Application Note 122/08 v11

Title: **Realisation of OpenTherm on KNX RF**

Status: Approved Standard **Date:**

Transitional period: Immediate effect after Final Voting.

Date: 2009.06.24

Subject: Realisation of OpenTherm on KNX RF

Documents

Referred

[01] AN 026 'Use of domain address on RF'

[02] S08: Distributed Address Assignment

[03] Chapter 7/10/1 "HVAC Sensor Functional Blocks"

[04] Chapter 7/11/1 "Hot Water Heating – Heat Production"

[05] Chapter 7/11/3 "Hot Water Heating – Domestic Hot Water Control "

Document updates

Version	Date	Modifications
0.3	05.08.08	Mention of DPTs in described channels
0.4	09.08	Intermediate version
0.5	15.10.08	combined channels, details for properties, name and CC of datapoints
0.6	15.11.08	Reviewed channels
0.7	26.11.08	Readying document for approval by KSG and WGI
0.8	14.01.09	Clearer specification of timing requirements
0.9	19.02.09	Integration of feedback from KSG, readying doc for Release for voting
0.10	29.04.09	Integration of comments from Release for voting, readying doc for Final voting
0.11	24.06.09	Publication as Approved Standard – no comments in final voting cycle

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1 Introduction

OpenTherm (hereafter referred to as OT) is the name of a non-manufacturer-dependent system of communication between modulating heating appliances (central heating appliances and air heaters) and room thermostats. The system consists of a communication protocol and an interface specification[1].

OT products are historically using an own developed TP communication medium. The OT community has however expressed the wish to be able to also use radio communication for the link between the room thermostat and the heating appliances.

In order to enable OT manufacturers to use KNX RF in their products and ensuring compatibility with existing KNX RF products, whilst safeguarding the independence of the OT community and coding, this AN sets a framework of KNX system and interworking requirements to ensure the before-said.

[1] For more information, see www.opentherm.nl

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2 Principles

OT communication is principally P2P: a Central Heating (CH) and Domestic Hot Water (DHW) controller communicate to a CH/DHW producer.

Principally, OT KNX RF devices shall comply with the KNX Bi-directional system profile (2010h).

For run-time communication and in order to ensure a maximum interaction with existing KNX RF products, KNX group objects shall be used.

The data exchange via group communication shall respect the KNX DPTs as laid down in the underneath specified functional blocks. KNX Certification confirms that conformance.

For exchange of maintenance and visualisation data, interface objects and function properties[2] shall be used for communication, whereby the CH/DHW controller acts as KNX property client and the CH/DHW producer acts as property server.

For this type of communication, four KNX application interface objects are reserved (**1200d to 1203d**) in the KNX specifications.

As is the case in OT, the producer functionality is grouped in one application interface object, the consumer functionality in another.

In these interface objects, properties within the range of **PID 51d to 200d** shall be used, according to the mapping in the underneath table, mapping OT IDs to KNX properties.

Only if OT IDs higher than 127 need to be implemented, the implementation of the application interface objects 1202d and 1203d are necessary.

Before 60d, the application interface objects in the clients/controllers (1200d and 1202d) shall foresee properties amongst other for the following management data, documenting which producer(s) is (are) linked to which controller. These properties would for instance allow a tool such as ETS to establish the links between interface objects.
These following properties shall be supported:

- The individual address of the respective server (PDT_UNSIGNED_INT, 2 bytes) on property ID 51d
- The index of the Interface Object of the respective server (PDT_UCHAR, 1 byte) on property ID 52d
- Serial number of the respective server (PDT_Gen_6, 6 byte) on property ID 11d
- Serial number of the communication partner (PDT_Gen_6, 6 byte) on property ID 53d
- The further properties are currently reserved (shall not be used).

The corresponding properties in the application interface objects of the producer(s) 1201d and 1203d are currently reserved (shall not be used), as only the controller shall store the data of his communication partner, not the producer.

Summarized: the interface objects shall be implemented in both the server as well as the client, whereby

- the interface objects in the client shall at least contain the properties before 60d
- the interface objects in the server shall contain all properties except for those before 60d.

[2] The OT specification allows writing of data, which is answered by a response with data different than what was written. In KNX, such behaviour requires the support of function properties

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Application Interface Object Number	Significance	Mapping OT to KNX
1200d	OT Controller_Part1	OT ID 0 to PID60d OT ID 127 to PID187d
1201d	OT Producer_Part1	
1202d	OT Controller_Part2[3]	OT ID 128 to PID60d OT ID 255 to PID187d
1203d	OT Producer_Part2[3]	

Any properties with higher values shall be used for OT manufacturer specific extensions.

The data exchange via properties does not respect any KNX DPT definitions. The coding is OT specific and in accordance with the OT specifications of the individual OT ID: any extensions or modifications completely falls within the responsibility of the OT community and is not part of the KNX specifications.
For KNX conformity, the implementation of the OT specific data exchange is optional, group data exchange is mandatory. If the OT properties are implemented, some of the functionality will therefore be accessible via group and interface objects.

An OT write access shall be mapped to a KNX property function command service, an OT read access to a KNX property function read state service.

Coding of the data in property function command:

The service 'A_Property_Function_Command-PDU' shall be used to execute a write access to an OT ID. The values of OT IDs shall always be coded in 2 octets.

Octet 10	Octet 11	Octet 11
Status	OT high byte data[4]	OT low byte data[3]

Status coding

Bit 0 LSB = 0 data invalid

Bit 0 LSB = 1 data valid

Bit 1..7 reserved, shall be set to ‚0' by the sender, shall be ignored by the receiver

[3] Optional, if OT Ids higher than 127 need to be implemented
[4] For further info please consult the OT protocol specification

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Coding of the property function response:

A property server (e.g. boiler) shall respond to a function command service with a 'A_Property_Function_Response-PDU'.

