒	
Protection	Read level	--	Write level	--

Exception Handling: Value after Powerup: Stored Value ☒ Act Value ☐ Default Value ☐

--

Special Features:

HFDM is not LTE communicating with the pump if zone is 'OutOfService'

2.3.4.21 Parameter PeripheralLinkFTC

FB: HFDM	Property Name (Server): PeripheralLinkFTC	Mandatory ☐ Optional ☒

Description:

LTE zone: link to FTC used for control of the flow temperature in the secondary Heat Distribution Segment

DPT:	Name	DPT_UcountValue16_Z	DPT ID	203.012	Datatype format	$U_{16}Z_8$

Field	Description	Sup.	Range	Unit	Default
CounterValue	peripheral link number	M	full	--	1
Status - OutOfService - all other flags	 zone active /inactive not supported, fixed to '0'	 O NA	 true/false	bitset	 false
Command - NormalWrite - SetOSV & ResetOSV - all other commands	 set zone inactive / active not supported	 M O NA		enum	

Communication:

DP Address: (in the server)	IO Type(ID):	144 (HFDM)	Property ID:	104
	Start-Index:	1	N° of elements	1
Property access:	Read only ☐		Read/Write ☒	
Protection	Read level	--	Write level	--

Exception Handling: Value after Powerup: Stored Value ☒ Act Value ☐ Default Value ☐

--

Special Features:

HFDM is not LTE communicating with the FTC if zone is 'OutOfService'

2.3.4.22 Parameter TempFlowWaterDiffFTC

FB: HFDM	Property Name (Server): TempFlowWaterDiffFTC	Mandatory ☐ Optional ☒

Description:

Value to be added to resulting flow temperature demand in the primary Heat Distribution Segment so that the FTC has some control margin

DPT:	Name	DPT_HVACTempRel_Z	DPT ID	205.101	Datatype format	$V_{16}Z_8$

Field	Description	Sup.	Range	Unit	Default
Temp	temperature delta value	M	cs	° K	cs
Status - all flags	 not supported, fixed to '0'	 NA		bitset	
Command - NormalWrite - all other commands	 not supported	 M NA		enum	

Communication:

DP Address:	IO Type(ID):	144 (HFDM)	Property ID:	111
(in the server)	Start-Index:	1	N° of elements	1
Property access:	Read only ☐		Read/Write ☒	
Protection	Read level	--	Write level	--

Exception Handling: Value after Powerup: Stored Value ☒ Act Value ☐ Default Value ☐

--

Special Features:

--

2.3.4.23 Parameter TempFlowWaterMax

FB: HFDM	Property Name (Server): TempFlowWaterMax	Mandatory ☐ Optional ☒

Description:

Flow temperature limitation in the secondary Heat Distribution Segment (in case of Forcing Signals)

DPT:	Name	DPT_HVACTempAbs_Z	DPT ID	205.100	Datatype format	$V_{16}Z_8$

Field	Description	Sup.	Range	Unit	Default
Temp	temperature value	M	cs	° C	cs
Status - OutOfService - all other flags	 max limitation active /inactive not supported, fixed to '0'	 O NA	 true/false	bitset	 false
Command - NormalWrite - SetOSV & ResetOSV - all other commands	 set limitation parameter inactive / active not supported	 M O NA		enum	

Communication:

DP Address:	IO Type(ID):	144 (HFDM)	Property ID:	112
(in the server)	Start-Index:	1	N° of elements	1
Property access:	Read only ☐		Read/Write ☒	
Protection	Read level	--	Write level	--

Exception Handling: Value after Powerup: Stored Value ☒ Act Value ☐ Default Value ☐

--

Special Features:

Limitation function is activated or deactivated by the 'OutOfService' Status

2.3.4.24 Diagnostic data TempFlowWaterSetpAct

FB: HFDM	Property Name (Server): TempFlowWaterSetpAct	Mandatory ☐ Optional ☒

Description:

Actual calculated flow temperature setpoint in the secondary Heat Distribution Segment

DPT:	Name	DPT_HVACTempAbs_Z	DPT ID	205.100	Datatype format	$V_{16}Z_8$

Field	Description	Sup.	Range	Unit	Default
Temp	temperature value	M	cs	° C	--
Status				bitset	
- OutOfService	no resulting heat demand => no setpoint	O	true/false		true
- Overridden	external override of the setpoint	O	true/false		false
- all other flags	not supported, fixed to '0'	NA			
Command	standard Command field			enum	
- Override & Release	override and release setpoint	O			
- all other commands	not supported	NA			

Communication:

DP Address:	IO Type(ID):	144 (HFDM)	Property ID:	110
(in the server)	Start-Index:	1	N° of elements	1
Property access:	Read only ☐		Read/Write ☒ [1)]	
Protection	Read level	--	Write level	--

Exception Handling: Value after Powerup: Stored Value ☐ Act Value ☐ Default Value ☒

--

Special Features:

[1)] optional Write access for Override / Release function only

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.

