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Summary

This document specifies the standard mode E-Mode Channels specified for the HVAC Application Domain.

Version 01.02.02 is a KNX Approved Standard.

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

Document Updates

Version	Date	Modifications
1.0	2007.10.10	• Document creation • **AN051 "New channels"** integrated.
	2007.10.18	• **AN087 "New channels 2005.02"** integrated.
1.0	2009.06.16	Update in view of publication in the KNX Specifications v2.0.
1.1	2010.07.15	• **AN093 "Common HVA Channels" integrated.**
01.02.01	2013.09.10	• **AN135 "E-Mode Channel CH_HVAC_Mode_Display2"** integration started and completed.
01.02.02	2013.10.29	Editorial updates for the publication of KNX Specifications 2.1.

References

[01] Chapter 7/1/2 "Common Sensors"
[02] Chapter 7/1/4 "Technical Alarm"
[03] Chapter 7/10/1 "HVAC Sensor Functional Blocks"
[04] Chapter 7/10/2 "HVAC HMI Functional Blocks"
[05] Chapter 7/10/3 "HVAC Actuator Functional Blocks"
[06] Chapter 7/10/4 "HVAC Common Functional Blocks"
[07] Chapter 7/10/5 "HVAC Schedulers"
[08] Chapter 7/11/1 "Heat Production"
[09] Chapter 7/13/1 "Controller" (Terminal Unit Functional Blocks)
[10] Chapter 7/14/1 "Ventilation, Air Conditioning"
[11] Chapter 7/14/2 "Cold Water"

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Contents

1 Introduction

1.1 E-Mode Channels for heating

Figure 1 gives a possible combination of HVAC E-Mode Channels to build an HVAC application. Other HVAC E-Mode Channels and other models are possible.