(identical for property function command and property function state read)

Octet 10	Octet 11	Octet 11
Return Code	OT high byte data[3]	OT low byte data[3]

Return Codes:

(00h) = SUCCESS (value successfully written/read)

(06h) = data invalid[3]

(07h) = unknown OT ID[3]

(08h) = wait, retry later (only for read service)

Note: The return code wait/retry shall indicate that the server shall retrieve the data from the OT slave. The client may retry only after at least 2 seconds. The server shall ignore a second request for the same data during the wait state. The server shall use the wait return code in case the data is not cached in the server and a response cannot be sent within 500 ms. In general both server and client shall respect the duty cycle.

Coding of the property function state read:

Same format shall be used as for the function command service.

The CH/DHW controller may be battery powered. In order to allow saving battery status, it is allowed that the controller goes into sleep mode. The update of input data shall be initiated on the controller upon user stimulus, triggering a read of the corresponding property[5]. In order to keep itself informed about cyclical sent server information, the controller may initiate an automatic wake up at regular intervals. The controller may return to sleep mode immediately after receiving the requested property service response. Should the property service response still be missing after 800 ms, the controller may also return to sleep mode. During the link sequence the controller shall never go into sleep mode.

A mechanism shall be provided to set a device in permanent receive mode, to ensure configuration by a tool.

Links between KNX OT products are established using KNX PB mode. For this, 6 new KNX Easy Channels are defined, two for the Central heating functionality and two for the direct hot water heating functionally and two combining the before-said functionality. Some of the data points in these channels are marked as optional. The usage of optional data points is only possible if the product complies with the Flexible E-Mode channel concept. If such mechanism are not supported only the mandatory data points may be implemented in the channels

During the start-up of the OT-producer, it shall be checked if CH and/or DHW are available at the connected boiler. Depending on this result the corresponding channel shall be supplied in the DD2 response.

[5] Reading of data through group value read messages is not recommended on KNX RF: if reading of data stored in a group object is necessary, the group data shall always also be implemented additionally as a property.

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3 Establishing the Property Client – Server Relation

3.1 General

In the Easy Push button procedure, a property client can be linked automatically to a property server.

During the push button procedure the serial numbers of the communication partners are exchanged as well as the channel codes. In this way, as a property client, a device shall store the serial number of a potential property server. The returned channel code indicates that the communication partner is an OT device, in turn suggesting that this device implements special OT application interface objects and properties. The knowledge of the serial number of a KNX device is sufficient to set up a point to point communication based on domain address and individual address.

In S-Mode the client-server relation can be established by writing the property 51d and 52d as part of the OT controller application interface object.

In the case where one client can manage multiple servers, several instances of the relevant application interface objects shall be implemented.

3.2 Setting the Domain address

In order to be able to exchange individual addressed frames on KNX-RF, both devices shall use the same domain address.

In push button mode the domain address is not used. As there is no central tool to set the domain addresses, the following procedure shall be followed.

All devices shall be shipped with the domain address set to 0.

The sensor (client) device shall read the domain address from the actuator (server) via the service A_DomainAddressSerialNumber_Read/Response (as described in [1]).

If the domain address of the server is programmed (not equal 0), the client shall also use this domain address.

If only the domain address of the client is programmed, this address shall be written to the actuator using the service A_DomainAddressSerialNumber_Write.

If both domain addresses (from client and server) are not programmed (equal 0), the client shall write the serial number of the server as domain address to the server and also use this number as own domain address.

After the client has written a domain address to the server the result shall be verified via the service A_DomainAddressSerialNumber_Read/Response.

In S-Mode the domain address is set by the tool.

3.3 Setting the Individual address

After assigning the domain address, the individual addresses (IA) of sensor and actuator shall be programmed.

After assigning the individual addresses, each device shall have a unique address within the domain and different from the default address 0x05FF (see [2]).

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First the sensor shall check its own individual address. If this address is not programmed (0x05FF), it shall select another address within the range of 0x0501 to 0x05FE and shall check whether the selected address is unused within the domain via the services A_DeviceDescriptor_Read/Response.

An implemented random generator shall ensure that the sensor makes a random address selection within the before said range, to limit the possibility of duplication of individual addresses when sent A_DeviceDescriptor_Response messages should not reach the sender on the open RF medium.

If the sensor establishes that the individual address is not free, the procedure shall be repeated until a free IA is found.

If the individual address of the sensor had already been programmed before, the device shall keep the existing IA.

After programming the IA of the sensor, the current IA of the actuator shall be read by the sensor using the service A_IndividualAddressSerialNumber_Read/Response. As alternative this address may also be derived from any services received from the actuator before. If the IA of the actuator is already programmed, it shall be left untouched. If it is not programmed (0x05FF), the same procedure shall be used to find an unused IA as described above for the sensor. A new IA address can be programmed via the service A_IndividualAddressSerialNumber_Write. After the client has written an individual address to the server the result shall be verified via the service A_IndividualAddressSerialNumber_Read/Response.

In S-Mode the individual addresses are set by the tool.