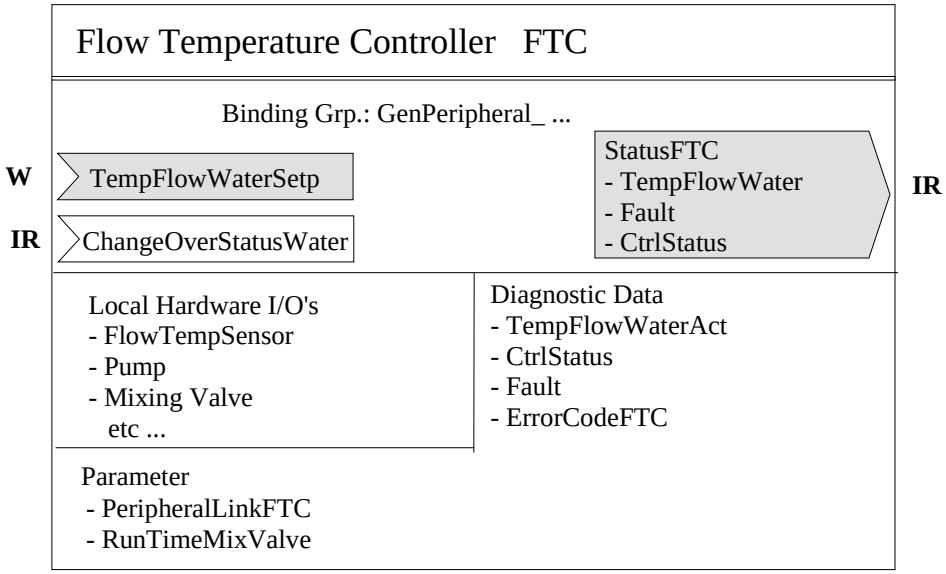
The FTC provides a status information StatusFTC which contains the current flow temperature and further attributes.

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	**EXTENDED MODE**	
		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)	O

Table 4: FTC Runtime Interworking - dependence on Configuration Modes

		Support
Parameter	PeripheralLinkPump	M

Table 5: FTC LTE specific Properties

		Support
Parameter	RunTimeMixValve	O
		O
Diagnostic Data	TempFlowWaterAct	M
	CtrlStatus	O
	Fault	M
	ErrorCodeFTC	O

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 Server Output Name:** StatusFTC	Mandatory ☒ Optional ☐

Description:

This signal contains the current flow temperature and status attributes of the FTC which may be used in the partner functional block for optimized control loop mechanisms or as a diagnostic value for visualization.

DPT:	Name	DPT_StatusWTC	DPT ID	209.103	Datatype format	$V_{16}B_8$

Field	Description	Sup.	Range	Unit	COV	Default
TempWater	current flow temperature	M	full range	°C	0.5	cs
Attributes	Bitset containing status info					
–TempWaterValid	validity of TempWater Field	M	true/false	bool	Y	false
– Fault	some failure in the FTC	M	true/false	bool	Y	false
– CtrlStatus	Controller status on: FTC is working (default if not supported) off: FTC is stopped; no control of flow temperature	O	true/false	bool	Y	on

Communication:

Binding Group:

Class	Type	Default
Geographical ☐		
Application Specific ☐		
Unassigned ☒	Broadcast ☐ Configurable ☒	1

DP Address:	IO Type(ID):	120 (FTC)	Property ID:	51
LTE-Services (event): InfoReport ☒ (LTE Read-Response polling of the output shall always be supported)	COV ☒	MinRepTime: 10 sec	Heartbeat: 15 min	
	Output per default communicating ☐		Binding Group Wildcard allowed ☐	
	Tx Prio:	High ☐	Normal ☒	Low ☐
	Transm after Powerup: Stored Value ☐	Act Value ☒	Default Value ☐	
Property-Service (individual access):	Read only ☒	Read/Write ☐		

Exception Handling: Save at Powerdown ☐

--

Special Features:

--

2.4.3.3 Output TempFlowWater

Standard mode

DP Name:	TempFlowWater			Abbr.:	--				Mandatory	☒	
FB Name:	FTC								Can be internal	☐	
Description											
Current flow temperature											
Datapoint Type											
DPT_Name:	DPT_Value_Temp										
DPT Format:	F_{16}						DPT_ID:	9.001			
Field	Description						Supp.	Range	Unit	Default	
								full range	°C	cs	
Access Type											
♦ Output											
this → M	☒ [1])		this → 1	☐							
Spontaneous	☒	COV:	☒	Δ-Value:	0.5 K	MinRepTime:	10s				
		Cyclic	☒	Period:	15 Min						
Request	☒										
Communication Type											
♦ Group Object Datapoint								Mandatory:	☒		
Default Group Address:	--										
Dynamics											
Power down:	Save:	☐									
Power up:	Value:	No initialisation:	☐			Default value:	☐				
		Saved value:	☐			Actual value (not for input):	☒				
	Transmit on bus (only for output):		☐			Read from bus (only for input):	☐				
Exception Handling											
--											
Special Features											
[1]) this datapoint is also interesting for visualisation and not only used in the associated FB											

LTE-HEE mode: NA

2.4.3.4 Output Fault

Standard mode

DP Name:	Fault			Abbr.:	--				Mandatory	☒	
FB Name:	FTC								Can be internal	☐	
Description											
reports a failure of the FTC											
Datapoint Type											
DPT_Name:	DPT_Bool										
DPT Format:	B_1						DPT_ID:	1.002			
Field	Description						Supp.	Range		Unit	Default
											false
Access Type											
♦ Output											
this → M	☒ 1)		this → 1	☐							
Spontaneous	☒	COV:	☐	Δ-Value:	--	MinRepTime:	10s				
		Cyclic	☒	Period:	15 Min						
Request	☒										
Communication Type											
♦ Group Object Datapoint									Mandatory:	☒	
Default Group Address:	--										
Dynamics											
Power down:	Save:	☐									
Power up:	Value:	No initialisation:	☐			Default value:	☒				
		Saved value:	☐			Actual value (not for input):	☐				
	Transmit on bus (only for output):		☐			Read from bus (only for input):	☐				
Exception Handling											
--											
Special Features											
1) this datapoint is also interesting for visualisation and not only used in the associated FB											

LTE-HEE mode: NA

2.4.3.5 Output CtrlStatus

Standard mode

DP Name:	CtrlStatus	Abbr.:	--	Mandatory	☐
FB Name:	FTC			Can be internal	☐

Description

Controller status
on: FTC is working (default if not supported)
off: FTC is stopped; no control of flow temperature

Datapoint Type

DPT_Name:	DPT_Switch				
DPT Format:	B_1	DPT_ID:	1.001		
Field	Description	Supp.	Range	Unit	Default
					on

Access Type

♦ Output

this → M	☒ 1)	this → 1	☐				
Spontaneous	☒	COV:	☐	Δ-Value:	--	MinRepTime:	10s
		Cyclic	☒	Period:	15 Min		
Request	☒						

Communication Type

♦ Group Object Datapoint	Mandatory:	☒
Default Group Address:	--	

Dynamics

Power down:	Save:	☐			
Power up:	Value:	No initialisation:	☐	Default value:	☒
		Saved value:	☐	Actual value (not for input):	☐
	Transmit on bus (only for output):		☐	Read from bus (only for input):	☐

Exception Handling

--

Special Features

1) this datapoint is also interesting for visualisation and not only used in the associated FB

LTE-HEE mode: NA

2.4.3.6 Input TempFlowWaterSetp

Standard mode:

DP Name:	TempFlowWaterSetp	Abbr.:	--	Mandatory	☒
FB Name:	FTC			Can be internal	☒

Description
see LTE-HEE mode

Datapoint Type					
DPT_Name:	DPT_Value_Temp				
DPT Format:	F_{16}	DPT_ID:	9.001		
Field	Description	Supp.	Range	Unit	Default
			full range	°C	cs

Access Type						
♦ Input						
	N → this	☐	1 → this	☒		
	Spontaneous	☒	Cyclically:	☒	Time-out:	31 min
	Request	☐	Polling:	☐	Period:	

Communication Type			
♦ Group Object Datapoint		Mandatory:	☒
	Default Group Address:	--	

Dynamics						
	Power down:	Save:	☐			
	Power up:	Value:	No initialisation:	☐	Default value:	☒
			Saved value:	☐	Actual value (not for input):	☐
		Transmit on bus (only for output):		☐	Read from bus (only for input):	☐

Exception Handling
see LTE Mode

Special Features
--

LTE-HEE mode:

FB: FTC	**LTE Server Input Name:** TempFlowWaterSetp	Mandatory ☒ Optional ☐

Description:

This inputs contains the requested flow temperature setpoint. The FTC will control the flow temperature accordingly using a manufacturer specific control-loop mechanism.