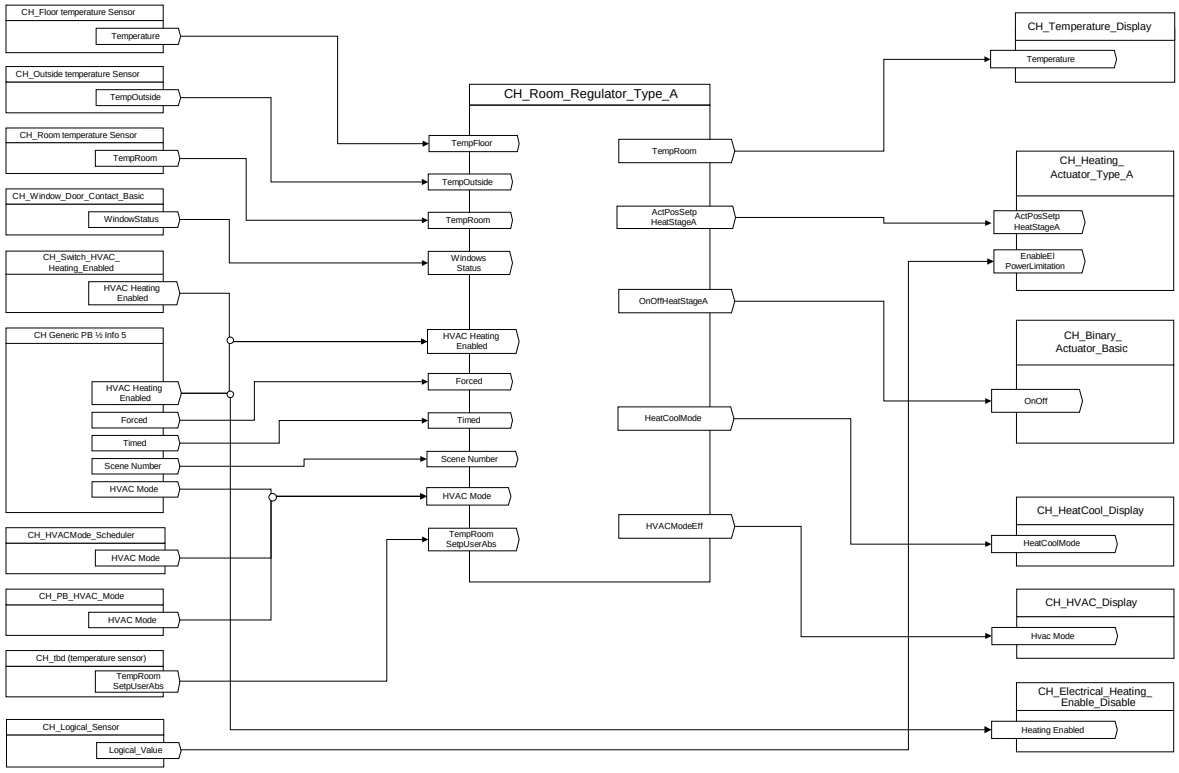


Figure 1 – HVAC E-Mode Channels application model

1.2 Channel overview

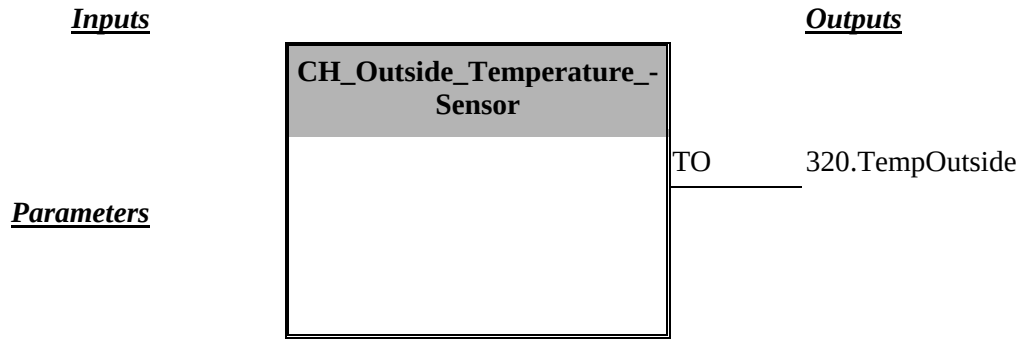
Channel Code	Channel Name
0024h	CH_Outside_Temperature_Sensor
0025h	CH_Room_Temperature_Sensor
0027h	CH_PB_HVAC_Mode
0028h	CH_Switch_HVAC_Heating_Enabled
002Eh	CH_PB_HVAC_Mode_1
0207h	CH_HVAC_Mode_Scheduler
0208h	CH_Room_Regulator_Type_A
0501h	CH_Heating_Valve_Actuator
0502h	CH_HVACMode_Display

Channel Code	Channel Name
0503h	CH_Electrical_Heating_Actuator_Type_A
0504h	CH_Electrical_Heating_Enable_Disable
0505h	CH_HVAC_Mode_Display2

2 Channels HVAC

2.1 CH_Outside_Temperature_Sensor (Channel Code 0024h)

- **Name:** CH_Outside_Temperature_Sensor
- **ID:** 0024h
- **Classification:** sensor
- **Functional Block:**
  - 320 - FB Outside Temperature Sensor (OTS) (See [03]).
- **Graphical representation:**



- **Description:**

  The outside temperature sensor channel shall measure the outside air temperature and shall provide it to the system. The outside temperature shall be sent on change and shall be repeated periodically.

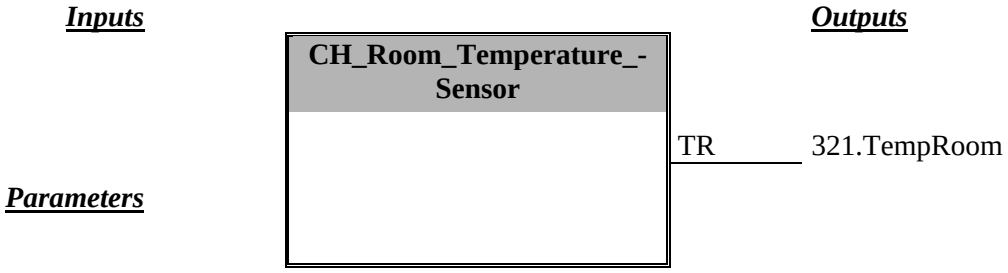
  - The period for sending the outside temperature shall be 15 min and the TempCOV value shall be 0,2 K.
  - The TempOutside Datapoint Type shall be 9.001 DPT_Value_Temp. The exponent may be fixed to 3.

- **Datapoint list:**

Index	FB Datapoint ID	Name	Subunit	Main CC	Additional CCs	Flags (i/o,x,v, …)
0	320.TempOutside	TempOutside	1	CC_TO	CC_Temperature	OL

2.2 CH_Room_Temperature_Sensor (Channel Code 0025h)

- **Name:** CH_Room_Temparature_Sensor
- **ID:** 0025h
- **Classification:** sensor
- **Functional Block:**
  - 321 - FB Room Temperature Sensor (RTS) (See [03]).
- **Graphical representation:**



- **Description:**

  Please refer to the specifications of the FB Room Temperature Sensor.

  The room temperature sensor channel shall measure the room temperature and shall provide it to the system. The room temperature shall be sent on change and shall be repeated periodically.

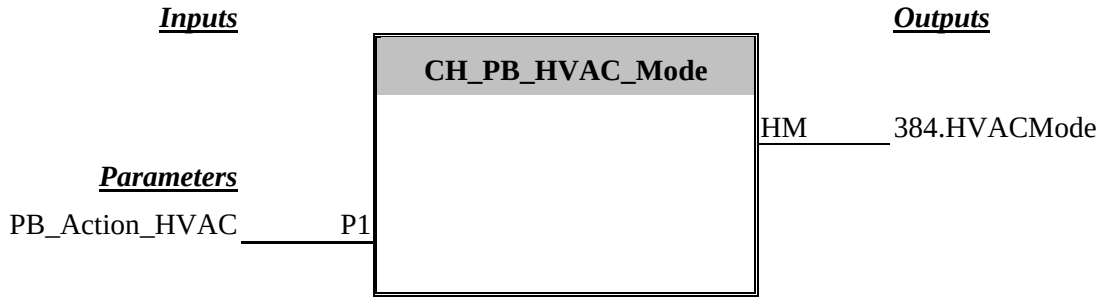
  - The period for sending the room temperature shall be 15 min and the TempCOV value shall be 0,2 K.
  - The TempRoom Datapoint Type shall be 9.001 DPT_Value_Temp. The exponent may be fixed to 3.