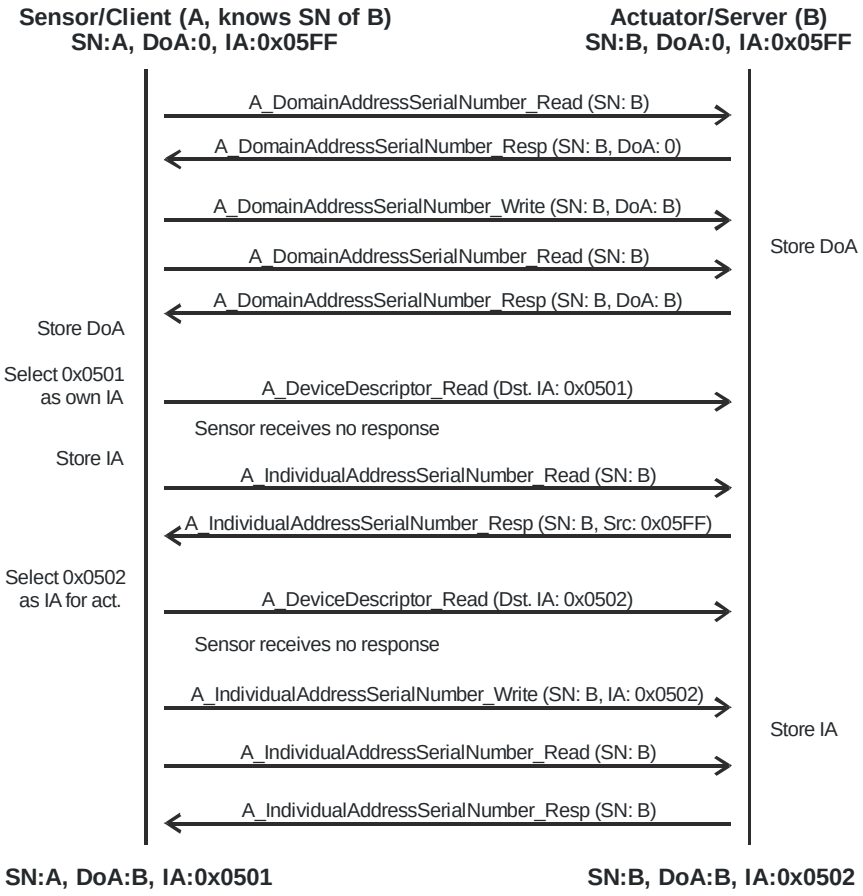

Figure 1: Sequence with two unprogrammed devices without address conflicts

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This procedure can also be used to setup the client/server relation in the other direction.

The manufacturer shall ensure that a simultaneous execution of the set-up of the client/server relation is excluded.

4 Channel overview

4.1 Introduction

OpenTherm is a point-to-point communication system and connects boilers with room controllers.

The room controller calculates a heating demand signal in the form of a water temperature Control Set point based on room temperature (or other control from, e.g. OTC) and transmits this heating demand signal to the boiler, thus controlling its output.

The boiler in turn may transmit fault and system information to the room controller for display or diagnostics purposes. A large number of data items are defined in the OT/+ Application Layer Protocol, covering these and many other types of system data.

4.2 General

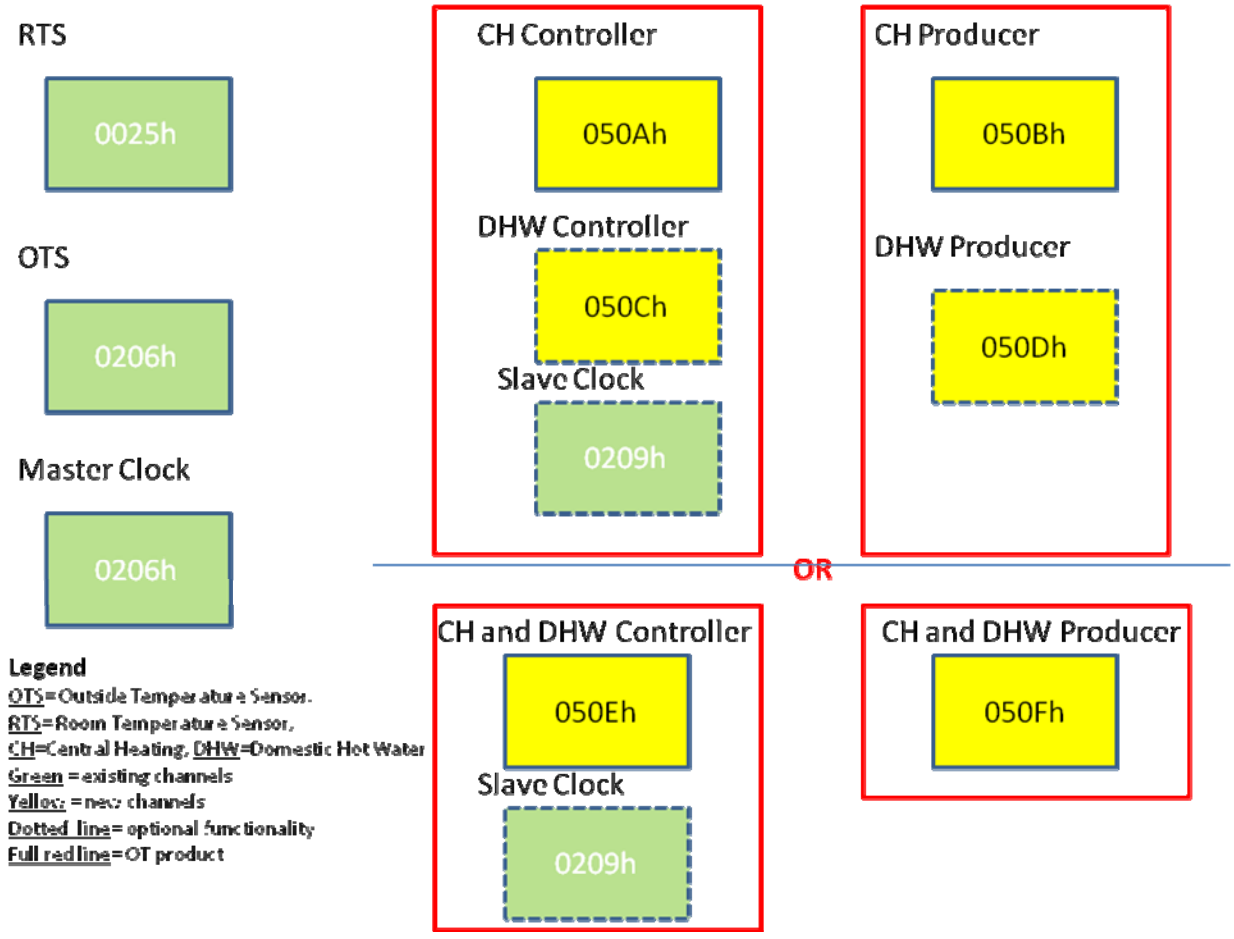

Figure 2 – Overview of Open Therm KNX regulation

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4.3 Channel Central Heating Controller

This channel allows receiving information from a CH producer for controlling and/or displaying purposes. On the basis of information stored in the controller (clock program, heating curve etc.), it controls the producer by sending an enable signal and a supply temperature set-point.