DPT:	Name	DPT_TempHVACAbs_Z	DPT ID	205.100	Datatype format	$V_{16}Z_8$

Field	Description	Sup.	Unit	Default
TempFlowWaterSetp	temperature setpoint	M	°C	cs
Command	standard Command field		enum	
- Write	normal Write (runtime communication)	M		
- Override & Release	override and release setpoint (by a tool)	O		
- other Commands	not applicable	NA		

Communication:

Binding Group:

Class	Type	Default
Geographical ☐		
Application Specific ☐		
Unassigned ☒	Broadcast ☐ Configurable ☒	1

DP Address:	IO Type(ID):	120 (FTC)	Property ID:	52
LTE-Service (event): Write ☒	Timeout:	31	Min	
Property-Service (individual access):	Read only ☐		Read/Write ☒	

Value after Powerup: [1] Default Value ☒ Stored Value ☐

Exception Handling: Save at Powerdown ☐

[1] manufacturer-specific behaviour of the FTC if no valid setpoint is available in case of power-up or receiver-timeout. e.g.
- close the valve
- open the valve
- leave valve position unchanged
- use default setpoint

Special Features:

This input can be internal (1:1 link with associated FB)

2.4.3.7 Input ChangeOverStatusWater

Standard Mode:

DP Name:	ChangeOverStatusWater	Abbr.:	---	Mandatory	☐
FB Name:	FTC			Can be internal	☒

Description
see LTE-HEE Mode

Datapoint Type			
DPT_Name:	DPT_Heat/Cool		
DPT Format:	B_1	DPT_ID:	01.100

Field	Description	Supp.	Range	Unit	Default
			cooling / heating	bool	heating

Access Type						
♦ Input						
N → this	☐	1 → this	☒			
Spontaneous	☒	Cyclically:	☒	Time-out:	31	
Request	☐	Polling:	☐	Period:		

Communication Type		
♦ Group Object Datapoint	Mandatory:	☒
Default Group Address:	---	

Dynamics					
Power down:	Save:	☐			
Power up:	Value:	No initialisation:	☐	Default value:	☒
		Saved value:	☐		
				Read from bus:	☐

Exception Handling
--

Special Features
--

LTE-HEE mode:

FB: FTC	**LTE Client Input Name:** **ChangeOverStatusWater**	Mandatory ☐ Optional ☒

Description:

This optional input signal indicates the water change over status in a change over system. For an overview refer to chapter 2.2. Depending on this input the FTC will activate the heating sequence or cooling sequence.

DPT:	Name	DPT_Heat/Cool_Z	DPT ID	200.100	Datatype format	$B_1 Z_8$

Field	Description	Sup.	Unit	Default
Heat/Cool	change over status (0 = cooling, 1 = heating)	M	bool	heating
Status	standard Status attributes		bitset	
- Overridden	sensor value overridden true / false	O	bool	false
- all other flags	not supported	NA	bool	

Communication:

Binding Group:

Class	Type	Default
Geographical ☐		
Application Specific ☐		
Unassigned ☒	Broadcast ☐ Configurable ☒	1

DP Address:	IO Type(ID):	342 (WCOS)	Property ID:	51
LTE-Service (event):	InfoReport Sniffer on Binding Group:			--
InfoReport ☒	Timeout:	31	Min	
LTE-Service (polling): Read – Response ☐	Read Wildcard / Resp Sniffer on Binding Group:			--

Value after Powerup: Default Value ☒ Stored Value ☐

Exception Handling: Save at Powerdown ☐

Special Features:

2.4.3.8 Parameter PeripheralLinkFTC

FB: FTC	Property Name (Server): PeripheralLinkFTC	Mandatory ☐ Optional ☒

Description:

LTE zoning number Peripheral link FTC <-> associated FB

DPT:	Name	DPT_UcountValue16_Z	DPT ID	203.012	Datatype format	$U_{16}Z_8$

Field	Description	Sup.	Range	Unit	Default
CounterValue	peripheral link number	M	full	--	1
Status - OutOfService - all other flags	 zone active /inactive not supported, fixed to '0'	 O NA	 true/false	bitset	 false
Command - NormalWrite - SetOSV & ResetOSV - all other commands	 set zone inactive / active not supported	 M O NA		enum	

Communication:

DP Address:	IO Type(ID):	120 (FTC)	Property ID:	101
(in the server)	Start-Index:	1	N° of elements	1
Property access:	Read only ☐		Read/Write ☒	
Protection	Read level	--	Write level	--