- **Datapoint list:**

Index	FB Datapoint ID	Name	Subunit	Main CC	Additional CCs	Flags (i/o,x,v, …)
0	321.TempRoom	TempRoom	1	CC_TR	CC_Temperature	OL

2.3 CH_PB_HVAC_Mode (Channel Code 0027h)

- **Name:** CH_PB_HVAC_Mode
- **ID:** 0027h
- **Classification:** sensor
- **Functional Block:**
  - 384 – User HVAC Room Settings (UHRS) (See [04]).
- **Graphical representation:**



- **Description:**

  See FB Switching Sensor Basic.

  On activation of interaction 1 the value1 shall be sent corresponding to the parameter PB_Action_HVAC.

  On deactivation of interaction 1 the value2 shall be sent corresponding to the parameter PB_Action_HVAC.

  If the value is “nothing”, no message shall be sent on the bus.

- **Datapoint list:**

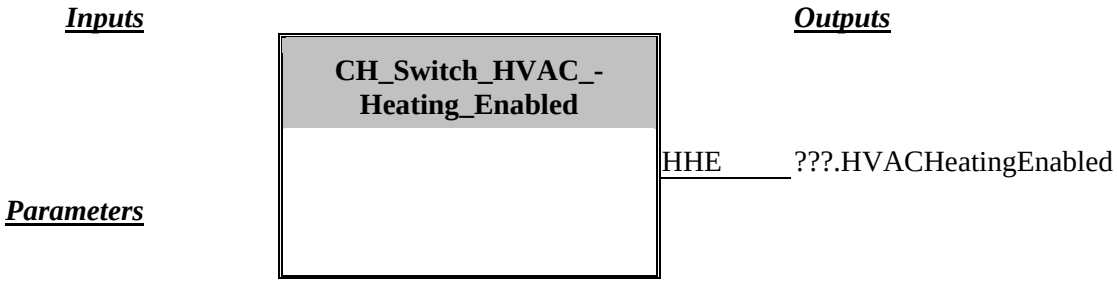
Index	FB Datapoint ID	Name	Subunit	Main CC	Additional CCs	Flags (i/o,x,v, …)
1	384.HMU	HVAC Mode	1	CC_HVAC_Mode		O L

- **Parameter table:**

Index	Identifier	Name	Type	Recommended default Value	Bit Offset
1	P1	PB action hvac	PART_PB_HVAC_Action	0b: Comfort/Economy	6

2.4 CH_Switch_HVAC_Heating_Enabled (Channel Code 0028h)

- **Name:** CH_Switch_HVAC_Heating_Enabled
- **ID:** 0028h
- **Classification:** sensor
- **Functional Block:**
  - ??? – FB Lock Sensor (See [01]).
- **Graphical representation:**



- **Description:**

  See FB Lock Sensor; the Output “Lock” of this FB shall be used to enable and disable the heating.

  On activation of interaction 1: the value “Enable” shall be sent.

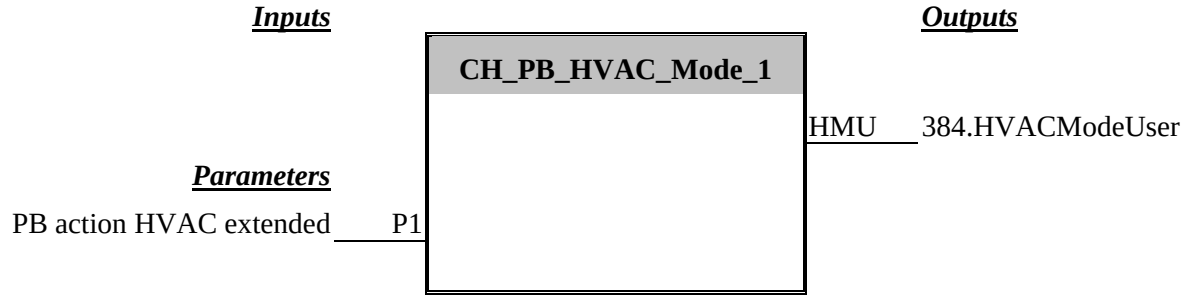
  On deactivation of interaction 1: the value “Disable” shall be sent.

- **Datapoint list:**

Index	FB Datapoint ID	Name	Subunit	Main CC	Additional CCs	Flags (i/o,x,v, …)
1	401/OO	Heating Enabled	1	CC_Heating_Enabled	CC_Logical	O L

2.5 CH_PB_HVAC_Mode_1 (Channel Code 002Eh)

- **Name:** CH_PB_HVAC_Mode_1
- **ID:** 002Eh
- **Classification:** sensor
- **Functional Block:**
  - 384 – User HVAC Room Settings (See [04])
- **Graphical representation:**



- **Description**

  On activation of interaction 1 the value1 corresponding to the parameter PB_Action_HVAC_Extended shall be transmitted on the Output HMU.