4.4 Channel Central Heating Producer

This channel allows receiving information from a CH controller in order to generate the demanded supply temperature for a CH system. It also provides the controller with status information.

4.5 Channel Domestic Hot Water Controller

This channel allows receiving information from a DHW producer for controlling and/or displaying purposes. On the basis of information stored in the controller (clock program, set-point etc.), it controls the producer by sending an enable signal, and a DHW temperature set-point.

4.6 Channel Domestic Hot Water Producer

This channel allows receiving commands from a DHW controller in order to generate the demanded DHW temperature. It also provides the controller with status information.

4.7 Channel Central Heating and Domestic Hot Water Controller

This channel combines the functionality of the channels explained under 4.3 and 4.5.

4.8 Channel Central Heating and Domestic Hot Water Producer

This channel combines the functionality of the channels explained under 4.4 and 4.6.

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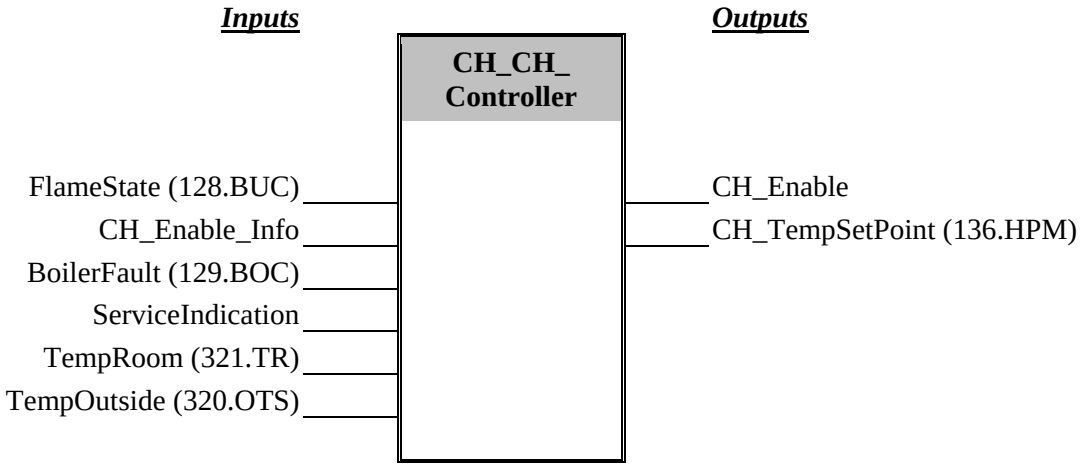
5 CH_CH_Controller (Channel Code 050Ah)

- **Name:** CH_CH_Controller
- **ID:** 50Ah
- **Classification:** Central heating controller (sensor)
- **Functional Block:**
  - Chapter 7/10/1 “HVAC Sensor Functional Blocks” (see [3])
  - Chapter 7/11/1 “Hot Water Heating – Heat Production” (see [4])
- **Graphical representation:**



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- **Datapoint list:**

Mandatory datapoints

Index	FB / Datapoint ID	Name	Sub-unit	Main CC	Additional CCs	Flags (i/o,x,v…..)	reference to OT-ID	DPT
1		CH_Enable	1	CC_Heating_Enable (33)	CC_Enable (16)	O, L	ID 0 HB 0	1.003
Flag to demand the CH mode of the producer. When enabled the producer shall heat up the CH system to CH_TempContrSetPoint.								
2	136.HPM	CH_TempSetPoint	1	CC_CH_Temp Setpoint (101)	---	O	ID 1	9.001
The producer shall use this temperature as set-point to make CH supply water. It shall only do so when CH is enabled.								

Optional datapoints

Index	FB / Datapoint ID	Name	Sub-unit	Main CC	Additional CCs	Flags (i/o,x,v…..)	reference to OT-ID	DPT
	128.BUC	FlameState	1	CC_Switch_OnOff _Status (2)	---	I, X	ID 0 LB 3	1.001
Flame status indicating that the producer flame is on or off								
		CH_Enable_Info	1	CC_CH_Enable_Info (102)	---	I, X	ID 0 LB 1	1.001
Status flag indicating the CH mode of the producer. Producer is CH enabled when it is providing heat to the CH system.								
	129.BOC	BoilerFault	1	CC_Fault (103)	---	I, X	ID 0 LB 0	1.005
Flag indicating that the producer has a fault. This can be both non recoverable (manual intervention is needed) or recoverable (no intervention needed). Depending on the type of fault the producer may still function: the controller therefore needs to continue controlling the producer.								
		ServiceIndication	1	CC_Service (104)	---	I, X	ID 0 LB 6	1.005
Flag indicating that the producer needs service. The producer may still function, possibly with reduced functionality.								
	321.TR	TempRoom	1	CC_TR (37)	CC_Temp (34)	I, X	ID 24	9.001
Measured room temperature. Used for room temperature control or heat curve correction.								
	320.OTS	TempOutside	1	CC_TO (36)	---	I, X	ID 27	9.001
Measured outside temperature. Used for heat curve or just for displaying purposes on the controller								