Exception Handling: Value after Powerup: Stored Value ☒ Act Value ☐ Default Value ☐

--

Special Features:

FTC is not LTE communicating if zone is 'OutOfService'

2.4.3.9 Parameter RunTimeMixValve

FB: FTC	Property Name (Server): RunTimeMixValve	Mandatory ☐ Optional ☒

Description:

Run time of mixing valve

DPT:	Name	DPT_TimePeriodSec	DPT ID	7.005	Datatype format	U_{16}

Field	Description	Sup.	Range	Unit	Default
			0..65535 s	s	cs

Communication:

DP Address:	IO Type(ID):	120 (FTC)	Property ID:	110
(in the server)	Start-Index:	1	N° of elements	1
Property access:	Read only ☐		Read/Write ☒	
Protection	Read level	--	Write level	--

Exception Handling: Value after Powerup: Stored Value ☒ Act Value ☐ Default Value ☐

--

Special Features:

--

2.4.3.10 Diagnostic data TempFlowWaterAct

FB: FTC	Property Name (Server): TempFlowWaterAct	Mandatory ☒ Optional ☐

Description:

Flow temperature

DPT:	Name	DPT_HVACTempAbs_Z	DPT ID	205.100	Datatype format	$V_{16}Z_8$

Field	Description	Sup.	Range	Unit	Default
Temp	temperature value	M	cs	° C	cs
Status				bitset	
- Fault	temperature corrupted, sensor failure	M	true/false		false
- InAlarm	critical limit is reached	O	true/false		false
- AlarmUnAck	alarm acknowledgement status	O	ack/unack		unack
- all other flags	not supported, fixed to '0'	NA			
Command	standard Command field			enum	
- AlarmAck	alarm acknowledge	O			
- all other commands	not supported	NA			

Communication:

DP Address:	IO Type(ID):	120 (FTC)	Property ID:	111
(in the server)	Start-Index:	1	N° of elements	1
Property access:	Read only ☐		Read/Write ☒ [1)]	
Protection	Read level	--	Write level	--

Exception Handling: Value after Powerup: Stored Value ☐ Act Value ☒ Default Value ☐

--

Special Features:

[1)] optional Write access for Alarm acknowledgement only

2.4.3.11 Diagnostic data CtrlStatus

FB: FTC	Property Name (Server): CtrlStatus	Mandatory ☐ Optional ☒

Description:

Controller status
on: FTC is working (default if not supported)
off: FTC is stopped; no control of flow temperature

DPT:	Name	DPT_Switch	DPT ID	1.001	Datatype format	B_1

Field	Description	Sup.	Range	Unit	Default
			on/off	bool	on

Communication:

DP Address:	IO Type(ID):	120 (FTC)	Property ID:	112
(in the server)	Start-Index:	1	N° of elements	1
Property access:	Read only ☒		Read/Write ☐	
Protection	Read level	--	Write level	--

Exception Handling: Value after Powerup: Stored Value ☐ Act Value ☒ Default Value ☐

--

Special Features:

--

2.4.3.12 Diagnostic data Fault

FB: FTC	Property Name (Server): Fault	Mandatory ☒ Optional ☐

Description:

FTC failure

DPT:	Name	DPT_Bool	DPT ID	1.002	Datatype format	B_1

Field	Description	Sup.	Range	Unit	Default
			true/false	bool	false

Communication:

DP Address: (in the server)	IO Type(ID):	120 (FTC)	Property ID:	113
	Start-Index:	1	N° of elements	1
Property access:	Read only ☒		Read/Write ☐	
Protection	Read level	--	Write level	--

Exception Handling: Value after Powerup: Stored Value ☐ Act Value ☒ Default Value ☐

--

Special Features:

--

2.4.3.13 Diagnostic data ErrorCodeFTC

FB: FTC	Property Name (Server): ErrorCodeFTC	Mandatory ☐ Optional ☒

Description:

Company specific numeric 16 bit error code

DPT:	Name	DPT_Value_2_Ucount	DPT ID	7.001	Datatype format	U_{16}

Field	Description	Sup.	Range	Unit	Default
			full range	--	cs

Communication:

DP Address: (in the server)	IO Type(ID):	120 (FTC)	Property ID:	114
	Start-Index:	1	N° of elements	1
Property access:	Read only ☒		Read/Write ☐	
Protection	Read level	--	Write level	--

Exception Handling: Value after Powerup: Stored Value ☐ Act Value ☒ Default Value ☐

--

Special Features:

--