  On deactivation of interaction 1 the value2 corresponding to the parameter PB_Action_HVAC_Extended shall be transmitted on the Output HMU.

  If the value is nothing, no datagram shall be sent on the bus.

- **Datapoint list**

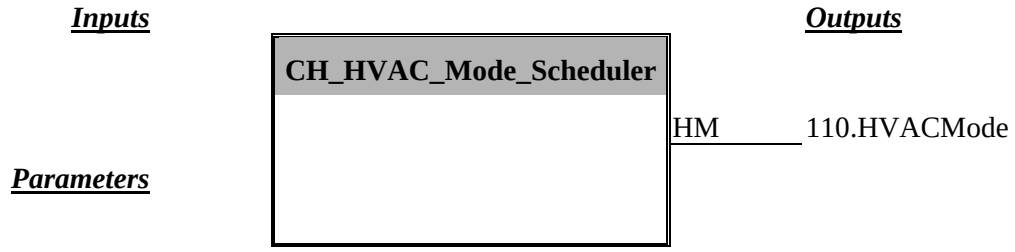
Index	FB Datapoint ID	Name	Sub-unit	Main CC	Additional CCs	Flags (i/o,x,v…..)
1	384.HMU	HVAC Mode User	1	CC_HVAC_Mode		O L

- **Parameter table**

Index	Identifier	Name	Type	Recommended default Value	Bit offset
1	P1	PB action HVAC extended	PART_PB_HVAC_-Action_Extended	000b : Comfort/Economy	5

2.6 CH_HVAC_Mode_Scheduler (Channel Code 0207h)

- **Name:** CH_HVAC_Mode_Scheduler
- **ID:** 0207h
- **Classification:** sensor
- **Functional Block:**
    - 110 - FB HVAC Mode Scheduler (HVACS) (See [07]).
- **Graphical representation:**



- **Description:**

  The HVAC_Mode_Scheduler shall providi the HVAC Mode according to a scheduling program.

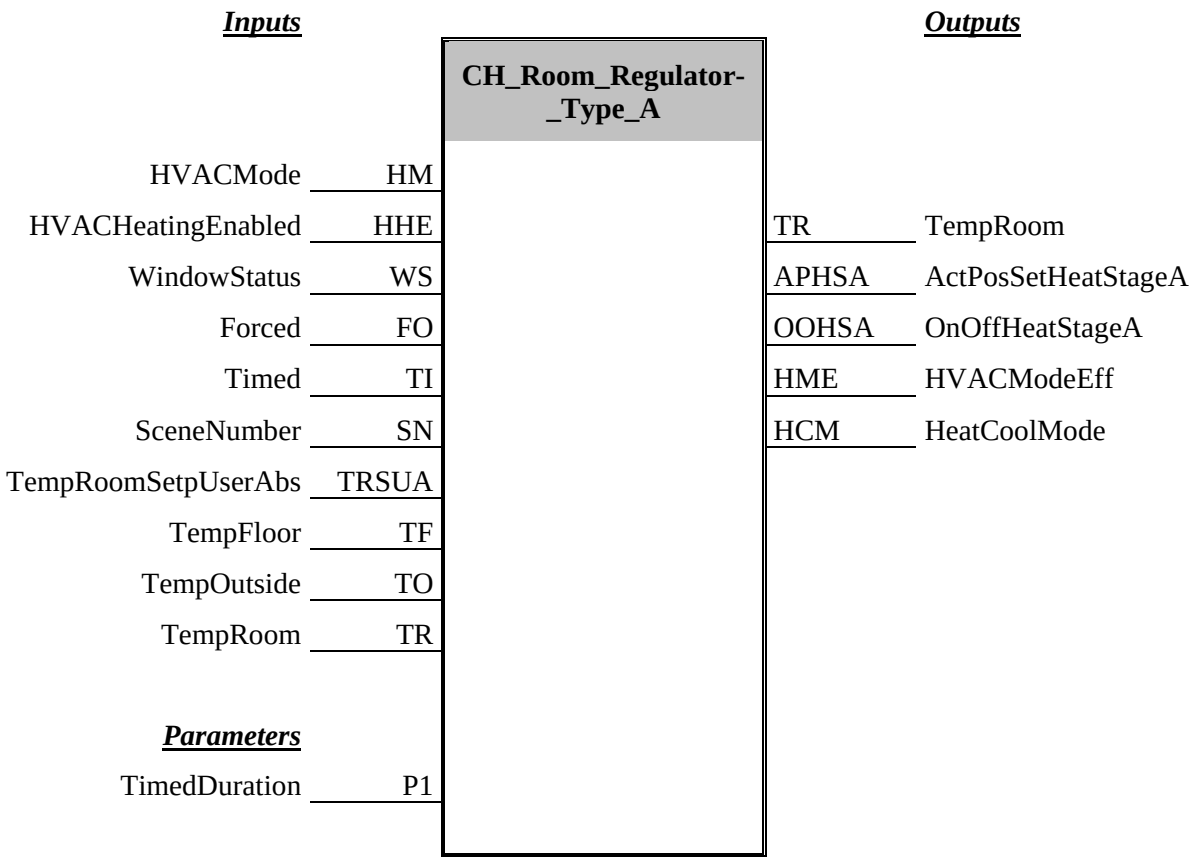
- **Datapoint list:**

Index	FB Datapoint ID	Name	Subunit	Main CC	Additional CCs	Flags (i/o,x,v, …)
0	110.HVACMode	HVAC_Mode	1	CC_HVAC_Mode		OL