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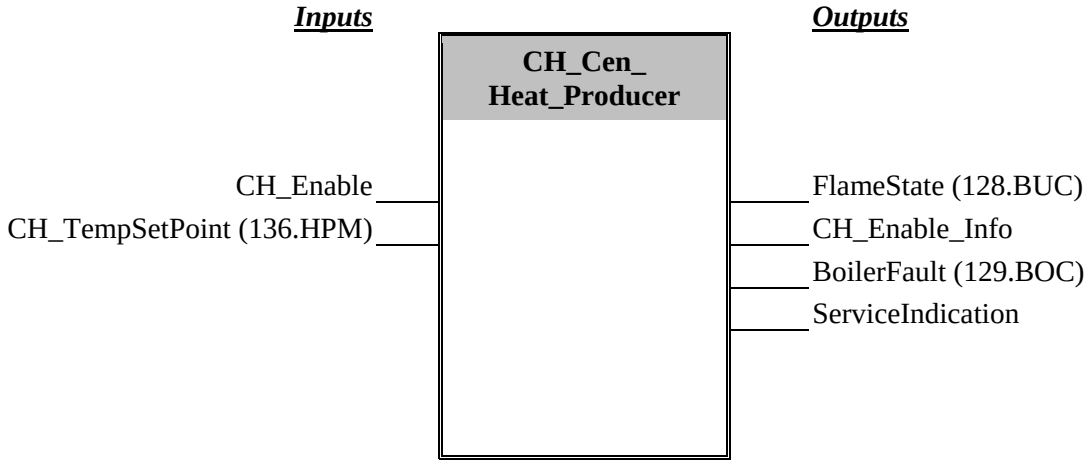
6 CH_CH_Producer (Channel Code 050Bh)

- **Name:** CH_CH_Producer
- **ID:** 50Bh
- **Classification:** Central heating producer (actuator)
- **Functional Block:**
  - Chapter 7/11/1 “Hot Water Heating – Heat Production” (see [4])
- **Graphical representation:**



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- **Datapoint list:**

Mandatory datapoints

Index	FB / Data point ID	Name	Sub-unit	Main CC	Additional CCs	Flags (i/o,x,v…..)	reference to OT-ID	DPT
1		CH_Enable	1	CC_CH_Enable (33)	CC_Enable (16)	I, X, L	ID 0 HB 0	1.003
Flag to demand the CH mode of the producer. When enabled the producer will heat up the CH system to CH_TempContrSetPoint.								
2	136. HPM	CH_TempSetPoint	1	CC_CH_TempSet point(101)	---	I,X	ID1	9.001
The producer uses this temperature as set-point to make CH supply water. It shall only do so when CH is enabled.								
3	128. BUC	FlameState	1	CC_Switch_OnOff _Status (2)	---	O	ID 0 LB 3	1.001
Flame status indicating that the producer flame is on or off								
4		CH_Enable_Info	1	CC_CH_Enable_Info (102)	---	O, LA	ID 0 LB 1	1.001
Status flag indicating the CH mode of the producer. Producer is CH enabled when it providing heat to the CH system.								
5	129. BOC	BoilerFault	1	CC_Fault (103)	---	O	ID 0 LB 0	1.005
Flag indicating that the producer has a fault. This can be both non recoverable (manual intervention is needed) or recoverable (no intervention needed). Depending on the type of fault the producer may still function: the controller therefore needs to continue controlling the producer.								

Optional datapoints

Index	FB / Data point ID	Name	Sub-unit	Main CC	Additional CCs	Flags (i/o,x,v…..)	reference to OT-ID	DPT
		ServiceIndication	1	CC_Service (104)	---	O	ID 0 LB 6	1.011
Flag indicating that the producer needs service. The producer may still function, possibly with reduced functionality.								

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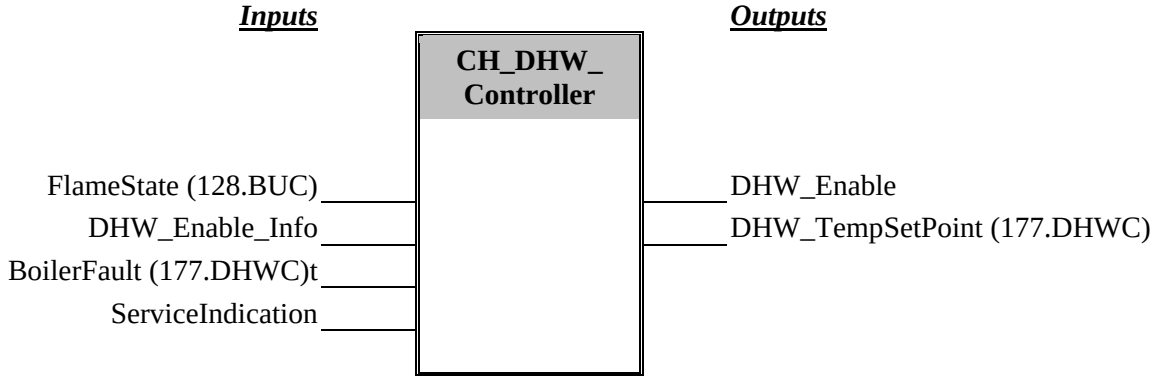
7 CH_DHW_Controller (Channel Code 050Ch)

- **Name:** CH_DHW_Controller
- **ID:** 50Ch
- **Classification:** Hot water controller (sensor)
- **Functional Block:**
  - Chapter 7/11/1 “Hot Water Heating – Heat Production” (see [4])
  - Chapter 7/11/3 “Hot Water Heating – Domestic Hot Water Control ” (see [5])
- **Graphical representation:**



- **Datapoint list:**

Mandatory datapoints

- **Datapoint list:**

Index	FB / Datapoint ID	Name	Sub-unit	Main CC	Additional CCs	Flags (i/o,x,v…..)	reference to OT-ID	DPT
1		DHW_Enable	1	CC_DHW_Enable (105)	CC_Enable (16)	O, L	ID 0 HB 1	1.003
This flag indicates to producer to be ready to produce DHW when it is demanded by the user by opening the tap. When DHW is not enabled, the producer is not obliged to react on a user opening the tap. DHW enabled is generally used to save energy.								

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Optional datapoints

Index	FB / Datapoint ID	Name	Sub-unit	Main CC	Additional CCs	Flags (i/o,x,v…..)	reference to OT-ID	DPT
	128.BUC	FlameState	1	CC_Switch_OnOff_Status (2)	---	I, X	ID 0 LB 3	1.001
Flame status indicating that the producer flame is on or off								
		DHW_Enable_Info	1	CC_DHW_Enable_Info (106)	---	I, X	ID 0 LB 2	1.001
Status flag indicating the DHW mode of the producer. Producer is DHW enabled when it is providing heat to the DHW system.								
	177. DHWC	DHW_TempSet Point	1	CC_DHW_Temp Setpoint (107)	---	O	ID 56	9.001
This DHW temperature set point is used by the DHW producer as set-point for providing DHW. When no DHW temperature set point has been sent, the DHW producer shall use its default value.								
	177. DHWC	BoilerFault	1	CC_Fault (103)	---	I, X	ID 0 LB 0	1.005
Flag indicating that the producer has a fault. This can be both non recoverable (manual intervention is needed) or recoverable (no intervention needed). Depending on the type of fault the producer may still function: the controller therefore needs to continue controlling the producer.								
		ServiceIndication	1	CC_Service (104)	---	I, X	ID 0 LB 6	1.005
Flag indicating that the producer needs service. The producer may still function, possibly with reduced functionality.								

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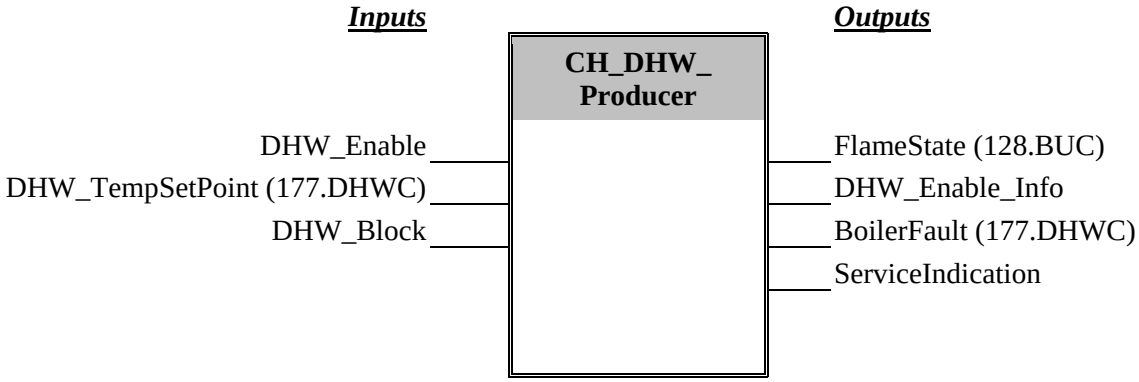
8 CH_DHW_Producer (Channel Code 050Dh)

- **Name:** CH_DHW_Producer
- **ID:** 50Dh
- **Classification:** Hot water producer (actuator)
- **Functional Block:**
  - Chapter 7/11/1 “Hot Water Heating – Heat Production” (see [4])
  - Chapter 7/11/3 “Hot Water Heating – Domestic Hot Water Control ” (see [5])
- **Graphical representation:**



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- **Datapoint list:**

Mandatory datapoints

Index	FB / Datapoint ID	Name	Sub-unit	Main CC	Additional CCs	Flags (i/o,x,v …..)	reference to OT-ID	DPT
1		DHW_Enable	1	CC_DHW_ Enable (105)	CC_Enable (16)	I, X, L	ID 0 HB 1	1.003
This flag indicates to producer to be ready to produce DHW when it is demanded by the user when opening the tap. When DHW is not enabled, the producer is not obliged to react on a user opening the tap. DHW enabled is generally used to save energy.								
2		DHW_Block	1	CC_SwithOnOff (01)	---	I	ID 0 HB 6	1.003
This flag shall indicate the DHW producer to immediately stop producing DHW. Can be used is case other devices take over DHW production (e.g. solar systems).								
3	128.BUC	FlameState	1	CC_Switch_ OnOff_Status (2)	---	O	ID 0 LB 3	1.001
Flame status indicating that the producer flame is on or off								
4		DHW_Enable_Info	1	CC_DHW_Mode (106)	---	O, LA	ID 0 LB 2	1.001
Status flag indicating the DHW mode of the producer. Producer is DHW enabled when it is providing heat to the DHW system.								
5	177.DHWC	BoilerFault	1	CC_Fault (103)	---	O	ID 0 LB 0	1.005
Flag indicating that the producer has a fault. This can be both non recoverable (manual intervention is needed) or recoverable (no intervention needed). Depending on the type of fault the producer may still function: the controller therefore needs to continue controlling the producer.								

Optional datapoints

Index	FB / Datapoint ID	Name	Sub-unit	Main CC	Additional CCs	Flags (i/o,x,v… ..)	reference to OT-ID	DPT
	177.DHWC	DHW_TempSet Point	1	CC_DHW_Temp Setpoint (107)	---	I, X	ID 56	9.001
This DHW temperature set point is used by the DHW producer as set-point for providing DHW. When no DHW temperature set point has been sent, the DHW producer shall use its default value.								
		ServiceIndication	1	CC_Service (104)	---	O	ID 0 LB 6	1.011
Flag indicating that the producer has a fault. This can be both non recoverable (manual intervention is needed) or recoverable (no intervention needed). Depending on the type of fault the producer may still function: the controller therefore needs to continue controlling the producer.								