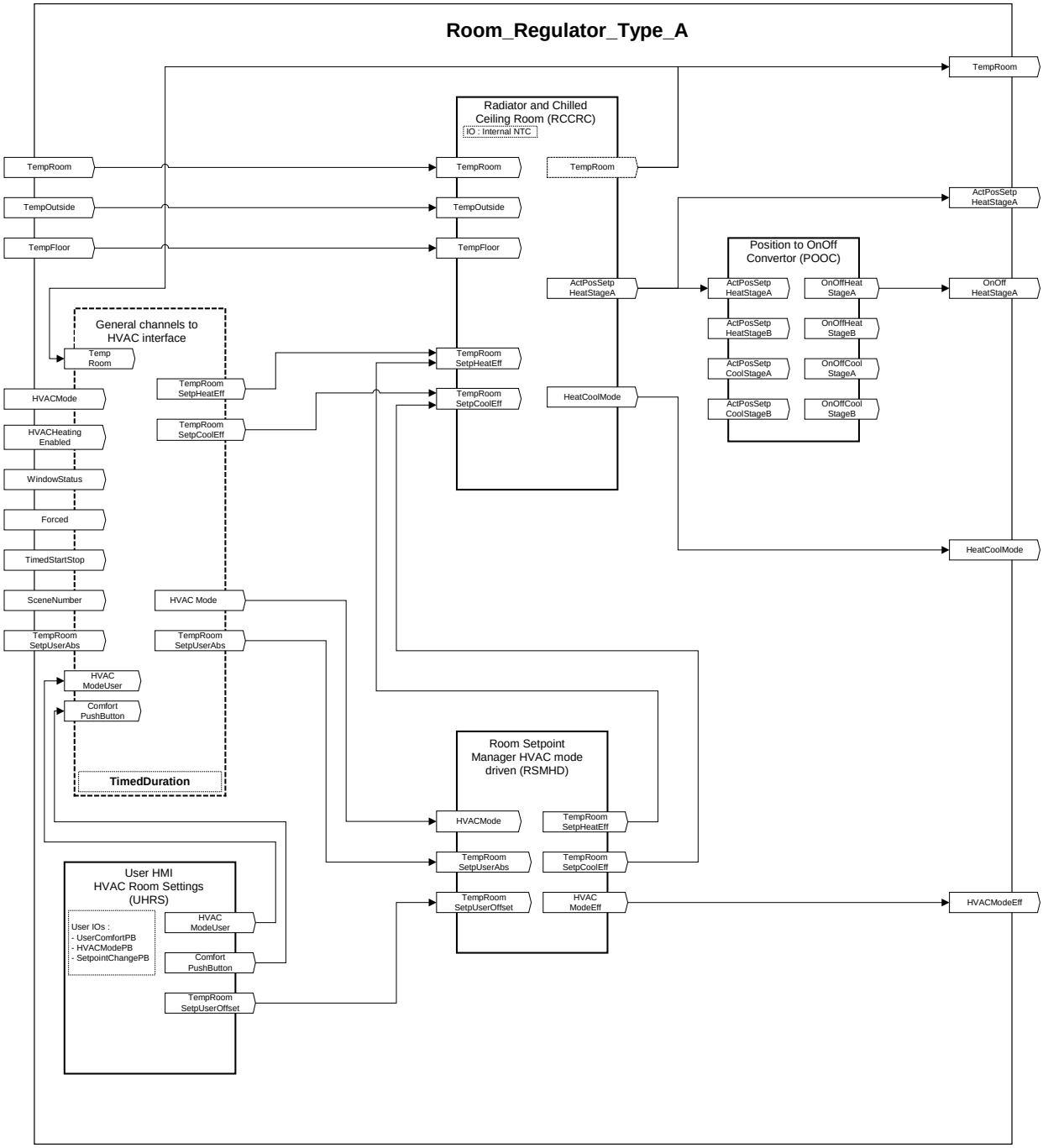
2.7 CH_Room_Regulator_Type_A (Channel Code 0208h)

- **Name:** CH_Room_Regulator_Type_A
- **ID:** 0208h
- **Classification:** Functional Module
- **Functional Block:**
    - 257 - Radiator and Chilled Ceiling Room Control (RCCRC) (See [09])
    - 100 - Room Setpoint Manager HVAC Mode Driven (RSMHD) (See [06])
    - 384 - User HVAC Room Settings (UHRS) (See [04])
    - xxx - FB_Position_to_On_Off_Converter

- **Graphical representation:**



- **Description:**



The functionality is based on existing Functional Blocks (UHRS, RSMHD, POOC and RCCRC) and an interface with general purpose channel.

The interface with general purpose channels (timed, forced, scene functions) as Inputs is described as a “general channel to HVAC interface” just hereafter.

General channel to HVAC interface

This functionality will generate 4 internal values:

HVACMode	HM	HVAC mode	20.102 DPT_HVAC_Mode
TempRoomSetpHeatEff	TRSHE	Absolute value of the heat effective setpoint	9.001 DPT_Value_Temp
TempRoomSetpCoolEff	TRSCE	Absolute value of the cool effective setpoint	9.001 DPT_Value_Temp
TempRoomSetpUserAbs	TRSUA	Absolute value of the basic setpoint	9.001 DPT_Value_Temp

Depending on value received on input Datapoints of the channels:

HVACMode	HM	Command to set the current HVAC_Mode	20.102 DPT_HVAC_Mode
HVACHeatingEnabled	HHE	To force the output to the “BuildingProtection” mode	1.003 DPT_Enable
WindowStatus	WS	To force the output to the “BuildingProtection” mode	1.019 DPT_Window_Door
Forced	FO	to force the output to “Comfort” or “BuildingProtection”	2.002 DPT_Bool_Control
TimedStartStop	TSS	to switch the “timed HVAC mode” during the TimedDuration delay	1.010 DPT_Start
SceneNumber	SN	To activate/learn the scene	18.001 DPT_SceneControl
TempRoomSetpUserAbs	TRSUA	Absolute value of the basic setpoint	9.001 DPT_Value_Temp
TempRoom	TR	Room temperature	9.001 DPT_Value_Temp

And internal Datapoints coming from UHRS functionnality

HVACModeUser	HMU	HVAC mode user	20.102 DPT_HVAC_Mode
ComfortPushButton	CPB	Comfort push button activated by the user	1.017 DPT_Trigger

- If the value 0 (Disabled) is received on the HVAC Heating Enabled Input, the interface shall send the “BuildingProtection” mode on the HVACMode Output. This Input can be used as an alternative of the Window status Input as the logic is inverted between the two Inputs.
- If the window status is triggered then the block shall send the “BuildingProtection” on the HVAC Mode Output.
- If start is received on the Timed input Datapoint then the block shall send the HVAC Mode Comfort or BuildingProtection (according to the current HVAC Mode) on the HVAC Mode Output during a period defined by the TimedDuration (P1) Parameter.
- If the SceneNumber is received, according to the bit Learn/Activate, the interface shall save or render the current HVAC Mode or room temperature setpoint of the FB.
- In the forced state (received value 1x on the Datapoint Forced)
  - If value is TRUE then the output is set to the value “BuildingProtection”.
  - If value is FALSE then the output is set with the value “Comfort”.

- If the interface is not in a special state (forced, timed, window status….) then the last mode received on the HVACMode Input shall be sent on the HVACMode Output.
- The interface can also receive a temperature value, which shall set the value of the basic setpoint related to the “Comfort” mode.

Priority description

Highest: Stop, Forced, Window Status

Lowest: TimedStartStop, HVACMode, SceneNumber

- **Datapoint list**

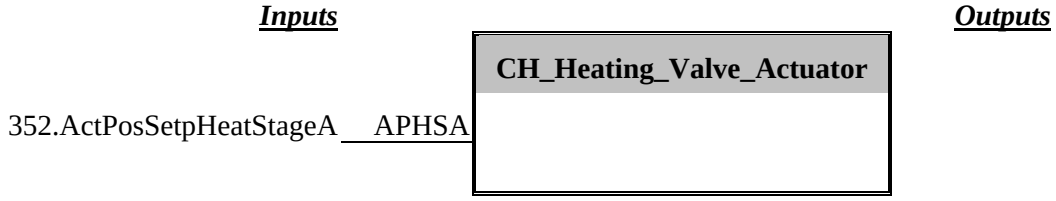
Index	FB Datapoint ID	Name	Sub-Unit	Main CC	Additional CCs	Flags (i/o,x,v…..)
1	HM	HVACMode	1	CC_HVAC_Mode		I
2	HHE	HVACHeatingEnabled	1	CC_Heating_Enabled		I
3	WS	WindowStatus	1	CC_Window_Status	CC_Switch_OnOff	I
4	FO	Forced	1	CC_Forced		I
5	TSS	TimedStartStop	1	CC_Timer_StartStop		I
6	SN	SceneNumber	1	CC_Scene_Numbered		I
7	TRSUA	TempRoomSetpUserAbs	1	CC_TRSUA		I
8	TF	TempFloor	1	CC_TF		I
9	TO	TempOutside	1	CC_TO		I
10	TR	TempRoom	1	CC_TR		I
11	TR	TempRoom	1	CC_TR		O
12	APSHSA	ActPosSetpHeatStageA	1	CC_Scaling_Value		OL
13	OOHSA	OnOffHeatStageA	1	CC_Switch_OnOff		O
14	HME	HvacModeEff	1	CC_HVAC_Mode_-Status		O
15	HCM	HeatCoolMode	1	CC_HeatCool_Status		O