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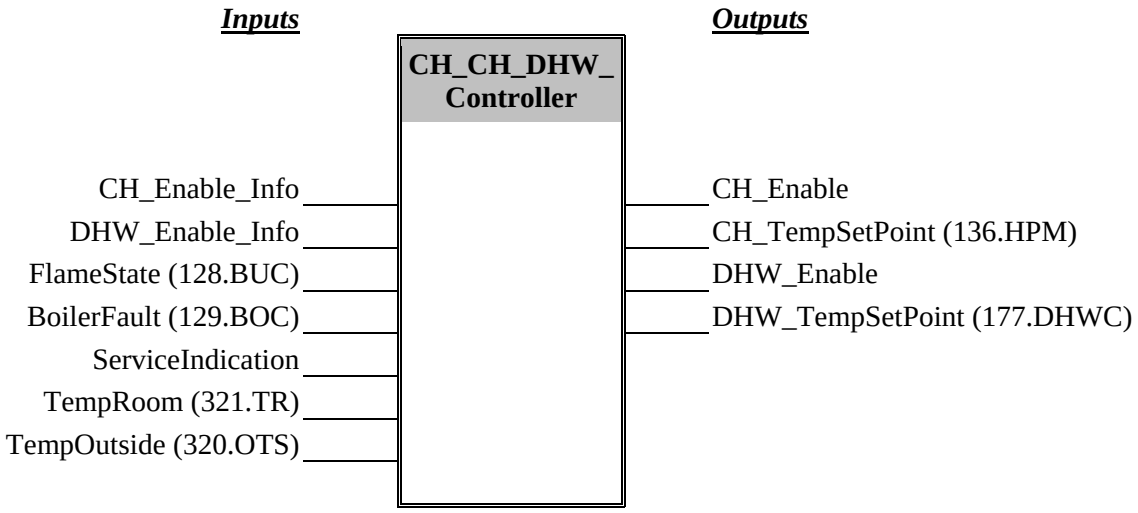
9 CH_CH_DHW Controller (Channel Code 050Eh)

- **Name:** CH_CH_DHW_Controller
- **ID:** 50Eh
- **Classification:** Central heating and domestic hot water controller (sensor)
- **Functional Block:**
  - Chapter 7/10/1 “HVAC Sensor Functional Blocks” (see [3])
  - Chapter 7/11/1 “Hot Water Heating – Heat Production” (see [4])
  - Chapter 7/11/3 “Hot Water Heating – Domestic Hot Water Control ” (see [5])
- **Graphical representation:**



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- **Datapoint list:**

Mandatory datapoints

Index	FB / Data point ID	Name	Sub-unit	Main CC	Additional CCs	Flags (i/o,x,v…..)	reference to OT-ID	DPT
1		CH_Enable_	1	CC_CH_Enable (33)	CC_Enable (16)	O, L	ID 0 HB 0	1.003
Flag to demand the CH mode of the producer. When enabled the producer will heat up the CH system to CH_TempContrSetPoint. It is however allowed to give priority to DHW_enable (see data point with index 3).								
2	136. HPM	CH_TempSetPoint	1	CC_CH_TempSet Point (101)	---	O	ID 1	9.001
The producer uses this temperature as set-point to make CH supply water. It shall only do so when CH is enabled.								
3		DHW_Enable	1	CC_DHW_Enable (105)	---	O,	ID 0 HB 1	1.003
This flag indicates to producer to be ready to produce DHW when it is demanded by the user by opening the tap. When DHW is not enabled, the producer is not obliged to react on a user opening the tap. DHW enabled is generally used to save energy.								

Optional datapoints

Index	FB / Data point ID	Name	Sub-unit	Main CC	Additional CCs	Flags (i/o,x,v…..)	reference to OT-ID	DPT
	177. DHWC	DHW_TempSet Point	1	CC_DHW_Temp SetPoint (107)	---	O	ID 56	9.001
This DHW temperature set point is used by the DHW producer as set-point for providing DHW. When no DHW temperature set point has been sent, the DHW producer shall use its default value.								
		CH_Enable_Info	1	CC_CH_Enable_Info (102)	---	I, X	ID 0 LB 1	1.001
Status flag indicating the CH mode of the producer. Producer is CH enabled when it providing heat to the DHW system.								
		DHW_Enable_Info	1	CC_DHW_Enable _Info (106)	---	I, X	ID 0 LB 2	1.001
Status flag indicating the DHW mode of the producer. Producer is DHW enabled when it is providing heat to the DHW system.								
	128. BUC	FlameState	1	CC_Switch_OnOff _Status (2)	---	I, X	ID 0 LB 3	1.001
Flame status indicating that the producer flame is on or off								
	129. BOC	BoilerFault	1	CC_Fault (103)	---	I, X	ID 0 LB 0	1.005
Flag indicating that the producer has a fault. This can be both non recoverable (manual intervention is needed) or recoverable (no intervention needed). Depending on the type of fault the producer may still function: the controller therefore needs to continue controlling the producer.								

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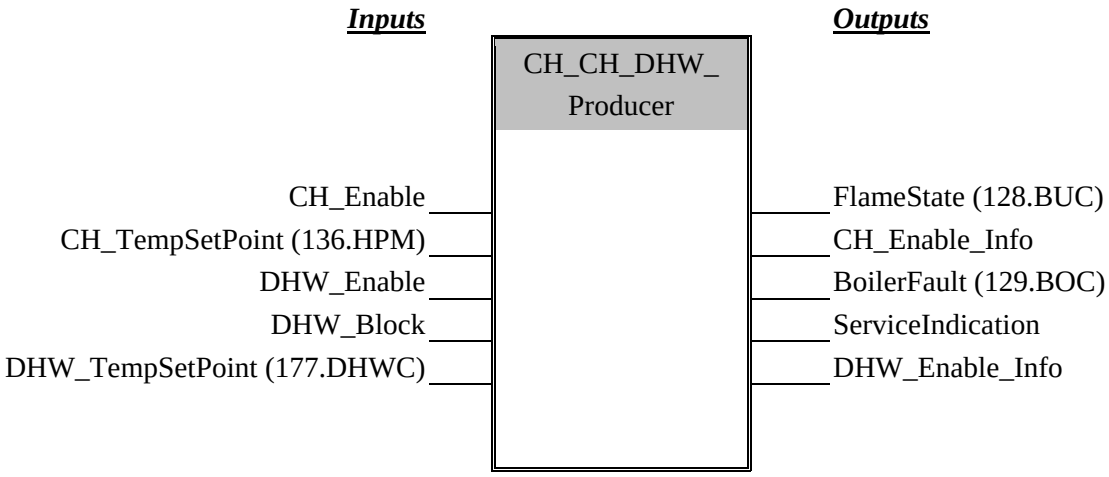
		ServiceIndication	1	CC_Service (104)	---	I, X	ID 0 LB 6	1.005
Flag indicating that the producer has a fault. This can be both non recoverable (manual intervention is needed) or recoverable (no intervention needed). Depending on the type of fault the producer may still function: the controller therefore needs to continue controlling the producer.								
	321.TR	TempRoom	1	CC_TR (37)	CC_Temp (34)	I, X	ID 24	9.001
Measured room temperature. Used for room temperature control or heat curve correction.								
	320. OTS	TempOustide	1	CC_TO (36)	---	I, X	ID 27	9.001
Measured outside temperature. Used for heat curve or just for displaying purposes on the controller								

10 CH_CH_DHW_Producer (Channel Code 050Fh)

- **Name:** CH_CH_DHW_Producer
- **ID:** 50Fh
- **Classification:** Central heating and domestic hot water producer (actuator)
- **Functional Block:**
  - Chapter 7/11/1 “Hot Water Heating – Heat Production” (see [4])
  - Chapter 7/11/3 “Hot Water Heating – Domestic Hot Water Control ” (see [5])
- **Graphical representation:**



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- **Datapoint list:**

Mandatory datapoints

Index	FB / Data point ID	Name	Sub-unit	Main CC	Additional CCs	Flags (i/o,x,v…..)	reference to OT-ID	DPT
1		CH_Enable	1	CC_CH_Enable (33)	CC_Enable (16)	I, X, L	ID 0 HB 0	1.003
Flag to demand the CH mode of the producer. When enabled the producer will heat up the CH system to CH_TempContrSetPoint. It is however allowed to give priority to DHW_enable (see data point with index 3).								
2	136. HPM	CH_TempSetPoint	1	CC_CH_TempSetpoint (101)	---	I, X	ID1	9.001
The producer uses this temperature as set-point to make CH supply water. It shall only do so when CH is enabled.								
3		DHW_Enable	1	CC_DHW_Enable (105)	CC_Enable (16)	I, X	ID 0 HB 1	1.003
This flag indicates to producer to be ready to produce DHW when it is demanded by the user when opening the tap. When DHW is not enabled, the producer is not obliged to react on a user opening the tap. DHW enabled is generally used to save energy.								
4		DHW_Block	1	CC_SwithOnOff (01)	---	I	ID 0 HB 6	1.003
This flag shall indicate the DHW producer to immediately stop producing DHW. Can be used is case other devices take over DHW production (e.g. solar systems).								
5	128. BUC	FlameState	1	CC_Switch_OnOff _Status (2)	---	O	ID 0 LB 3	1.001
Flame status indicating that the producer flame is on or off								
6		CH_Enable_Info	1	CC_CH_Enable_Info (102)	---	O, LA	ID 0 LB 1	1.001
Status flag indicating the CH mode of the producer. Producer is CH enabled when it providing heat to the CH system.								
7	129. BOC	BoilerFault	1	CC_Fault (103)	---	O	ID 0 LB 0	1.005
Flag indicating that the producer has a fault. This can be both non recoverable (manual intervention is needed) or recoverable (no intervention needed). Depending on the type of fault the producer may still function: the controller therefore needs to continue controlling the producer.								
8		DHW_Enable_Info	1	CC_DHW_Enable_Info (106)	---	O	ID 0 LB 2	1.001
Status flag indicating the DHW mode of the producer. Producer is DHW enabled when it is providing heat to the DHW system.								

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Optional datapoints

Index	FB / Data point ID	Name	Sub-unit	Main CC	Additional CCs	Flags (i/o,x,v…..)	reference to OT-ID	DPT
		ServiceIndication	1	CC_Service (104)	---	O	ID 0 LB 6	1.011
Flag indicating that the producer has a fault. This can be both non recoverable (manual intervention is needed) or recoverable (no intervention needed). Depending on the type of fault the producer may still function: the controller therefore needs to continue controlling the producer.								
	177. DHWC	DHW_TempSetPoint	1	CC_DHW_TempSet Point (107)	---	I,X	ID 56	9.001
This DHW temperature set point is used by the DHW producer as set-point for providing DHW. When no DHW temperature set point has been sent, the DHW producer shall use its default value.								

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11 New defined Connection codes

Connection code			Based on DPT:	
Name	Identifier Dec.	Abbrev.	Name	DTP type
Central Heating Temperature Setpoint	101	CC_CH_TempSet point	DPT_ValueTemp	9.001
Central Heating Enable Info	102	CC_CH_Enable_Info	DPT_Switch	1.001
Boiler Fault	103	CC_Fault	DPT_Alarm	1.005
Service Indication	104	CC_Service	DPT_Alarm	1.005
Domestic Hot Water Enable	105	CC_DHW_Enable	DPT_Enable	1.003
Domestic Hot Water Enable Info	106	CC_DHW_Enable _Info	DPT_Switch	1.001
Domestic Hot Water Setpoint	107	CC_DHW_TempSet point	DPT_ValueTemp	9.001

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