- **Parameter table**

Index	Identifier	Name	Type	Recommended default Value	Bit-Offset
1	P1	TimedDuration	PART_Time_Delay	1 hour	0

2.8 CH_Heating_Valve_Actuator (Channel Code 0501h)

- **Name:** CH_Heating_Valve_Actuator
- **ID:** 0501h
- **Classification:** actuator
- **Functional Block:**
- **352 - HVAC Valve Actuator (HVA) (See [05]).**
- **Graphical representation:**



- **Description:**

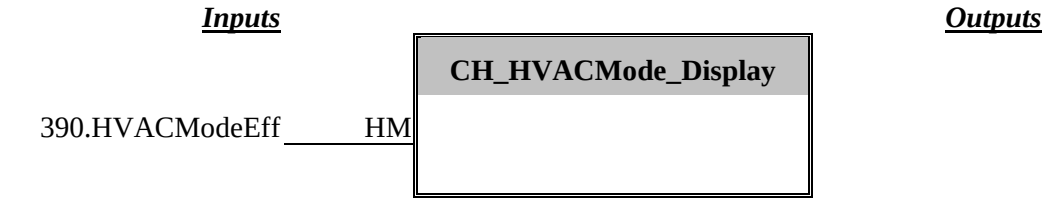
  See Functional Block HVAC Valve Actuator (HVA).

- **Datapoint list:**

Index	FB Datapoint ID	Name	Subunit	Main CC	Additional CCs	Flags (i/o,x,v, …)
1	352.ActPosSetpHeatStageA	APHSA	1	CC_Scaling_Value		I L

2.9 CH_HVACMode_Display (Channel Code 0502h)

- **Name:** CH_HVACMode_Display
- **ID:** 0502h
- **Classification:** actuator
- **Functional Block:**
  - 390 – User HVAC Display (UHD) (See [04]).
- **Graphical representation:**



- **Description:**

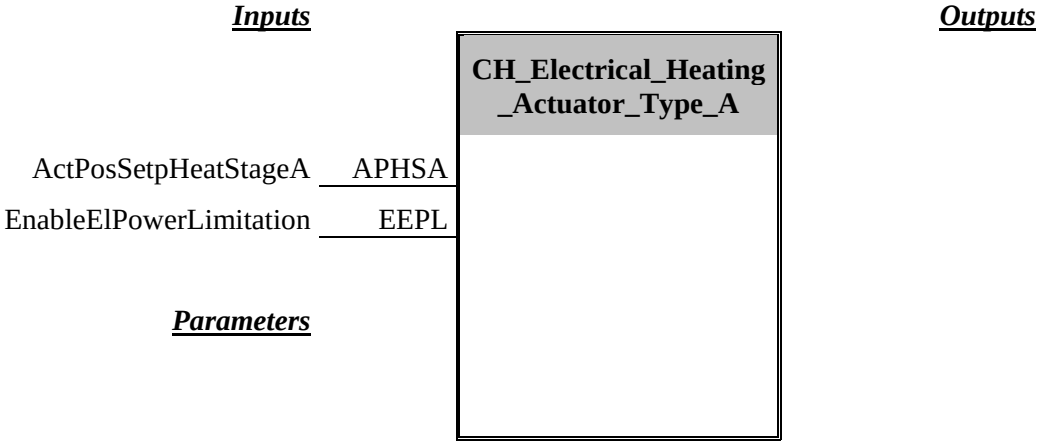
  See Functional Block User HVAC Display (UHDA)

- **Datapoint list**

Index	FB Datapoint ID	Name	Subunit	Main CC	Additional CCs	Flags (i/o,x,v, …)
1	390.HVACModeEff	HVACMode	1	CC_HVAC_Mode_Status		I L

2.10 CH_Electrical_Heating_Actuator_Type_A (Channel Code 0503h)

- **Name:** CH_Electrical_Heating_Actuator_Type_A
- **ID:** 0503h
- **Classification:** Actuator
- **Functional Block:**
  - 369 – Electrical Heating Element Actuator (EHEA) (See [05])
  - 352 – HVAC Valve Actuator (HVA) (See [05])
- **Graphical representation:**



- **Description**

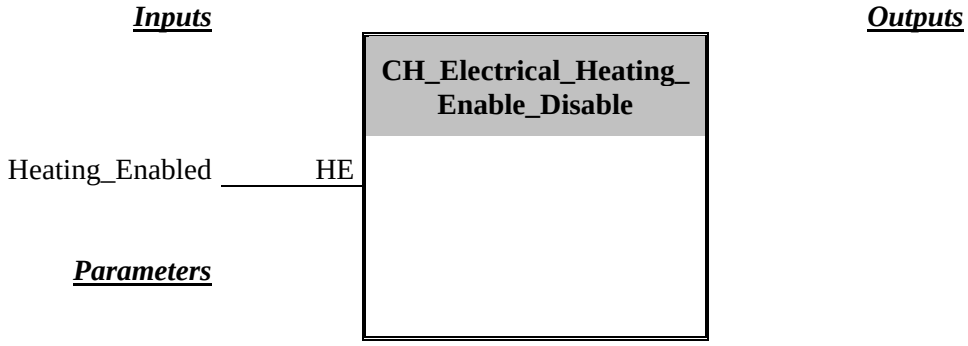
The Input EnableElPowerLimitation shall be mapped to the Functional Block Input DisableElPowerLim. The Electrical Power Limitation is defined with the value 0 %.

- **Datapoint list**

Index	FB Datapoint ID	Name	Sub-Unit	Main CC	Additional CCs	Flags (i/o,x,v…)
1	369 - APHSA	ActPosSetpHeatStageA	1	CC_Scaling_Value		IL
2	369 - EEPL	EnableElPowerLimitation	1	CC_Logical		I

2.11 CH_Electrical_Heating_Enable_Disable (Channel Code 0504h)

- **Name:** CH_Electrical_Heating_Enable_Disable
- **ID:** 0504h
- **Classification:** Actuator
- **Functional Block:**
  - 369 – Electrical Heating Element Actuator (EHEA)
  - 352 – HVAC Valve Actuator (HVA)
- **Graphical representation:**



- **Description**

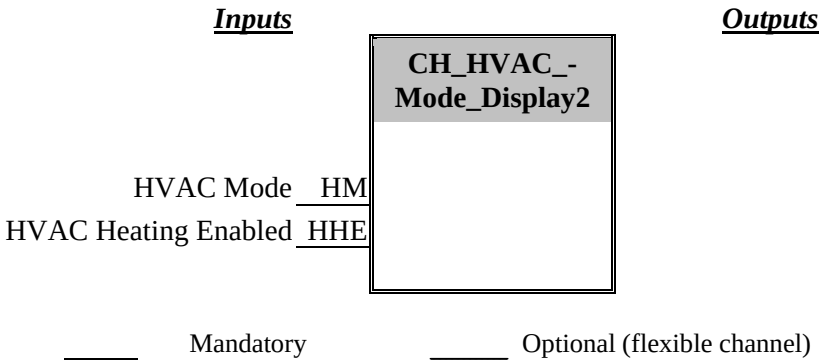
This HE input Datapoint allows (with the value Enable) or disables (with the value Disable) the heating.

- **Datapoint list**

Index	FB Datapoint ID	Name	Sub-Unit	Main CC	Additional CCs	Flags (i/o,x,v…)
1	HE	Heating_Enabled	1	CC_Heating_Enabled	CC_Logical	IL

2.12 CH_HVAC_Mode_Display2

- **Name:** CH_HVAC_Mode_Display2
- **ID:** 0505h
- **Classification:** Actuator
- **Functional Block:**
  - 295 - KNX to Fil Pilote Converter (KFP)
- **Graphical representation:**



- **Description:**

See functional block KNX to Fil Pilote Converter (KFP).

In France, concerning electrical heating, a specific protocol is used to drive electrical heating element. This protocol is called “fil pilote”. It uses different power signal to define different heating modes: Comfort, Comfort-1, Comfort-2, Economy, Building protection, Stop heating.

There is a correspondence between HVAC Mode values and fil pilote signals.

Figure 2 gives the definition of signals for each heating mode.

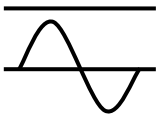
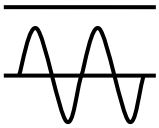
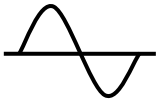
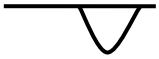
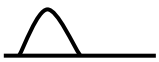
Received commands	Signals		Obtained results
Absence of current		comfort	The obtained temperature is the one set at the thermostat.
Alternating Absence of current: 4'57" Phase 230 V: 3"		comfort -1°C	The obtained temperature is the one set at the thermostat – 1°C.
Alternating Absence of current : 4'53" Phase 230 V: 7"		comfort -2°C	The obtained temperature is the one set at the thermostat – 2°C.
Full phase 230 V		Economy mode	Economy temperature.
Half negative phase - 115 V		Frost protection	Temperature without frost of about 7°C. This can be used for load shedding.
Half positive phase +115 V		Stop	Immediate stop of the appliance.

Figure 2 – Definition of signals for "fil pilote"

There may exist KNX devices that have an Output "fil pilote". These devices receive HVAC mode information and generate a corresponding signal on their "fil pilote" hardware output.

For example the correspondence between the two input Datapoints and the hardwired "fil pilote" output can be done as in Table 1.

Table 1 – Mapping between HM, HHE and the output "fil pilote" (example)

HVAC Mode	HVAC Enable	Fil pilote command
Comfort	Enable	Comfort
Economy	Enable	Economy
Building Prot	Enable	Building Prot
Any	Disable	Stop

- **Datapoint list**

Index	FB / Datapoint ID	Name	Sub-unit	Main CC	Additional CCs	Flags (i/o,x,v…..)	O/M DPT
1	KFP/HM	HVAC Mode	1	CC_HVAC_Mode (31)		I	M 20.102
2	KFP/HHE	HVAC Heating Enable	1	CC_Heating_Enabled (33)		I	M 1.003

- **Parameter table**

No parameter